CRANFIELD UNIVERSITY

ANNIE MADDISON

# THE IMPACT OF CRITICAL SUCCESS FACTORS ON GOVERNMENT IT PROJECTS: A CASE STUDY OF THE DEFENCE INFORMATION INFRASTRUCTURE PROGRAMME

DEFENCE ACADEMY - COLLEGE OF MANAGEMENT AND TECHNOLOGY

PhD Thesis

CRANFIELD UNIVERSITY

DEFENCE ACADEMY - COLLEGE OF MANAGEMENT AND TECHNOLOGY

DEPARTMENT OF MANAGEMENT AND SECURITY

PhD DISSERTATION

Academic Year 2010-2011

Annie Maddison

**THE IMPACT OF CRITICAL SUCCESS FACTORS ON GOVERNMENT IT PROJECTS: A CASE STUDY OF THE DEFENCE INFORMATION INFRASTRUCTURE PROGRAMME**

Supervisor: Professor Ron Matthews

May 2011

**Word Count: 83,262**

© Cranfield University 2011. All rights reserved. No part of this publication may be reproduced without the written permission of the copyright owner.

***For Jack Maddison***
***1925-2010***

# ABSTRACT

Government IT mega-projects often end in costly failure, despite attempts to identify those Critical Success Factors (CSFs) that lead to project success. This raises questions about whether these CSFs are understood, applied and, if so, whether they are having an impact on the management and subsequent performance of government IT mega-projects.

The literature review compared CSFs from the generic and IT project management literature to find that they are broadly similar. CSF frameworks were then assessed to find a measure of the impact of CSFs and a measure of 'performance' was also defined. CSFs were then identified from fifteen reports on IT and information infrastructure projects and verified against the CSFs identified in the literature to produce a synthesised list of twelve CSFs. The understanding, application and impact of these CSFs were examined through a case study of the MoD's Defence Information Infrastructure (DII) Programme, a government IT mega-project to provide a more integrated and coherent Defence infrastructure.

It was evident that the CSFs were recognised and they appeared to have been understood within the DII Programme. However, the extent to which they have been applied is variable with differing effect. Therefore, the impact that CSFs have had on the management of the DII Programme is debatable. There were areas where the project could have been managed better and, therefore, could be performing better, suggesting that the overall success of the project is potentially at risk.

The overarching conclusion of this study is that, in terms of the management of the DII Programme, the impact of the identified CSFs is variable and, where they are not applied, there is an adverse effect on its performance, suggesting a causal relationship. More generally, not applying generic CSFs to project management is likely to lead to failure, but is unlikely to assure success. Unique projects operating in highly specific and complex contexts require more contingent solutions. As a result of these conclusions, further case studies are suggested, along with further study into government and MoD IT project management and the management of trust in contractual relationships.

**CONTENTS**

CHAPTER THREE
*Research Methodology*



CHAPTER FOUR
*Lessons Learned: Identifying the Critical Success Factors*

CHAPTER FIVE

*Defence Information Infrastructure Programme: Context, Setting and Process*



CHAPTER SIX

*Defence Information Infrastructure Programme: Impact of Identified CSFs*

CHAPTER SEVEN
*Conclusions and Policy Implications*

# LIST OF FIGURES

# LIST OF TABLES

# GLOSSARY

| | |
|---|---|
| $2^{nd}$ PUS | Second Permanent Under Secretary for State |
| AOF | Acquisition Operating Framework |
| BAFO | Best and Final Offer |
| BCS | British Computer Society |
| C-NOMIS | National Offender Management Information System |
| CAT | Coding Analysis Toolkit |
| CBI | Confederation of British Industry |
| CCTA | Central Computer and Telecommunications Agency |
| CDM | Chief of Defence Materiel |
| CDP | Chief of Defence Procurement |
| CDS | Chief of Defence Staff |
| CE | Chief Executive |
| CHOTS | Corporate Headquarters Office Technology System |
| CIMO | Context, Intervention, Mechanism, Outcome |
| CIO | Chief Information Officer |
| CIP | Combat Infrastructure Programme |
| CITU | Central IT Unit |
| CMPS | Centre for Management and Policy Studies |
| COM | Chief of Materiel |
| COO | Chief Operating Officer |
| COTS | Commercial-Off-the-Shelf |
| CPD | Continuing Professional Development |
| CRAMS | Case Record And Management System |
| CSA | Child Support Agency |
| CSF | Critical Success Factor |
| DARPA | Defence Advanced Research Projects Agency |
| DCA | Defence Cryptosecurity Authority |
| DCP | Defence Change Programme |
| DCSA | Defence Communications Services Agency |
| DB | Defence Board |
| DCDS | Deputy Chief of the Defence Staff |
| DE&S | Defence Equipment and Support |
| DEC | Director Equipment Capability |
| DEC CCII | Director of Equipment Capability for Command, Control and Information Infrastructure |
| DEE | Department of Education and Employment |
| DEFRA | Department for Environment, Food and Rural Affairs |
| DEL | Defence Expenditure Limits |
| DfES | Department for Education and Skills |
| DFN | Defence Fixed Network |
| DFTS | Defence Fixed Telecommunications Network |
| DG | Director General |
| DG Info | Director General Information |
| DII | Defence Information Infrastructure |
| DII(F) | Defence Information Infrastructure (Future) |
| DIS | Defence Industrial Strategy |

| | |
|---|---|
| D(IS) | Director Information Superiority |
| DLO | Defence Logistics Organisation |
| DLOD | Defence Lines of Development |
| DMB | Defence Management Board |
| DMF | Defence Modernisation Fund |
| DNS | Domain Name Systems |
| DP | Delivery Provider |
| DPA | Defence Procurement Agency |
| DRUMM | Delivering the Requirement for Unit Materiel and Management |
| DSS | Department of Social Security |
| DTS | Defence Technology Strategy |
| DSD | Defence Strategic Direction |
| DSMS | Defence Stores Management Solution |
| DSTL | Defence Science and Technology Laboratories |
| DTI | Department of Trade and Industry |
| DTS | Defence Technology Strategy |
| DVLA | Driver and Vehicle Licensing Agency |
| DWP | Department of Work and Pensions |
| EC | Equipment Capability |
| ECC | Equipment Capability Customer |
| EDRMS | Electronic Document and Records Management System |
| EP | Equipment Plan |
| EPSRC | Engineering and Physical Sciences Research Council |
| FoI | Freedom of Information |
| FSM | Formal Systems Model |
| FTE | Full Time Equivalent |
| FY | Financial Year |
| GDP | Gross Domestic Product |
| GE | General Electric |
| GPS | Government Procurement Services |
| HISS | Hospital Information Support System |
| HOME | Head Office Modern Environment |
| HP | Hewlett Packard |
| HQ | Headquarters |
| HRMS | Human Resource Management System |
| IAB | Investment Appraisal Board |
| IAGC | Information Age Government Champions |
| ICT | Information and Communications Technologies |
| IEE | Institute of Electrical Engineers |
| IoD | Institute of Directors |
| IP | Internet Protocol |
| IPT | Integrated Project Team |
| IPTL | Integrated Project Team Leader |
| IS | Information System |
| ISS | Information Systems and Services |
| IT | Information Technology |
| ITIL | Information Technology Infrastructure Library |
| ITMRA | Information Technology Management Reform Act |
| ITV | In-Transit Visibility |
| JAMES | Joint Asset Management and Equipment Support |

| | |
|---|---|
| JOCS | Joint Operations Command System |
| JPA | Joint Personnel Administration |
| JPB | Joint Partnering Board |
| JSI | Joint Statement of Intent |
| KPI | Key Performance Indicator |
| MBA | Masters in Business Administration |
| MJDI | Management of the Joint Deployed Inventory |
| MMiT | Management of Materiel in Transit |
| MoD | Ministry of Defence |
| MODIS | Ministry of Defence Information Strategy |
| MSP | Military Service Provider |
| NAO | National Audit Office |
| NEC | Network Enabled Capability |
| NGO | Non-Governmental Organisation |
| NHS | National Health Service |
| NIRS2 | National Insurance Recording System 2 |
| NMCI | Navy Marine Corps Intranet |
| NPM | New Public Management |
| NPSISS | National Probation Service: Information Systems Strategy |
| OECD | Organisation for Economic Co-Operation and Development |
| OeE | Office of the e-Envoy |
| OGC | Office of Government Commerce |
| OGD | Other Government Departments |
| Opstrat | Operational Strategy System |
| PAC | Public Accounts Committee |
| PC | Personal Computer |
| PCT | Project Contingency Theory |
| PFI | Private Finance Initiative |
| PIR | Post-Implementation Review |
| PJHQ | Permanent Joint Headquarters |
| PMBOK | Project Management Body of Knowledge |
| PMDU | Prime Minister’s Delivery Unit |
| PMI | Project Management Institute |
| POST | Parliamentary Office of Science and Technology |
| PPM | Project Profile Model |
| PPP | Public Private Partnership |
| PRINCE2 | Projects in Controlled Environments 2 |
| PS | Permanent Secretary |
| PSRCP | Public Safety Radio Communications Project |
| PUS | Permanent Under Secretary |
| R&D | Research and Development |
| RAEng | Royal Academy of Engineering |
| RAF | Royal Air Force |
| RISP | Regional Information Systems Plan |
| RN | Royal Navy |
| RNCSS | Royal Navy Command Support System |
| ROI | Return On Investment |
| SA | Smart Acquisition |
| SDLC | Systems Development Life Cycle |
| SDR | Strategic Defence Review |

| | |
|---|---|
| SDSR | Strategic Defence and Security Review |
| SFIA | Skills for the Information Age |
| SME | Small and Medium Enterprises |
| SPI | Smart Procurement Initiative |
| SPRITE | Successful Projects in an IT Environment |
| SRD | Service Requirements Document |
| SRIE | Senior Responsible Industry Executive |
| SRO | Senior Responsible Owner/Officer |
| STP | Short Term Plan |
| TEC | Training and Enterprise Council |
| TLB | Top Level Budget Holder |
| TLCM | Through Life Capability Management |
| Total DEL | Total Departmental Expenditure Limit |
| TUPE | Transfer of Undertakings (Protection of Employment) |
| UAD | User Access Device |
| UOR | Urgent Operational Requirement |
| URD | User Requirement Document |
| VCDS | Vice Chief of the Defence Staff |
| VfM | Value for Money |
| WAN | Wide Area Network |
| WSLC | Work Systems Life Cycle |

# Chapter One
# Finding the Key to Success:
# Major IT Projects and Programmes in the UK Public Sector

## 1.1. IT Promise; IT Failure

The public sector in the UK has used Information Technology (IT) since it first appeared, seeing it as a means of delivering more efficient services and so relieving the strain on the public purse.[1] This has led to increasingly large investments in major IT projects and programmes, which are initiated with a fanfare but all too often end in failure. The Government is reported to waste more money on IT than on any other area of public sector working.[2] There have been many attempts by government, academia and other reputable bodies to break this cycle by trying to identify those factors that project managers need to address in order to avoid failure and ensure successful delivery. Despite these efforts, the failure rate remains high with only 30% of public sector IT projects delivered successfully in 2008.[3] Given that the relevant success factors have been correctly identified, this suggests that they are not being given the necessary attention, raising questions about whether work in this area has had any beneficial effect to date on the outcome of major IT projects or programmes.

The purpose of this chapter is, therefore, to set the scene for this study into the impact of Critical Success Factors (CSFs) on IT project management in the public sector. It begins by expanding on this opening discussion, assessing the extent of government investment in IT against the extent of project failure. Government IT projects tend to be large, complex and expensive. Very often, they are termed ‘mega-projects’, referring to their size and complexity, or programmes, meaning a number of interrelated projects. For the sake of conciseness, the term ‘project’ will be used throughout this thesis, although it is recognised that this may not always be entirely precise or correct. According to the Office of Government Commerce (OGC), these projects “seek to implement technology on a scale without parallel in the commercial sector”.[4] Tackling projects of this magnitude brings specific problems and increases the risk of failure. These problems and risks have been identified in a number of critical reports, which are discussed in this chapter along with some of the specific contextual issues that impact on government IT projects. Government context, complex mega-projects and project failure are then drawn together into a discussion about the Ministry of Defence (MoD) and its Defence Information Infrastructure (DII) programme, which promises to improve the business processes of the department as well as the battlefield capability of the Armed Forces. This is a complex programme being managed within the government context. It spans the periods of the reports under investigation and, therefore, some of the highlighted CSFs should have been incorporated into its management processes. As such, it provides an ideal case study for an examination of how CSFs are being adopted at the operational level in government IT project management and whether this will assure a return on the MoD's investment in DII.

The large amount of money being spent on the MoD's infrastructure project reflects the increasingly significant amounts that have been invested in IT in both the public and private sectors. In the mid 1960s, North American companies were spending less than 5% of their capital expenditure on IT.[5] With the arrival of Personal Computers (PCs), this percentage reached 50% by the end of the 1990s.[6] Despite talk of a recession in IT in 2002, the total amount spent by public and private sector organisations in the UK on all aspects of IT (hardware, software, services and staff) was cited as £63 billion, the highest figure yet recorded and representing an average of £2,546 per annum for every UK employee.[7] By 2004, total spending reached £73 billion.[8] Overall, UK IT spending was expected to fall by 1.8 percent in 2009, largely due to the financial crisis beginning in 2007.[9] However, at the same time, expenditure on IT in the public sector was expected to rise by 2.8 percent.[10]

This increase stemmed largely from the 2002 decision to make the largest ever programme of peacetime investment in the public services, increasing IT spending by 25% to reach £12.4 billion over the financial year 2003-04, equivalent to 1.1% of Gross Domestic Product (GDP).[11] This spending was concentrated in three areas. There was an 84% rise in spending on healthcare IT to finance the NHS IT infrastructure, the National

Programme for IT.[12] This is arguably the world's largest single IT project, with an initial proposed budget of £12 billion between 2003 and 2008 (from barely a billion in 2002).[13] A 25% rise in spending was allocated to central government IT with a new criminal justice network, as well as big new projects in the Inland Revenue, Customs and Excise and the Department of Trade and Industry.[14] Finally, there was a 17% rise in spending on Defence IT with investments in two big projects: DII and a secure battlefield communications system.[15] The stated aim was a £5 billion, ten-year overhaul of Defence IT systems.[16]

In 2010, the Cabinet Office reported that spending on public sector IT projects in the UK was running at £16 billion per year, making government the biggest and probably the most experienced computer user in the country.[17] However, that year's Budget saw the Chancellor announcing a £500 million cut in IT programmes by 2012-13 along with a 50% reduction in the use of third party consultants within departments.[18] The Coalition Government, elected two months later, froze spending on all projects worth more than £1 million and placed 400 further projects under review.[19]

Whilst the steady rise in IT investment in both the public and private sectors may have stalled, the belief that spending on IT pays dividends in terms of increased productivity and profitability remains prevalent. In the private sector, IT is no longer simply a business tool, but is the means of delivering strategic value and competitive advantage.[20] In 2009, the average company was spending about 4-5% of its revenue on IT, not only to enhance efficiency but also as a strategy to support future growth.[21] One of the objectives of successive UK Governments has been to contain public expenditure by ensuring resources are used efficiently.[22] This is undoubtedly set to continue with IT seen as a critical means of providing this Value for Money (VfM). To this end, the 1999 *Modernising Government* White Paper made a commitment to 'Information Age Government' as part of the Labour Government's programme of renewal and reform, encouraging the use of new technology to 'meet the needs of citizens and business' and to ensure that the UK does not 'trail behind technological developments'.[23] Integral to this process was the establishment of a Government IT strategy, published as *E-*

*Government: a Strategic Framework for Public Services in the Information Age*.[24] IT was seen as the means of providing faster communications, a more open relationship with citizens, more efficient buying of goods and services, lower administrative costs and new, improved services.[25]

The scale of investment in IT and the expectation of resulting business benefit has placed great pressure on government IT procurement and project management. To date, many major projects at key government departments have ended in expensive and embarrassing failure, as documented in a series of reports by watchdog bodies such as the Public Accounts Committee (PAC) and the National Audit Office (NAO). The PAC published its report on *Improving the Delivery of Government IT Projects* in 1999.[26] It listed 25 projects, a number of which had experienced cost overruns, been delayed or abandoned, costing large sums of money and inconveniencing the public. Estimates vary year on year but it was thought that about 85% of all IT projects in the public sector were failing at this time.[27] Examples abound: the Passport Agency suffered severe implementation problems over the summer of 1999 due to poor testing before going live, costing £12.6 million;[28] the Home Office Immigration System was started in 1996 and abandoned in 2001, judged over-complex and out of touch with working practices, while costing £77 million;[29] the Swanick air traffic control centre was due to open in 1996 at a cost of £475 million and was finally completed in 2002, six years late, £180 million over budget and already obsolete;[30] Pathway, which was a benefit payment project to develop smartcards, collapsed after three years with a loss of £698 million;[31] and Libra, the system designed to automate the magistrate's courts and now running several years behind schedule, was described by the Chairman of the PAC as one of the worst IT projects he had ever seen.[32]

According to a survey by the trade magazine *Computing*, the catalogue of over-budget IT projects and cancelled contracts cost more than £1.5 billion between 1997 and 2003.[33] This represents a 50% increase since this survey was last carried out in 2001, but is based entirely on estimates.[34] Central Government does not keep figures on the cost of its problematic IT projects and has no intention of doing so.[35] The high failure rate and estimates of the amount of taxpayers' money being wasted have resulted in vociferous concern in both the trade and popular press alongside attempts to pinpoint the causes of the problem. Moores highlights the fact that "IT managers in large private sector organisations have sleepless nights thinking about £1 million projects and yet the Government believes it can succeed with £100 million initiatives".[36] According to Collins, Ministers and IT suppliers encourage one another to think big, to tackle ever-greater complexity and to deliver the results in the shortest possible timeframes.[37] Size and complexity is indeed a factor: more than a third of projects have budgets greater than £1 million and, of these, four percent are categorised as 'mega-projects' with budgets greater than £50 million.[38] The public sector is more likely to initiate mega-projects or programmes than the private sector, due to the scale and complexity of its operations.[39] However, with scale and complexity comes a heightened risk of failure. These projects are defined as "physical, very expensive, and public".[40] They attract a high level of public attention due to their inevitable impact on communities, environment and budgets.[41]

With the press highlighting concerns, the Government has not been complacent about the level of project failure. Indeed, the PAC began reporting on IT failure in government back in 1984, having noted "the dangers of general over-optimism about the benefits and time scales of computer projects".[42] Fifteen years later, the Government finally initiated a major review of failed IT projects, resulting in the so-called McCartney Report, *Successful IT: Modernising Government in Action*, published in 2000. This identified 10 areas where improvement was required in order to deliver successful results:

- Change management;
- Leadership and responsibility;
- Project management;
- Risk management;
- Modular and incremental development;
- Benefit realisation;
- Procurement and supplier relationships;
- Cross-cutting initiatives;

- People and skills; and
- Learning lessons.[43]

The 30 recommendations stemming from these areas were designed to improve performance and avoid expensive mistakes. They included initiatives such as the Gateway Review Process, a system of sequenced appraisals to ensure that IT projects are viable and remain on target, and the appointment of a Senior Responsible Owner (SRO) for each major project to ensure that it meets its objectives and delivers the projected benefits. However, the headline statement of this report was the idea of IT-enabled change:

> A change of approach is needed. Rather than think of IT projects, the public sector needs to think in terms of projects to change the way Government works, of which new IT is an important part.[44]

At the end of 2006, the NAO mirrored McCartney's key message with its *Delivering Successful IT-Enabled Business Change* report.[45] It highlights three key areas that impact on the delivery of successful programmes and projects: engagement by senior decision makers; understanding how to be an 'intelligent client'; and determining benefits at the outset, then actively managing them to ensure their delivery and optimisation.[46] From these areas stem nine key questions that Central Government departments are encouraged to ask before embarking on IT-enabled business change along with eight recommendations.

Between 2000 and 2006 when these two 'book end' reports were published, eight other major reports on public sector IT project failure also appeared, as shown at Table 1.1. Of these, four were published by government bodies and four by other reputable organisations. The Organisation for Economic Co-Operation and Development is an international development organisation helping governments tackle the economic, social and governance challenges of a globalised economy. Intellect represents software and IT organisations to government and the media, and provides a code of conduct for members.

**Table 1.1. Reports of Public Sector IT Project Failure, 2000-2006**

| Reporting Body | Title | Date |
|---|---|---|
| Cabinet Office | Successful IT: Modernising Government in Action (the McCartney Report) | 2000 |
| Organisation for Economic Co-Operation and Development (OECD) | The Hidden Threat to E-Government: Avoiding Large Government IT Failures | 2001 |
| Intellect | Getting IT Right for Government | 2002 |
| Office of Government Commerce (OGC) | Common Causes of Project Failure | 2002 |
| Intellect | IT Supplier Code of Practice | 2003 |
| Parliamentary Office of Science and Technology (POST) | Government IT Projects | 2003 |
| House of Commons, Work and Pensions Committee | Department of Work and Pensions Management of Information Technology Projects: Making IT Deliver for DWP Customers | 2004 |
| National Audit Office (NAO) | Improving IT Procurement | 2004 |
| Royal Academy of Engineering (RAEng) and the British Computer Society (BCS) | The Challenges of Complex IT Projects | 2004 |
| National Audit Office (NAO) | Delivering Successful IT-Enabled Business Change | 2006 |

**Source: Author**

The Royal Academy of Engineering (RAEng) brings together the UK's most eminent engineers from all disciplines to promote excellence in their engineering practice and the British Computer Society (BCS) is the Chartered Institute for IT, promoting the advancement of IT science and practice. All ten reports identify a range of factors that are deemed critical to success. In other words, the authors of these reports clearly believe that if project teams take these CSFs into account, then they can significantly increase the chances of a successful outcome.

First proffered by Daniel in the 1960s, success factors remain the best-known means of addressing the human and organisational aspects of projects.[47] However, it was Rockart in his seminal paper of 1979 who attempted a full definition of the term 'Critical Success Factors':

> …the limited number of areas in which results, if they are satisfactory, will ensure successful competitive performance for the organisation…
>
> …the few key areas where 'things must go right' for the business to flourish…
>
> …areas of activity that should receive constant and careful attention from management…

> …the areas in which good performance is necessary to ensure attainment of [organisational] goals.[48]

His suggestion that it is possible to identify a "limited number" or a "few key areas" has resulted in a significant number of studies in both the general project management and IT project management literature, which have sought out the lessons from projects to compare and contrast different sets of factors in an attempt to produce a definitive list.[49] However, to date, there has been no attempt to assess whether these CSFs have been noted and adopted by public sector IT project managers and, if so, whether they do, indeed, lead to "successful competitive performance for the organisation".[50]

Given this lack of assessment, the value of these reports and their CSFs is questionable. Indeed, CSFs are not without their critics and a number of issues have been raised about their validity, as will be discussed further in the literature review. One key problem is whether it is possible to identify CSFs that have general applicability across a range of different projects. Can the same approach be adopted, whatever the funding, procurement, development or implementation model for a project, with simply some fine tuning to reflect variety, scale and complexity?[51] Therefore, one of the problems with providing such a generic solution for IT project management in the public sector is its disparate nature and the fact that "government is different".[52]

## 1.2. "Government is Different"

In 2000, Patricia Hewitt, then Britain's e-Minister, observed that…

> If Jack Welch says that GE (General Electric) is going to become an e-business, it does, and pretty quickly. Government is different.[53]

What is it about the machinery of government that makes it difficult to redirect and change? What, specifically, makes government 'different'? This is partly answered by the organisational structure of the UK Government with its 20 departments, over 200 agencies and 400 local authorities.[54] In addition, local government offers more than 750 services and central government over 520, carrying out nearly 5 billion transactions a year for over 60 million citizens.[55] The sheer number of government organisations and operations results in cumbersome administrative structures and mechanisms. Government exists on many levels, each with its own laws, codes and policies, and with authority to create mission statements and organisational structures.[56] In addition, it is arranged vertically with an insular culture.[57] The resulting 'silos' create barriers to collaboration and deter inter-organisational co-operation, making it difficult to design or operate integrated or government-wide programmes.[58]

It could be argued that this dissipation of authority across multiple decision makers is no different to the experience of a global private sector organisation, the point of comparison in Patricia Hewitt's quote. To follow the GE example, it is made up of six distinct businesses, each with its own units producing a wide variety of goods and services ranging from jet engines to financial services. In 2005, the Chief Executive noted that "size with complexity breeds bureaucracy", indicating similar problems to government in terms of structure and mechanisms.[59] However, it is questionable whether GE operates on the same monolithic scale as government or faces the same levels of complexity and resulting bureaucracy. The differences between the private and public sectors are neatly summarised by Mercer, as shown at Table 1.2. The dominating force within the private sector organisation is economic whilst, according to Moore[60] and Frederickson[61], the overriding purpose of a public sector organisation is creating public value by meeting its mandate and fulfilling its mission. The imposition of political purpose is also distinct from the strategic management freedoms of private organisations.[62]

**Table 1.2. Public and Private Sectors Compared**

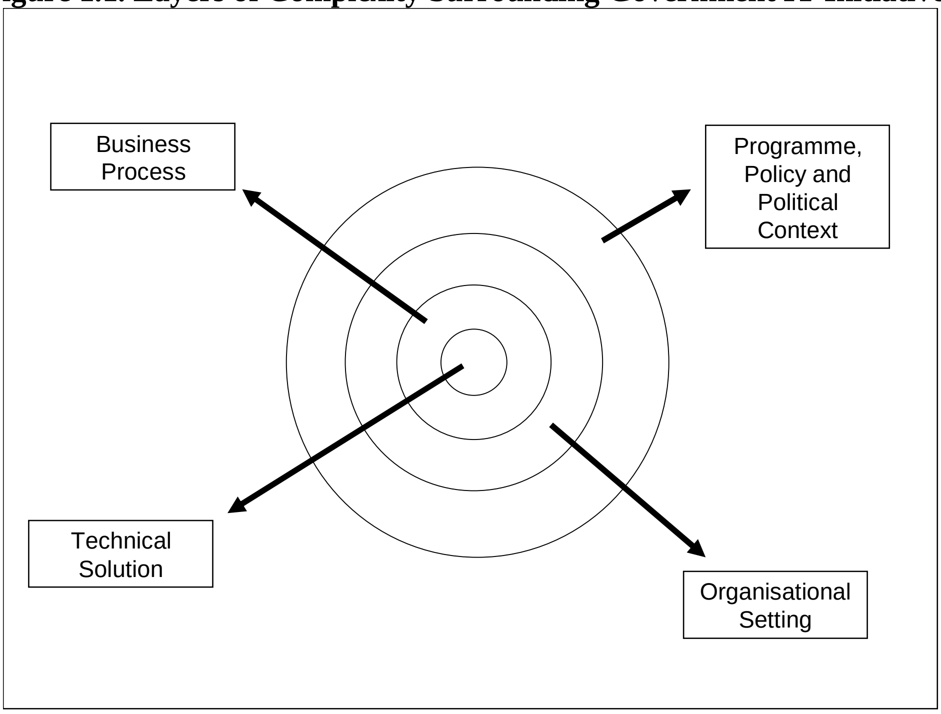
| Factors | Private | Public |
|---|---|---|
| Dominating Force | Economic | Politics |
| Decision Making | Centralised | Pluralist/Special interests |
| Mission, Goals, Objectives | Well defined, long term | Very broad term |
| Selection Criteria for Evaluation of Alternatives | Specific economic measures (Return On Investment (ROI), profits, market share etc.) | Ambiguous (public interest, political efficiency, cost benefit) |
| Chain of Command | Distinct | Not clear |
| Time Horizon for Top-Level Managers | Lengthy | Short Term |

**Source: Mercer, J.L., *Strategic Planning for Public Managers*, (New York, Questia, 1991).**

The bureaucracy, mandate and political purpose of government inevitably impact on any technical solution that the Government chooses to implement. Despite this and somewhat ironically, there is no central mandatory control of government IT. The only constraints are the Cabinet Office creating strategy and the Treasury providing guidance on procurement.[63] This is due in part to the federated nature of government, as discussed above, with its different parts making their own decisions.[64] This means that a universal approach to an initiative can only be achieved through persuasion and by attempting to build a common sense of purpose.[65]

Figure 1.1 shows that, as in the private sector, business processes and the organisational setting inevitably impact on any technical solution adopted by government. However, more critical than the effect of these processes and the setting are the laws, civil service rules and a variety of other procedures or court decisions that also restrict action.[66]

**Figure 1.1. Layers of Complexity Surrounding Government IT Initiatives**




**Source: Center for Technology in Government, *Making Smart IT Choices: Understanding Value and Risk in Government IT Investments.* www.ctg.albany.edu/publications/guides/martit2?chapter=2&PrintVersion+1, downloaded on 6th June 2003.**

Described as the 'Programme, Policy and Political Context', it is this additional layer that is unique to the public sector and makes it different from the private sector. The political party in power is elected on the basis of proposed services, opportunities and projects designed to meet social needs in accordance with the political stance of that party. Stemming from these imperatives are policies that translate the "political priorities and principles into courses of action to deliver designed changes".[67] Thus, policymaking is the pivotal element in this additional layer of complexity, ensuring the transition from political vision to programmes and, therefore, implementation.

It is this overarching political framework that makes public sector organisations very different from those in the private sector. It is based on the 'short-termism' dictated by the maximum five-year period of a government and is subject to a range of checks and balances unique to government. It is this 'Programme, Policy and Political Context' that drives the machinery of government, ultimately controlling the Organisational Setting, Business Processes and any proposed Technical Solution. It is this that makes government truly different.

Given this, IT projects are initiated in a context that consists of disparate groups working within layers of complexity that are unique to government. There is an expectation that such projects will adopt the CSFs proposed by a series of high profile reports. As the OGC states, "there is no shortage of best practice within the Government IT profession and the IT industry".[68] However, there is no mechanism for enforcing adoption of that best practice. In addition, it is questionable whether generic CSFs can provide the means of tackling failure in such a disparate and complex environment. Therefore, in order to examine whether the identified CSFs have been adopted and, if so, what value they bring in terms of performance, a public sector case study was sought. The MoD's Defence Information Infrastructure (DII) Programme was identified. Initiated in 2001, it is a complex IT mega-project being delivered into a complex context.

The MoD's 2007 Autumn Performance Report argued that the Armed Forces had been "consistently operating above the level of concurrent operations" that they are currently resourced and structured to deliver.[69] In 2010, along with the *Strategic Defence and Security Review* (SDSR), the Prime Minister, David Cameron, announced an 8% fall in the MoD Defence budget by 2015.[70] In the spirit of the Government IT Strategy that was prevalent at the inception of DII and which was discussed earlier, the infrastructure programme should deliver faster communications, more efficient buying of goods and services, lower administrative costs and the provision of new and improved services, so easing the strains on the Defence budget. Success is, therefore, imperative.

### 1.3. Delivering Defence Capability through Complexity

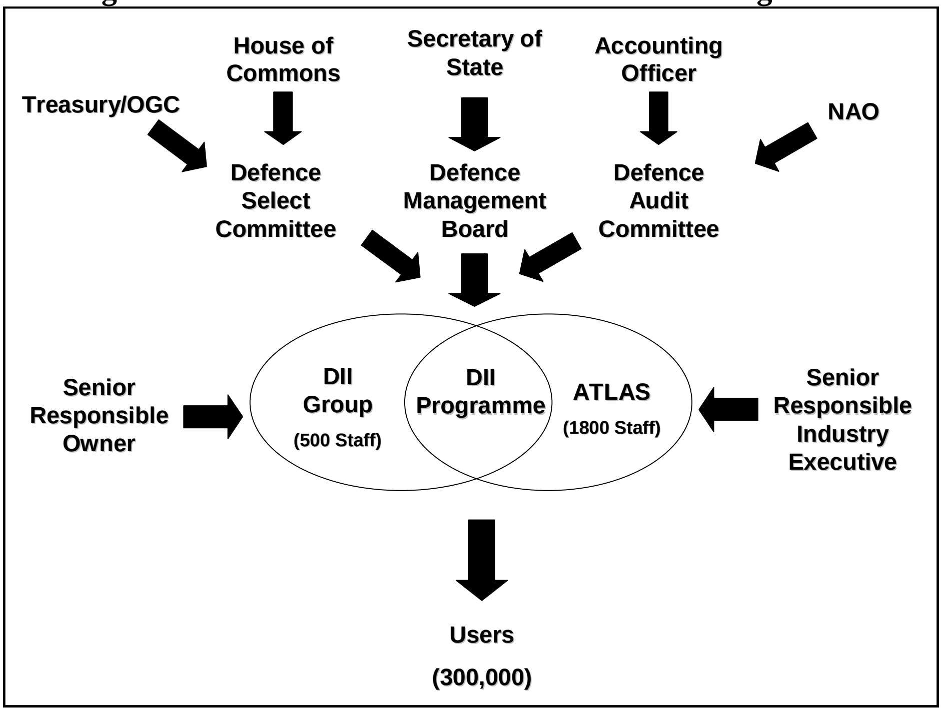
The MoD is one of the largest and most diverse government departments. Unique in having executive responsibility, it is charged with providing both policy and capability, whereas the Department of Health, for example, sets the policy, which is then implemented by the NHS and social services. In line with other departments, however, the MoD is under pressure to improve its levels of efficiency and to provide VfM. Between 1990 and 2000, real Defence spending in the UK fell by some 23%[71] while equipment costs have been rising by some 10% per annum in real terms, a doubling of costs every 7.25 years.[72] The 2000 Spending Review provided the first sustained real growth in the UK Defence budget since the end of the Cold War, an annual average of some 0.3% over the three years 2001/02 to 2003/04.[73] The core Defence budget in 1997/98 was equal to 2.5 per cent of the economy.[74] By 2006/07 that had fallen to 2.3 per cent, before rising again to 2.5 per cent in 2008/09.[75] By 2010/11, according to the MoD website, the budget was some 11% higher in real terms than in 1997.[76]

While there has been some increase in resources, this has been offset by increased equipment costs and the current operational tempo, which demands capability to support rapid joint reaction in operational theatres all over the world. The MoD operates in two arenas, the so-called ‘business space’ and the ‘battlespace’, with the business space providing the equipment and personnel to support the battlespace. Aligned to its executive status, discussed above, the conundrum for the MoD is how to maintain the roles and responsibilities of UK forces (the policy) with an increasing operational demand, a relatively static Defence budget and the unit costs of Defence equipment rising by up to 10% a year (the capability).[77] One way of doing this has been to respond to the call for Information Age Government and to streamline its business processes, making them more effective and efficient through the use of advanced technologies. However, this is not to ignore the potential effect that IT can have directly on the battlespace. The *Strategic Defence Review* (SDR) of 1998 envisaged that "better IT and communication systems will enable greater strategic and operational agility during times of crisis; and greater economy of effort".[78] Termed 'Networked Enabled Capability' or NEC, this aims to integrate sensors, decision makers, weapon systems and support capabilities.[79] Several major programmes are seen as contributing to the network that will enable NEC. These include Skynet5, Cormorant, Falcon, Bowman and DII.[80] This emphasis on information and information sharing remains a priority in the more recent SDSR.

The Labour Government allocated a 17% rise in spending for Defence IT in 2002 and annual expenditure in this area remained at around the £2 billion mark until 2010, averaging about 6% of the total Defence budget.[81] However, the 2010 Budget pinpointed cuts of £130 million with specific reference to the replacement of legacy systems.[82] Much of the remaining funding is allocated to the provision of DII. Designed to overcome the historic problems of Defence IT being disjointed and non-interoperable, this system will provide the foundations, the infrastructure, to support the flow and processing of information, including hardware, software, data and network components.[83] DII will support around 300,000 user accounts and 150,000 computers throughout the MoD and the Armed Forces.[84] It will enable the exchange and sharing of information across Defence, as well as providing standard interfaces to systems belonging to Other Government Departments (OGDs), allies and industrial partners.[85] The scope includes all fixed sites in the UK and abroad, as well as maritime platforms and deployed headquarters.[86] It is, thus, one of the largest IT procurements in the UK public sector.[87]

The process of procuring DII began in April 2003 and the contract was awarded to the ATLAS Consortium almost two years later in March 2005. The five companies that originally made up the Consortium were EDS (now HP), Fujitsu, General Dynamics, EADS and LogicaCMG, who were to work alongside a 500 strong MoD project team. The project is overseen by a range of high level bodies and will impact on thousands of users. The ensuing complexity is shown at Figure 1.2. DII is one of the world's most

**Figure 1.2. Defence Information Infrastructure Programme**




**Source: Author**

difficult infrastructure projects. More correctly termed a programme, indicating that it is a portfolio of projects and activities that are co-ordinated and managed as a unit, it clearly falls into the category of a mega-project.[88] As discussed earlier, Altschuler and Luberoff describe a mega-project as "physical, very expensive, and public".[89] DII is undoubtedly a physical entity, consisting of hardware, software, servers and networks. Originally costing an estimated £5 billion, it is very expensive, whilst being firmly in the public eye. Flyvbjerg identified that mega-projects tend to attract public attention due to their inevitable impact on communities, environment and budgets.[90] DII will inevitably impact on the Defence community, the defence environment and, not least, the Defence budget, which is already facing the strains of the major equipment projects and concurrent operations set against significant cuts. In addition, DII has complexity. It is a project that has many connecting elements, but it is also intricate, entangled and involves many non-linear dimensions, as shown at Figure 1.2, which identifies some of the key stakeholders, the numbers of people working within the project from the two distinct organisations, and the user base.

Given the enormity, expense and complexity of the DII project, does the MoD have the capacity to achieve a successful outcome? It is fair to say that the MoD has a poor record when it comes to delivering complex technology projects. In October 2009, the Gray Review of Acquisition reported that the average Defence procurement programme overruns by five years and is 40% over budget.[91] While this report was not specifically aimed at IT projects, there are examples of such failures, although only limited information exists in the public domain. The Defence Stores Management Solution (DSMS) was one of the e-business initiatives and a requirement of the SDR in 1998. The project set out to provide a single Defence inventory management system to replace the three single services systems and to replace physical stock with data on how, where and at what cost stock could be obtained, enabling items to be used as required rather than stockpiled. The MoD announced in 2002 that it was suspending the project after two years and £130 million expenditure.

A similar example is DRUMM (Delivering the Requirement for Unit Materiel and Management). This army-specific project was created to handle the inventory information supplied to DSMS, again to increase the visibility of equipment, materiel and consumption. This was also suspended in 2002. In 2006, the NAO identified several difficulties in the Bowman programme, which involves the supply of a family of digital radios and an associated Combat Infrastructure Programme (CIP).[92] The project was initiated in 1988 with an in-service date of December 1995, which was not achieved. In July 2000, the MoD launched a new competition. It had already spent five years and £397 million on the earlier stages.[93] It subsequently wrote off £51 million of expenditure not considered to contribute to the revised programme.[94] In July 2009, two contracts worth £231 million were awarded to General Dynamics to upgrade Bowman.[95]

The track record does not auger well for DII. However, it began life in 2001, is due to deliver in 2015 and so fits within the scope of the reports on public sector IT project failure, framed by the McCartney Report of 1999 and the NAO's *Delivering Successful IT-Enabled Business Change* in 2006. These ten reports identify those CSFs most likely to improve the chances of a successful outcome if adopted by the project team. Although the OGC acknowledges that there is a plethora of best practice and lessons learned available in government IT, it suggests that "these are not always well understood or consistently applied"; this is evidenced by the high level of failure of IT projects in the public sector.[96]

This analysis leads to the following research question:

> How have the lessons learned from previous complex IT projects in government been used to improve the performance of subsequent projects?

To further clarify this question, 'lessons learned' are those lessons identified through the ten reports detailed at Table 1.1 above; 'complex IT projects' refers to projects or programmes where those elements that are the most complex, costly or resource demanding involve IT; and 'government' is used interchangeably with public sector to mean that part of the state dealing with the production, delivery and allocation of goods and services by and for the government or its citizens, whether national, regional or local. Finally, 'performance' describes the successful outcome. In this context and discussed further in the literature review, it can be defined and measured in terms of:

- Reducing the risk of escalation to cost, time and scope;
- Reducing the resource demands of cost, time and scope;
- Meeting the expectations of the stakeholders, including the project team, in terms of value and usefulness;
- Improving the scale or certainty of business benefits;
- Improving the scale or certainty of the project's contribution to defined strategic goals; and

- Avoidance of identified strategic environmental factors known to undermine delivery or future performance.

It is recognised that these measures of performance may be competing and may also carry different weightings depending on the type of project under review. In addition, there are three subsidiary questions that stem from this overarching research question:

1. Are the lessons learned from previous complex IT projects in government correct and comprehensively considered? This requires a point of comparison, which in this case is the academic literature.
2. Have the lessons learned been differentiated by the type of project? This requires identification of the different types of project.
3. Has the relative importance of the lessons learned been adequately explored and identified? This requires examination of how lessons might vary across a project and product lifecycle.

Based on the overarching research question, a study aim has been formed, as specified in Section 1.4 below.

## 1.4. Study Aim

**The aim of this study is to analyse the impact of identified Critical Success Factors on the management and subsequent performance of a major government IT project, taking as a case study the MoD's Defence Information Infrastructure Programme.**

The study's enabling objectives are listed below, covering the:

- Exploration of the key CSFs defined in academic studies of project management in general and IT project management specifically, along with assessment of the impact of these studies;
- Identification of the key CSFs defined in reports on public sector IT project failure and reviews of infrastructure projects;

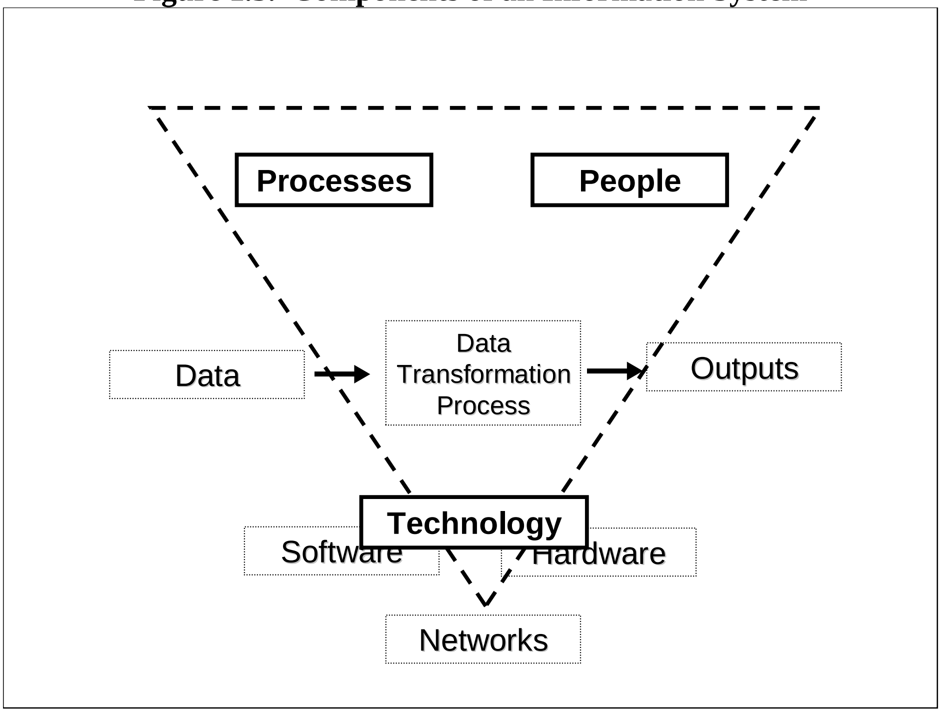
- Synthesis of the CSFs identified in the reports and comparison with those defined in the academic literature to ensure that they are correct and comprehensively considered;
- Development of a detailed case study of the design and delivery of the MoD's DII programme;
- Examination of the extent to which the CSFs have been incorporated into the management of the DII Programme;
- Assessment of the effectiveness of CSFs as a means of delivering IT project success.

## 1.5. Conceptual Framework

A conceptual framework is a device used to structure, shape and visualise a research study, assisting the researcher to answer the research question and meet the aim. It also provides an explicit outline of the thinking behind the research.[97] As such, it adds clarity for the reader.[98] Weaver-Hart describes the conceptual framework as: "a structure for organising and supporting ideas; a mechanism for systematically arranging abstractions".[99] Thus, it provides a theoretical overview of the intended research and of the order within the research process. Ideally, it should connect all aspects, including the problem definition, the aim, literature review, research methodology, data collection and analysis.[100] The definition of the framework derives from the literature review where the conceptual basis for the study and its relationship to the research question, as well as the theory underpinning that question, is described.[101] The conceptual framework, therefore, guides the entire research process, providing a link between theory, early findings and the purpose of the study. This aids decisions concerning the critical features of the research, which relationships are likely to be of importance and, hence, what data is going to be collected and analysed.

The rationale behind the conceptual framework for this study stems from a clear and logical definition of the term 'information infrastructure'. Given that the focus of the research question is a complex IT project, to what extent does an information structure programme fit within this category and what are the critical components of an IT project? An IT project is obviously about technology delivery and implementation, describing anything related to computing technology, such as networking, hardware, software or the people that work with these technologies. Pearlson and Saunders define an information infrastructure in much the same way: the hardware, software, data and network components that support the flow and processing of information in an organisation.[102] This slots an information infrastructure firmly into the category of an IT project. Both definitions are rooted in the technology, yet the stated aim of the DII programme is to "enable sharing of information and collaborative working to a variety of groups and individuals".[103] This demonstrates that this programme needs to combine technology with people and their everyday work processes, creating a system that produces, manages and distributes information. In other words, DII is not simply about technology; it is about the provision of an information system, the components of which are shown as an amalgamation of people, processes and technology at Figure 1.3.

**Figure 1.3. Components of an Information System**




**Source: Author**

Laudon and Laudon refine this definition to describe a set of interrelated components that retrieve, process, store and distribute information in order to support decision making, co-ordination and control in an organisation.[104] Therefore, in its entirety, an information system is a combination of elements (people, process and technology) that produces a sum (decision making, co-ordination and control) greater than the combined input of each individual element.[105] In other words, the interaction of the various components results in 'emergent properties'.

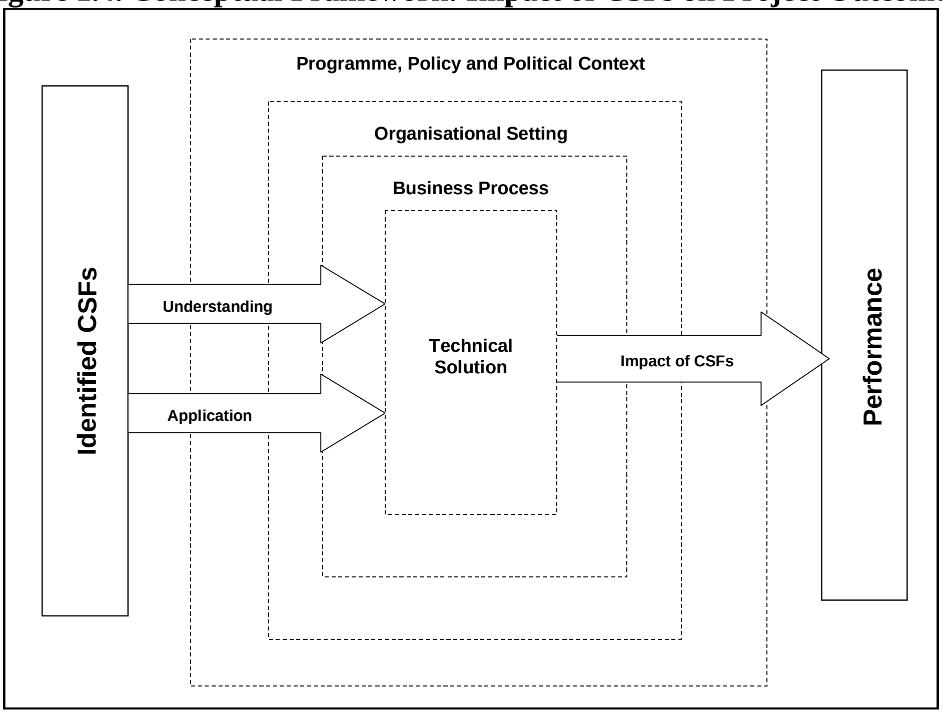
In addition to this, an information system is developed and implemented in a particular context, which, in turn, affects the system. The importance of context when developing an information system and the critical "interaction between specific system design features and the related features of the organisational setting" are highlighted in the academic literature.[106] If this context is taken to be the organisation in which the project is being managed, then a range of additional factors are likely to affect it. For example, in 1965, Leavitt proposed that an organisation consists of four interacting elements: task (or objectives), technology, people and structure.[107] Later studies have added factors that influence behaviour, such as power,[108] culture,[109] business process transformation[110] and resources.[111]

Therefore, implementing an information system is not simply about understanding the technology, the Technical Solution, as defined in Figure 1.1. It is also concerned with the comprehension of the problems that these systems are designed to solve, the architectural and design elements, the organisational processes, the people, the setting in which they work and the wider environment. The system is affected by a context and, in turn, the system attempts to influence that context. This leads to the conclusion that technology is an enabler in a much wider system, suggesting that information systems are prone to failure because they are both embedded in an organisation and interacting with that organisation. Furthermore, Davis et al argue that "an information system is a social system that uses information technology", stressing that attention should be given to both information systems and social systems.[112] The linkages and interactions between the systems need to be identified and understood if a successful outcome is to be achieved.[113]

The emphasis, therefore, is on the 'system', a group of interacting, interrelated, or interdependent elements that form a complex whole with emergent properties.[114]

Given this, if DII is an information system and an information system is a social system, then it makes sense to use 'systems thinking' as a means of shaping this study and, therefore, as the basis of the conceptual framework. Fundamental to this way of thinking is the notion of 'wholeness' or holism, which provides a means of examining the interaction between the IT project, the information system (people, process and technology), the social system, the context and the environment. Therefore, the IT project sits within a wider system or context, which provides it with strategy and resources and which is separated from its environment by a boundary. In terms of a government IT project, the context was examined in the above discussion regarding the essential difference of the public sector with its additional layer of complexity, shown diagrammatically at Figure 1.1 above. This forms the core of the conceptual framework, which is shown at Figure 1.4. This is based on systems thinking with the context

**Figure 1.4. Conceptual Framework: Impact of CSFs on Project Outcomes**




**Source: Author**

described as a system of systems with interactions taking place between each layer and the 'Technical Solution' sitting at the core. The inputs into this system are the identified CSFs, which are examined in terms of the extent to which they have been understood and applied. These have an impact, the output of which is the performance or successful outcome of the Technical Solution.

The interaction between the context of the IT project and the environment is defined by a boundary and each system within that context also has its own boundary. A 'closed system' ignores that boundary, failing to interact with its environment, taking nothing from it and giving nothing back. Therefore, over time, it can only deteriorate.[115] Systems that involve people, sometimes called 'human activity systems', are always 'open', interacting with their environment.[116] However, on occasions, the people inside the system consider it closed, paying little attention to the environment while overestimating their own power. Referred to as 'groupthink', this is a potential source of project failure.[117] These systems thinking ideas provide a powerful basis for considering systems failure, for examining complex situations and so for exploring the DII Programme. The conceptual framework incorporates these ideas whilst also providing a means to answer the research question and aim. It also underpins the structure of the research.

### 1.6. Contribution to Knowledge

The distinguishing mark of a thesis carried out at this level is the requirement to demonstrate an original contribution to knowledge. To this end, it must show that a worthwhile research question has been identified with no evidence that this question has been answered previously and it must demonstrate that the question has been answered by the study.[118]

This research contributes to knowledge by carrying out a thorough investigation into an IT project within the public sector. It has been clearly identified above that there are a number of factors that make this a very different and difficult context for such projects. Furthermore, providing such generic solutions as CSFs for IT project management in the public sector is compromised by its disparate nature. Despite this, there have been very few studies on IT project management in the UK public sector.

In 2007, Shenhar and Dvir observed that most projects fail to meet time, budget and, business objectives, despite the amount that is known about project failure.[119] They highlight the opportunity that this brings for research to help close the gap between what is known about project failure and the application of this knowledge.[120] Even the most cursory examination of the literature in this area reveals that there is widespread research on the success and failure of projects and a large number of studies that identify either lists of CSFs or CSF frameworks. However, there is no evidence in either the general project management literature or the IT project management literature of any studies that examine whether this theory is being applied in practice and, if so, whether it is having any beneficial impact on project outcomes. More specifically, there has been no attempt to assess whether CSFs, particularly those generated by government and related bodies, have been noted and adopted by public sector IT project managers and, if so, whether they do, indeed, lead to "successful competitive performance for the organization (*sic.*)".[121] This lack of impact assessment potentially calls into question the value of both government reports and academic studies on CSFs. Undoubtedly, not only do the lessons have to be identified, they also have to be learned, which means understanding and applying them.

There have been many attempts to combine lists of CSFs. These take the form of comparative studies of different sets of factors, such as the list presented by Fortune and White,[122] or the distillation of a large number of CSFs into a more usable framework. Arguably, DeLone and McLean presented the most famous example of the latter in 1992.[123] There are also attempts to compare success factors with failure factors, such as the study by Fowler and Horan in 2007,[124] or studies that either synthesise across different cases, such as the work by Chua in 2009,[125] or that compare across different fields of project management, such as the study by Pinto and Covin in 1989 of CSFs for R&D projects and construction projects.[126] To date, however, no similar attempt has been made to compare the factors identified by studies on general project management with those identified by studies on IT project management, even though there is extensive work on the latter. Generally, the two are treated as interchangeable. Moreover, there has been no attempt to compare the theoretical CSFs identified in the scholarly literature with those identified in government reports. This thesis offers extensive work on both areas.

Therefore, this study contributes to knowledge on four fronts: the examination of public sector IT projects with specific reference to the value of CSFs as a theoretical premise; an assessment of whether this theory is being applied in practice and, if so, whether it is having any beneficial impact on project outcomes with specific reference to public sector project management; the comparison of factors identified by studies on general project management with those identified by studies on IT project management; and, finally, the comparison of theoretical CSFs identified in the scholarly literature with those identified in government reports.

### 1.7. Study Structure

Chapter Two of the study critically reviews the current literature on approaches to understanding IT project success and failure. In doing so, it identifies the evolution of thinking in the areas of both general project management and IT project management, encompassing all relevant literature and both the public and private sector views. Chapter Three outlines the research methodology for this thesis, discussing decisions about the identification and location of the required data as well as the methods used to gather and analyse that data. Chapter Four examines UK Government initiatives stemming from the McCartney report and carries out a detailed content analysis of reports on IT project failure in the public sector in order to identify the CSFs in each, before creating a synthesised lists of the identified CSFs from these reports. In addition to this, it considers some specific reports on the failure of information infrastructure projects in order to identify if there are any CSFs that are particular to this type of project. Chapter Five presents the detailed case study of the DII Programme, examining the layers surrounding the central core of the conceptual framework: the Programme, Policy and Political Context; the Organisational Setting; and the Business Process. Chapter Six examines the Technical Solution at the core of these layers of complexity before looking across the conceptual framework to consider the understanding and application of the CSFs, their impact and then assessing the subsequent performance of the project. Chapter Seven then summarises the discussion, draws conclusions and provides recommendations.

## References


[1] Carr, N.G., 'IT Doesn't Matter', *Harvard Business Review*, May 2003, pages 41-49, this page 45.
[2] Collins, T., 'IT is the Biggest Area of Waste in the Public Sector', *ComputerWeekly.com*, 6 July 2004, http://www.computerweekly.com/articles/article.asp?liArticleID=131737&liArticleTy, downloaded 7th July 2004.
[3] Collins, T., 'Public Sector IT projects Have Only 30% Success Rate – CIO for Department of Work and Pensions', *Computerweekly.com*, 17 May 2007, http://www.computerweekly.com/blogs/tony_collins/2007/05/public-sector-it-projects-have.html, downloaded 3rd January 2008.
[4] Great Britain. Cabinet Office. Office of Government Commerce. *Programmes and Project Delivery: Joint Statement of Intent*. January 2009, www.ogc.gov.uk/documents/ppd_it_projects_joint_statement.pdf, downloaded 5th October 2010.
[5] Carr, N.G., 'IT Doesn't Matter', *Harvard Business Review*, May 2003, pages 41-49, this page 44
[6] Carr, N.G., 'IT Doesn't Matter', *Harvard Business Review*, May 2003, pages 41-49, this page 45
[7] Schneider, K., 'How Does Your Budget Size Up?' *ComputerWeekly.com*, 6 February 2003, http://www.computerweekly.com/articles/article.asp?liArticleID=124830&liArticleTypeID=20&liCategoryID=2&liChannelID=18&liFlavourID=1&sSearch=&nPage=1, downloaded 9th October 2004.
[8] Enticknap, N., 'Cautious Growth as Economy Grows', *ComputerWeekly.com*, 22nd July 2005, http://www.computerweekly.com/Articles/2005/07/22/210967/cautious-growth-as-economy-slows.htm, downloaded 26th October 2007.
[9] Anon., 'Retail to Lead IT Spending Downturn', *Contractor UK*, 31 March 2009, http://www.contractoruk.com/news/004290.html, downloaded 29th September 2010.
[10] Anon., 'Retail to Lead IT Spending Downturn', *Contractor UK*, 31 March 2009, http://www.contractoruk.com/news/004290.html, downloaded 29th September 2010.
[11] Kablenet.com, 'IT Spend Surges Towards 2004', 23rd October 2002, www.kable.co.uk, downloaded 3rd January 2008.
[12] Kablenet.com, 'IT Spend Surges Towards 2004', 23rd October 2002, www.kable.co.uk, downloaded 3rd January 2008.
[13] Anon., 'Computerising the NHS: the Health Service's IT Problem', *The Economist*, 17 October 2002, http://www.economist.com/node/1390034, downloaded 3rd January 2008.
[14] Kablenet.com, 'IT Spend Surges Towards 2004', 23rd October 2002, www.kable.co.uk, downloaded 3rd January 2008.
[15] Kablenet.com, 'IT Spend Surges Towards 2004', 23rd October 2002, www.kable.co.uk, downloaded 3rd January 2008.
[16] Simons, M., 'UK Defence Systems Get £5bn Overhaul', *ComputerWeekly.com*, 20th March 2003, www.computerweekly.com/Article120264.htm, downloaded 30th July 2003.
[17] Collins, T., 'Should Large IT Suppliers Worry About Government Spending Cuts', *ComputerWeekly.com*, 22 June 2010, http://www.computerweekly.com/blogs/tony_collins/2010/06/need-large-it-suppliers-worry.html, downloaded 29th September 2010.
[18] Wilcox, S., 'Budget 2010: Government ICT Spending Cut As Darling Talks Digital Economics', *www.publictechnology.net*, 24 March 2010, http://www.publictechnology.net/sector/central-gov/budget-10-nominal-cut-it-programmes-announced, downloaded 5th October 2010.
[19] Heath, N., 'Spending Cuts: 400 Government IT Projects Under The Microscope', *Silicon.com*, 22 September 2010, http://www.silicon.com/management/public-sector/2010/09/22/spending-cuts-400-government-it-projects-under-the-microscope-39746379/, downloaded 29th September 2010.
[20] Carr, N.G., 'IT Doesn't Matter', *Harvard Business Review*, May 2003, pages 41-49.
[21] Chua, A.Y.K., 'Exhuming IT Projects From Their Graves: An Analysis of Eight Failure Cases and Their Risk Factors', *Journal of Computer Information Systems*, Spring 2009, http://findarticles.com/p/articles/mi_hb5785/is_200904/ai_n32326224/?tag=content;col1, downloaded 31 March 2010
[22] Great Britain, HM Government, *Financial Management in Government Departments*, Command Paper 9058, (London, HMSO, 1983), pages 1-3.
[23] Sanger, C., 'E-Defence', *Defence Management Journal*, Vol 3, No 4, Autumn 2000, page 13.
[24] Sanger, C., 'E-Defence', *Defence Management Journal*, Vol 3, No 4, Autumn 2000, page 13.

[25] Great Britain, Cabinet Office, *E-Government: A Strategic Framework for Public Services in the Information Age*. (London, Central IT Unit, 2000).
[26] Great Britain, House of Commons, Public Accounts Committee, *Improving the Delivery of Government IT Projects*. (London, HMSO, 1999).
[27] Symonds, M., 'Survey: Government and the Internet: The Next Revolution'. *The Economist*, 22nd June 2000, www.economist.com/surveys/showsurvey.cfm?issue=20000624, downloaded 9th October 2004.
[28] Great Britain, Parliamentary Office of Science and Technology, *Government IT Projects*, Report 200, (London, HMSO, 2000).
[29] Great Britain, Parliamentary Office of Science and Technology, *Government IT Projects*, Report 200, (London, HMSO, 2000).
[30] Anon., 'Computerising the NHS: the Health Service's IT Problem', *The Economist*, 17 October 2002, http://www.economist.com/node/1390034, downloaded 3rd January 2008.
[31] Anon., 'Computerising the NHS: the Health Service's IT Problem', *The Economist*, 17 October 2002, http://www.economist.com/node/1390034, downloaded 3rd January 2008.
[32] Parliamentary Office of Science and Technology, *Government IT Projects*, Report 200, (London, HMSO, 2000).
[33] Arnott, S. 'Government IT Projects Squander £1.5 billion', *IT Week*, 13th March 2003, www.itweek.co.uk/Print/1139438, downloaded 31st July 2003.
[34] Anon, 'Government Faces £1.5 billion Bill for IT Failure', *The Guardian*, 12th March 2003
[35] Arnott, S. 'Government IT Projects Squander £1.5 Billion', *IT Week*, 13th March 2003, www.itweek.co.uk/Print/1139438, downloaded 31st July 2003.
[36] Moores, S., 'Thought for the Day: the Speed of State Spending', *Computer Weekly*, 17th July 2002.
[37] Collins, T., 'Whitehall Must Embrace Honesty and Openness to Succeed with IT', *Computer Weekly*, 17th May 2005, pages 1-4.
[38] Altshuler, A. and Luberoff, D., *Mega-Projects: the Changing Politics of Urban Public Investment*, (Washington DC, Brookings Institution, 2003), page 45.
[39] Cross, M., 'Inside IT: Public Domain,' *The Guardian*, 10th April 2003, page 19.
[40] Altshuler, A. and Luberoff, D., *Mega-Projects: the Changing Politics of Urban Public Investment*, (Washington DC, Brookings Institution, 2003), page 45.
[41] Flyvbjerg, B., Bruzelius, N. and Rothengatter, W., *Mega-Projects and Risk: An Anatomy of Ambition*, (Cambridge, Cambridge University Press, 2003).
[42] Collins, T., 'Twenty Five Years of Government IT Project Failure', *ComputerWeekly.com*, 6 November 2009, http://www.computerweekly.com/Articles/2009/11/06/238452/Twenty-five-years-of-government-IT-project-failure.htm, downloaded 29th September 2010.
[43] Great Britain, Cabinet Office, *Successful IT: Modernising Government in Action*, (London, HMSO, 1999).
[44] Great Britain, Cabinet Office, *Successful IT: Modernising Government in Action*, (London, HMSO, 1999), page 5.
[45] National Audit Office, *Delivering Successful IT-Enabled Change*, HC 33-1, Session 2006-2007, (London, HMSO, 2006).
[46] National Audit Office, *Delivering Successful IT-Enabled Change*, HC 33-1, Session 2006-2007, (London, HMSO, 2006), page 10.
[47] Daniel, D.R., 'Management Information Crisis', *Harvard Business Review*, Sept-Oct 1961, pages 111-121.
[48] Rockart, J.F., 'Chief Executives Define their own Data Needs', *Harvard Business Review*, Mar-Apr 1979, pages 81-93.
[49] Fortune, J. and White, D., 'Framing of Project Critical Success Factors by a Systems Model', *International Journal of Project Management*, 24, 2006, pages 53-65, this pages 53-54.
[50] Rockart, J.F., 'Chief Executives Define their own Data Needs', *Harvard Business Review*, Mar-Apr 1979, pages 81-93.
[51] Arnott, S., 'Government IT Projects Squander £1.5 billion', *IT Week*, 13th March 2003, www.itweek.co.uk/Print/1139438, downloaded 31st July 2003.
[52] Symonds, M., 'Survey: Government and the Internet: The Next Revolution'. *The Economist*, 22nd June 2000, www.economist.com/surveys/showsurvey.cfm?issue=20000624, downloaded 9th October 2004.

[53] Symonds, M., 'Survey: Government and the Internet: The Next Revolution', *The Economist*, 22nd June 2000, www.economist.com/surveys/showsurvey.cfm?issue=20000624, downloaded 9th October 2004.
[54] Butler Group. *Improving Public Sector Projects*, April 2003, www.butlergroup.com, downloaded 9th October 2004.
[55] Williams, N., 'Modernising Government: Policy Making Within Whitehall', *The Political Quarterly*, Vol. 70, No. 4, Oct-Dec 1999, Page 452.
[56] Williams, N., 'Modernising Government: Policy Making Within Whitehall', *The Political Quarterly*, Vol. 70, No. 4, Oct-Dec 1999, Page 455.
[57] Williams, N., 'Modernising Government: Policy Making Within Whitehall', *The Political Quarterly*, Vol. 70, No. 4, Oct-Dec 1999, Page 455
[58] Center for Technology in Government, *Making Smart IT Choices: Understanding Value and Risk in Government IT Investment*, (University of Albany, Albany, NY, April 2004).
[59] General Electric, *GE 2005 Annual Report: Letter to Stakeholders*, http://www.ge.com/ar2005/letter.htm, downloaded 23rd January 2007.
[60] Moore, M., *Creating Public Value: Strategic Management in Government*, (Cambridge, MA: Harvard University Press, 1995).
[61] Frederickson, H.G., 'Can Bureaucracy be Beautiful?' *Public Administration Review*, Vol.60, No.1, 2000, pages 47–53.
[62] Nutt, P. and Backoff, R., 'Organisational Publicness and its Implications for Strategic Management', *Journal of Public Administration Research and Theory*, 3, 1993.
[63] Anon., 'A Stronger Hand', *GC: Government Computing Magazine*, April 2010, page 22
[64] Anon., 'A Stronger Hand', *GC: Government Computing Magazine*, April 2010, page 22
[65] Anon., 'A Stronger Hand', *GC: Government Computing Magazine*, April 2010, page 22
[66] Center for Technology in Government, *Making Smart IT Choices: Understanding Value and Risk in Government IT Investment*, (Albany, NY, University of Albany, April 2004).
[67] National Audit Office, *Modern Policy-Making: Ensuring Policies Deliver Value for Money*. HC 289, Session 2001-2002, (London: HMSO, 2001), page 1.
[68] Great Britain, Cabinet Office, Office of Government Commerce, *Programmes and Project Delivery: Joint Statement of Intent*, January 2009, www.ogc.gov.uk/documents/ppd_it_projects_joint_statement.pdf, downloaded 5th October 2010.
[69] Great Britain, Ministry of Defence, *MoD Public Service Agreement: Autumn Performance Report 2006-07*. www.mod.uk/NR/rdonlyres/D808A991-FA9B-4ED3-9B99-B45C864BAD1F/0/0607_quarter1_psa_rpt.pdf, downloaded 26th January 2008.
[70] Chalmers, M. 'A Question of Balance? The Deficit and Defence Priorities', *Future Defence Review*, Working Paper No 7, June, (London: RUSI, 2010).
[71] Hartley, K., *UK Defence R&D Policy: An Economist's Perspective*, http://www.york.ac.uk/depts/econ/research/documents/dera.pdf, downloaded 14th July 2003.
[72] Hartley, K., *UK Defence R&D Policy: An Economist's Perspective*, http://www.york.ac.uk/depts/econ/research/documents/dera.pdf, downloaded 14th July 2003.
[73] Great Britain, HM Treasury, *Spending Review Whitepaper: New Public Spending Plans 2001 – 2004: Chapter 12: Ministry of Defence*, http://www.hm-treasury.gov.uk/spending_review/spending_review_2000/spending_review_report/spend_sr00_repchap12.cfm, downloaded 26th October 2007.
[74] Kirkup, J., 'Gordon Brown under Fire over Defence Spending Climb-Down', *Telegraph.co.uk*, 18 March 2010, http://www.telegraph.co.uk/news/newstopics/politics/gordon-brown/7470402/Gordon-Brown-under-fire-over-defence-spending-climb-down.html, downloaded 29th September 2010.
[75] Kirkup, J., 'Gordon Brown under Fire over Defence Spending Climb-Down', *Telegraph.co.uk*, 18 March 2010, http://www.telegraph.co.uk/news/newstopics/politics/gordon-brown/7470402/Gordon-Brown-under-fire-over-defence-spending-climb-down.html, downloaded 29th September 2010.
[76] Great Britain. Ministry of Defence. *Defence Spending*, http://www.mod.uk/DefenceInternet/AboutDefence/Organisation/KeyFactsAboutDefence/DefenceSpending.htm, downloaded 29th September 2010.
[77] Taylor, T., 'Smart Procurement: an Objective of the Strategic Defence Review', *RUSI Journal*, April 1998, pages 33-36.

78 Defence Committee, *The Strategic Defence Review: Modern Forces for the Modern World*, (London, HMSO, 1998).
79 Great Britain, Ministry of Defence, *Network Enabled Capability*, JSP 777, 2005, http://www.mod.uk/NR/rdonlyres/E1403E7F-96FA-4550-AE14-4C7FF610FE3E/0/nec_jsp777.pdf, downloaded 27th October 2007.
80 Great Britain, Ministry of Defence, *Network Enabled Capability*, JSP 777, 2005, http://www.mod.uk/NR/rdonlyres/E1403E7F-96FA-4550-AE14-4C7FF610FE3E/0/nec_jsp777.pdf, downloaded 27th October 2007.
81 Kable, *UK Public Sector Defence ICT Market Overview to 2010*, (Kable, London, 2007), www.kablenet.com/kd.nsf/020781ea9db2becf80256f2a0051cf72/$FILE/ICTandBPOintheUKcontents.pdf, downloaded 26th October 2007.
82 Wilcox, S., 'Budget 2010: Govt ICT Spending Cut as Darling Talks Digital Economics', *PublicTechnology*.Net, 24 March 2010, http://www.publictechnology.net/sector/central-gov/budget-10-nominal-cut-it-programmes-announced, downloaded 5th October 2010.
83 Pearlson, K.E. and Saunders, C.S. *Managing And Using Information Systems: A Strategic Approach.* (New York, Wiley, 2004), pages 6-7.
84 Anon., 'MoD to Wage £5bn IT campaign', *Government Computing*, 19th March 2003, www.kablenet.com.../2E9E07E556D73E1880256CED004FD0B4?OpenDocumen, downloaded 5th December 2003.
85 DII IPT, *Defence Information Infrastructure: One Information Infrastructure*, (Copenacre, DII IPT, 2004).
86 Thomas, D. 'Mod Cuts £4bn IT Overhaul Shortlist to Three', *ComputerWeekly.com*, 18th December 2003, www.computerweekly.co.uk/articles/articles.asp?liArticleID=127301@liArticleT..., downloaded 20th January 2004.
87 Anon., 'MoD to Wage £5bn IT campaign', *Government Computing*, 19th March 2003, www.kablenet.com.../2E9E07E556D73E1880256CED004FD0B4?OpenDocumen, downloaded 5th December 2003.
88 Thomas, D., 'Mod Cuts £4bn IT Overhaul Shortlist to Three', *ComputerWeekly.com*, 18th December 2003, www.computerweekly.co.uk/articles/articles.asp?liArticleID=127301@liArticleT..., downloaded 20th January 2004.
89 Altshuler, A. and Luberoff, D., *Mega-Projects: the Changing Politics of Urban Public Investment*, (Washington DC, Brookings Institution, 2003), page 45.
90 Flyvbjerg, B., Bruzelius, N. and Rothengatter, W., *Mega-projects and Risk: An Anatomy of Ambition*, (Cambridge, Cambridge University Press, 2003).
91 Great Britain. Ministry of Defence, *Review of Acquisition for the Secretary of State for Defence: an Independent Report by Bernard Gray*, (London, HMSO, 2009), page 7.
92 Great Britain, National Audit Office, *Delivering Digital Tactical Communications through the Bowman CIP Programme*, HC 1050 Session 2005-2006, (London, HMSO, 2006).
93 Great Britain, National Audit Office, *Delivering Digital Tactical Communications through the Bowman CIP Programme*, HC 1050 Session 2005-2006, (London, HMSO, 2006).
94 Great Britain, National Audit Office, *Delivering Digital Tactical Communications through the Bowman CIP Programme*, HC 1050 Session 2005-2006, (London, HMSO, 2006).
95 Great Britain, National Audit Office, *Delivering Digital Tactical Communications through the Bowman CIP Programme*, HC 1050 Session 2005-2006, (London, HMSO, 2006).
96 Great Britain,Cabinet Office,Office of Government Commerce, *Programmes and Project Delivery: Joint Statement of Intent*, January 2009, www.ogc.gov.uk/documents/ppd_it_projects_joint_statement.pdf, downloaded 5th October 2010.
97 Robson, C. *Real World Research*, (Oxford, Blackwell, 1993), pages 150-151.
98 King, G., Keohane, R. O. and Verba, S., *Designing Social Inquiry: Scientific Inference in Qualitative Research*, (Princeton, NJ, Princeton University Press, 1994), pages 29, 112.
99 Weaver-Hart, A., 'Framing an Innocent Concept and Getting Away with it', *UCEA Review*, 1988, Vol.24, No.2, pages 11–12, this page 11.
100 Shields, P and Hassan, T 'Intermediate Theory: The Missing Link in Successful Student Scholarship, *Journal of Public Affairs Education*, 2006, 12(3), pages 313-334.

[101] Berger, R. M. & Patchener, M. A., *Implementing the Research Plan*, (London, Sage, 1988), pages 156-159.
[102] Pearlson, K.E. and Saunders, C.S. *Managing and Using Information Systems: A Strategic Approach.* (Wiley, New York, 2004)
[103] Great Britain, Ministry of Defence. *Defence Information Infrastructure Integrated Project Team*, 19th June 2007, http://www.mod.uk/DefenceInternet/MicroSite/DES/OurTeams/Joint/DefenceInformationInfrastructureIntegratedProjectTeam.htm, downloaded 5th November, 2007.
[104] Laudon, K.C. and Laudon, J.P., *Essentials of Management Information Systems*, (Upper Saddle River, NJ, Prentice Hall, 2002), page 6.
[105] O'Connor, J. and McDermott, I., *The Art of Systems Thinking: Essential Skills for Creativity and Problem Solving*, (London, Thorsons, 1997), page 7.
[106] Markus, M.L. *Systems in Organisations: Bugs and Features*, (London, Pitman, 1984).
[107] Leavitt, H.J., 'Applied Organisational Change in Industry: Structural, Technological and Humanistic Approaches', in J.G.March (ed), *Handbook of Organisations*. (Chicago, Rand McNally, 1965).
[108] Pfeffer, J., *Managing with Power*, (Boston, MA, Harvard Business School Press, 1992).
[109] Lorsch, J., 'Managing Culture: the Invisible Barrier to Strategic Change', *California Management Review*, Vol.28, No.2, 1986, pages 95-109.
[110] Boddy, D., Boonstra, A. and Kennedy, G. *Managing Information Systems: An Organisational Perspective*, (Harlow, Financial Times Prentice Hall, 2002), page 59.
[111] Sauer, C., *Why Information Systems Fail: A Case Study Approach,* (Henley-on-Thames, Alfred Waller, 1993).
[112] Davis, G.B. et al., 'Diagnosis of an Information System Failure', *Information and Management*, 1992, 23, 293-318.
[113] Davis, G.B. et al., 'Diagnosis of an Information System Failure', *Information and Management*, 1992, 23, 293-318.
[114] Naughton, J. and Peters, G. *Systems and Failures*, (Oxford, OUP, 1976).
[115] Fortune, J. and Peters, G., *Information Systems: Achieving Success by Avoiding Failure*, (Chichester, Wiley, 2005), page 52.
[116] Fortune, J. and Peters, G., *Information Systems: Achieving Success by Avoiding Failure*, (Chichester, Wiley, 2005), page 52.
[117] Fortune, J. and Peters, G., *Information Systems: Achieving Success by Avoiding Failure*, (Chichester, Wiley, 2005), page 53.
[118] Chinneck, J.W., *How to Organize your Thesis*, (Canada, Department of Systems and Computer Engineering, University of Ottawa, 1999), http://www.sce.carleton.ca/faculty/chinneck/thesis.html, downloaded 2nd November 2010.
[119] Shenhar, A.J. and Dvir, D., *Reinventing Project Management: The Diamond Approach to Successful Growth and Innovation*, (Boston, Harvard Business School Press, 2007), page 93.
[120] Shenhar, A.J. and Dvir, D., *Reinventing Project Management: The Diamond Approach to Successful Growth and Innovation*, (Boston, Harvard Business School Press, 2007), page 93.
[121] Rockart, J.F., 'Chief Executives Define their own Data Needs', *Harvard Business Review*, Mar-Apr 1979, pages 81-93.
[122] Fortune, J. and White, D., 'Framing of Project Critical Success Factors by a Systems Model', *International Journal of Project Management*, 2006, Vol. 24, pages 53-65, this page 54.
[123] DeLone, W.H. and McLean, E.R., 'Information Systems Success: the Quest for the Dependent Variable', *Information Systems Research*, 1992, Vol.3, No.1, pages 60-95
[124] Fowler,J.J. and Horan, P., 'Are Information Systems' Success and Failure Factors Related?: An Exploratory Study,' *Journal of Organisational and End User Computing*, 2007, Vol. 19, No.2, pages 1-22.
[125] Chua, A.Y.K., 'Exhuming IT Projects from their Graves: An Analysis of Eight Failure Cases and their Risk Factors', *Journal of Computer Information Systems*, Spring 2009, http://findarticles.com/p/articles/mi_hb5785/is_200904/ai_n32326224/?tag=content;col1, downloaded 31 March 2010.
[126] Pinto, J.K. and Covin, J.G., 'Critical Factors in Project Implementation: A Comparison Study of Construction and R&D Projects', *Technovation*, 1989, Vol.9, No.1, pages 49-51.

# Chapter Two
# Understanding Failure and Defining Success:
# A Review of the Scholarly Literature

## 2.1. Mind the Gap: Putting Theory into Practice

With project management becoming a formal discipline in the middle of the last century, the resulting standardisation of its tools, techniques and methods has made it a core activity in modern organisations.[1] Organisational effectiveness tends to be measured by project success rates, highlighting the plight of the public sector as it struggles with cancelled, delayed, over-budget and over-scope Information Technology (IT) projects.[2] In recognition of these problems, ten major reports were published between 1999 and 2006, each aiming to discover why government IT projects fail and, using this information, to identify those Critical Success Factors (CSFs) most likely to increase the chances of a successful outcome. The resulting recommendations have spawned a plethora of advice and accompanying guidance, methodologies, standards and training. However, these attempts at improvement seem to have been in vain with ten major projects identified as being in difficulty in 2010 at a total cost of around £26.3 billion.[3] Thirteen years earlier, Martin Cobb posed his famous paradox: "we know why software projects fail; we know how to prevent their failure, so why do they still fail?"[4] Cobb's Paradox remains unresolved but highlights a key question: have the CSFs identified in these reports been recognised, adopted and implemented by government departments and agencies?

This situation was explored in Chapter One, comparing government investment in IT projects with the extent of failure; examining the size and complexity of these projects; and considering the problems of working in the public sector with its 'Programme, Policy and Political Context' impacting on any technical solutions. The MoD's Defence Information Infrastructure (DII) Programme is one of the largest and most complex projects of its kind in the UK, designed to enable information sharing and collaborative working throughout Defence. Managed within the government context, it is being developed and implemented in the shadow of the ten reports under investigation. The expectation is that some, if not all, of the highlighted CSFs have been incorporated and embedded into its project management to good effect. As such, it provides an ideal case study for examining how the lessons learned from previous complex IT projects in government have improved the performance of subsequent projects.

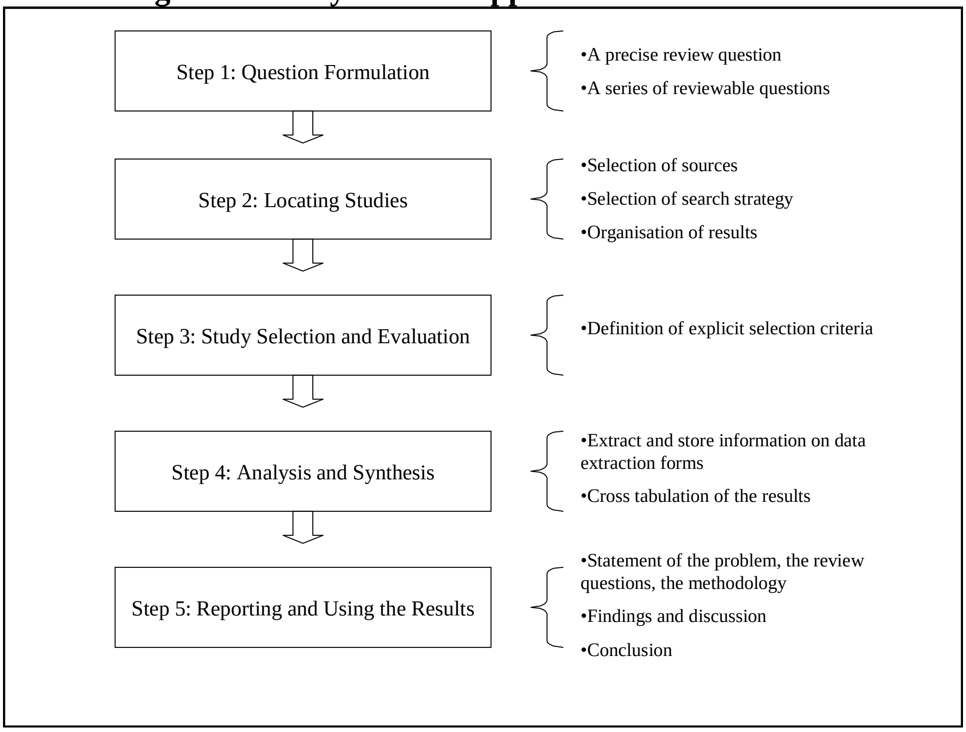
## 2.2. A Methodology for Review: Narrative or Systematic?

This chapter presents the literature review, designed to find out what is known and not known about the research question. The first stage in this process was the selection of a suitable approach, weighing the pros and cons of a traditional narrative literature review against the more rigorous and structured systematic review.[5] A narrative literature review critiques, summarises and draws conclusions about a body of relevant literature and knowledge.[6] However, the criteria that make the selected material relevant are not always clearly stated.[7] They may have been chosen to support the researcher's proposition, thereby producing inaccurate conclusions and questionable reliability.[8] Furthermore, the chosen method of searching, critiquing and synthesising the literature is not always defined, raising issues about its rigour. With no explanation about how the literature review was conducted, it is unlikely that another researcher would be able to replicate it.[9]

A systematic review provides a more transparent account, detailing decisions about inclusion and exclusion, whilst clearly stating the criteria used to assess the quality of the identified material.[10] It has its roots in medicine where meta-analysis, a quantitative approach, is used to integrate, evaluate and interpret a large body of findings to verify specific cause and effect relationships based on statistical evidence.[11] In the social sciences, this technique is termed 'qualitative meta-synthesis' or, simply, meta-synthesis. It is used to understand and explain phenomena by taking an interpretative approach whilst still using the same explicit and rigorous methods as a meta-analysis.[12] However, it is time consuming, putting it beyond the means and timescales of many researchers.[13] Critics argue that it places too much emphasis on quantitative data, favouring 'hard' statistical evidence over interpretation and distilling too quickly and crudely from large numbers of papers to a small selection for in-depth review.[14]

The management literature is particularly challenging to review due to its fragmented, trans-disciplinary nature.[15] Unlike medicine, there is no consensus on management research methods while researchers tend to pose a steady stream of questions rather than attempting to integrate and build coherent stocks of knowledge.[16] Given these factors, while a full-scale meta-synthesis would add logic, rigour and structure to the validity and reliability of the findings, it was considered beyond the available resources for this research. However, the alternative was to use a more limited but no less structured and precise methodology, specifically designed for organisational research and advocated by Denyer and Tranfield, as shown at Figure 2.1.[17] Driven by a well-focused literature review question stemming from the research question, it uses

**Figure 2.1. A Systematic Approach to the Literature**




**Source: Adapted from Denyer, D. and Tranfield, D., 'Producing a systematic review', In: Buchanan, D.A. and Bryman, A, *The Sage Handbook of Organisational Research Methods,* (Sage, Los Angeles, 2009), pages 671-689.**

a comprehensive and explicit search strategy, rigorous methods of appraisal and selection, and reports the resulting evidence in a way that enables clear conclusions to be reached. This turns the literature review into a research methodology in its own right.[18] It is more comprehensive and less biased than a narrative analysis, more transparent, more replicable and, therefore, it is considered highly appropriate for this research.[19]

Denyer and Tranfield advocate framing a clear literature review question as a means of focusing the review, designed to situate the research and guide the process of searching for the required information. This study asks whether the lessons learned from previous complex IT projects in government have improved the performance of subsequent projects. In addition, there are three subsidiary questions:

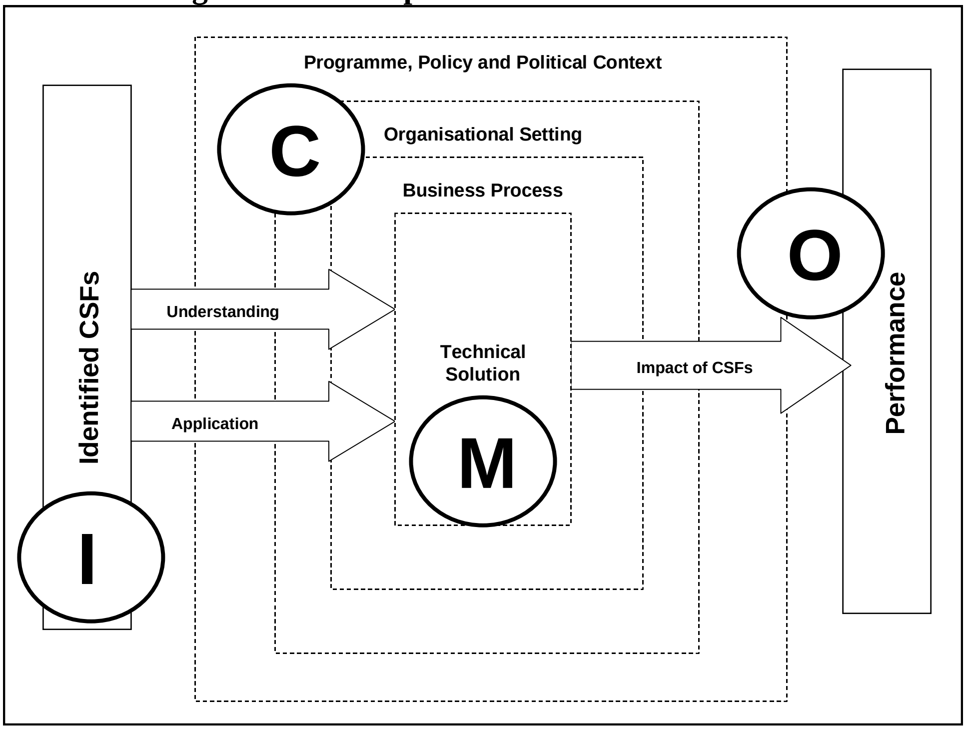
- Are the lessons learned from previous complex IT projects in government correct and comprehensively considered?
- Have the lessons learned been differentiated by project type?
- Has the relative importance of the lessons learned been adequately explored and identified?

This review considers the scholarly research relating to these questions, seeking either answers or the means to finding an answer through empirical research. In doing so, it examines what is already known about the factors driving the success or failure of project management with specific reference to IT projects in the public sector. It then determines whether there is any evidence of these factors being taken into account and, if so, whether they have improved the outcomes. This gives a critical point of comparison for this study: whether the policy, in the form of the identified reports, describes the same CSFs as those found in the theory, in the form of the scholarly literature, so providing the basis for answering the first subsidiary question. Given these factors, the literature review question was framed as follows:

> Within the public sector, has the identification of CSFs influenced the management of complex IT projects to optimise performance?

Denyer et al suggest developing this argument using four factors: Context, Intervention, Mechanism and Outcome (CIMO).[20] These fit well with the conceptual framework, identified in Chapter One and shown again at Figure 2.2, annotated with CIMO. This clearly demonstrates how the literature has informed the conceptual

**Figure 2.2. Conceptual Framework and CIMO**




**Source: Author**

framework and how the conceptual framework is, in turn, structuring the study. In accordance with the systematic review methodology, subsidiary questions are then asked about each of these parts, helping to scope the review and taking account of why and how relationships occur between the CIMO parts, and in what circumstances, as shown at Table 2.1.[21]

**Table 2.1. Research Question and Subsidiary Questions**

| **Within the public sector (C), has the identification of CSFs (I) influenced the management of IT projects (M) to optimise performance (O)?** |
|---|
| **Context**<br>Which individuals, relationships, institutional settings or wider systems are being studied? |
| **Intervention**<br>The effects of what event, action or activity are being studied? |
| **Mechanism**<br>What are the processes that explain the relationship between Intervention and Outcome? |
| **Outcome**<br>What are the effects of the Intervention?<br>How will the impact of the Intervention be measured?<br>What are the intended/unintended effects? |

**Source: Author**

Having identified the questions and scoped the review, a literature search was carried out using four electronic databases produced by leading publishers in business and management research: ABI-Inform, Ebsco Business Source Complete, Emerald, and Taylor and Francis Informaworld. Taken together, these give extensive coverage of the relevant literature in this subject area. In each instance, the advanced search option was selected and the terms ‘project and failure’ and then ‘project and success’ were searched, firstly in the article title field and then in the keyword field. The search was limited in three ways: peer-reviewed journals written in English and dating from 1980, the decade that saw IT being adopted in the workplace. The results were judged according to their relevance, as shown in the criteria for inclusion at Table 2.2 and the citation details of selected papers were stored in a Microsoft Excel spreadsheet. The resulting database was then divided into two areas: studies of generic project management and those that specifically focus on IT project management.

**Table 2.2. Literature Review: Criteria for Inclusion**

| **Stages** | **Criteria for Inclusion** |
|---|---|
| **Stage 1: Limits** | Peer-reviewed |
| | 1980 to date |
| | English language |
| **Stage 2: Relevance of Paper** | Subject:<br>Examining success or failure in projects both generally and specifically (i.e. case studies)<br>Reporting projects in relevant organisations |
| | Excluding:<br>Introductions to general project management for specific disciplines (i.e. Project Management Success for Accounting);<br>Portfolio management;<br>Project scheduling;<br>Project management structures;<br>Project control (i.e. specific financial detail like Earned Value Analysis, Net Present Value etc);<br>Outsourcing projects;<br>Management consulting projects. |
| | Methodology:<br>High quality<br>Defensible<br>Reliable and valid data |

**Source: Author**

After assembling the relevant sources, the data analysis and synthesis was undertaken. Each paper was read to see if it addressed the review questions, using a set of explicit selection criteria, based on Wallace and Wray’s critical analysis template, which is shown at Appendix 1.[22] This queries the purpose of each paper, its methodology, its relevance and use to the literature review. Information for every study included in the review was stored in the database to provide an audit trail from this review to the underlying evidence. An analysis was then carried out on the relationships between the studies, enabling associations to be made. This resulted in the extraction of the key material for review. Detailed decisions were recorded, precisely specifying the basis on which information sources were either included or excluded. This makes the reviewer's decisions available for scrutiny and evaluation whilst also making the logic informing those decisions visible. The references in the selected papers were then used to source other relevant literature, enabling the review to move through a variety of sources, as advocated by Bates.[23] This process continued throughout the writing of this thesis, ensuring that the literature review remained current. The final stage of this systematic review is reporting and using the results, which is the purpose of this chapter. As discussed above, it also seeks information relating to the subsidiary questions, as well as a means to measure the Intervention, the identified CSFs, and the Outcome, the impact of the CSFs. Following the CIMO structure, it begins by looking at the Context, which seeks to define the individuals, relationships, institutional settings or wider systems being studied.

## 2.3. Context

The conceptual framework situates the Technical Solution within a series of contextual layers. It is the outer layer, the Programme, Policy and Political Context, which makes government different, as argued in Chapter One. Intellect, the IT trade body, drew similar conclusions in its 2003 report, *Getting IT Right for Government*, highlighting accountability, publicity and the political environment as key differences and recognising the additional complexity that the government context brings, as shown at Table 2.3.[24]

This section of the review considers the academic literature concerned with the specific impact of that government context on an IT project. However, despite the high profile failure of public sector IT projects, very few sources were identified. Only twelve articles referred to 'government' or 'public sector' in their titles and, of

**Table 2.3. Private and Public Sector Projects Compared**

| Successful Private Sector Projects | Successful Public Sector Projects |
|---|---|
| Focused on measurable financial and service outcomes | Multiple aims so hard to measure |
| Business driven by competition | Generally not in competition with other projects |
| Often not visible to the public or shareholders | Highly visible to the public and the media |
| Less constrained by legislation and regulations | Constrained by UK and EU legislation |
| Open to risk taking | Managed in a risk averse culture |
| Designed to limit damage when they are in difficulty | Difficult to adapt to change because of scale and complexity |
| | Likely to interact with other departments |

**Source: Intellect, *Getting IT Right for Government*, (HMSO, London, 2000).**

those, only six specifically examined the effect of that context on the project and its management, one relating to the Australian public sector, one to the US, three to the UK and one comparing government experience across seven countries. Although there are sources that discuss the Defence context, none of them specifically examine its effect on an IT project. Rosacker and Rosacker confirm these findings, observing in 2010 that the separate fields of project management, IT project management and public sector management are well developed, but that empirical research on public sector IT project management remains in its infancy.[25]

In 1995, Hackney and McBride considered the effect of context and culture on IT projects in the UK, looking at 21 local authorities and three hospitals.[26] They identified three layers within the government context, albeit slightly different to those driving this study: external (legislative, commercial and social forces); organisational (infrastructure, management style and grouping of actors within interest groups); and individual (views of reality, agendas and interactions). A series of problems stem from these layers, including the cultural decentralisation of IT projects, causing "an unplanned proliferation of disparate systems"; IT personnel over-emphasising operational systems to the detriment of management information systems; and the reinforcement of barriers between sub-cultures through incompatible information systems.[27] Hackney and McBride conclude that IT departments need to improve their understanding of the context and culture of their organisations.

Writing in 2001, Brown identified three problem areas in the UK public sector: software development; insufficient management capacity; and procurement methods.[28] The large, complex and ambitious IT projects in government often ignore the needs of their users and opt for leading edge technology, a situation set to continue as long as the Government is under pressure to provide Value for Money (VfM).[29] However, complex IT requires complex hardware and software.[30] This is further complicated by the speed with which technology changes and the degree of novelty involved.[31] Despite these ambitions, there is a recognised shortage of in-house, specialist IT project development staff in government, which is unable to match private sector remuneration.[32] This results in projects being outsourced to external consultants and contractors. However, the lack of skills and knowledge makes it equally difficult to judge the suitability and viability of the products offered by the private sector or to manage the ensuing contractual process. Brown also raises questions about whether external personnel understand the context sufficiently, linking to Hackney and McBride's observations about the need to understand the context and culture.

Finally, Brown discusses the government procurement process. Writing in 2001, he questions the use of the Private Finance Initiative (PFI), which the Government subsequently withdrew from use for IT projects.[33] In preference to PFI, Brown advocates developing partnerships with suppliers, along the lines of Public-Private Partnership (PPP), as they hold the power in this imperfect market, where the general demand for IT services outstrips supply with supply, therefore, controlling price. Brown also suggests breaking projects into modular phases, rather than taking a 'big bang' approach.[34] This has been happening in the private sector for some time.[35] In 2003, for example, following a series of failures at the financial services company, Save & Prosper, a policy was introduced that all new projects should deliver a return on investment within six months, resulting in smaller projects with lower risks, delivering better results, faster.[36] Despite this, government continues with its massive projects of almost limitless complexity. However, a recent report by the Institute for Government, a cross-party think tank, berated this outdated model with its traditional linear approaches, pre-defined specifications and solutions procured and delivered against a pre-determined timetable that cannot keep pace with rapid technology change.[37] The report calls for a combination of 'platform' and 'agile development': a "shared government-wide approach to IT procurement and development" along with the use of modular and iterative development techniques.[38]

At the end of his article, Brown ponders the public sector culture. From the staff perspective, successful projects mean personnel reductions, reduced budgets due to expected business benefits and, probably, another large and complex project; failure means that staff remain in post with budget intact, unlikely to be subjected to another IT project in the short-term.[39] While somewhat cynical, this view reinforces the need to understand the context into which the project is being introduced. Brown's conclusion is that the public sector needs to embrace organisational learning by recognising its mistakes, learning from them and then communicating those lessons to others.[40]

Reviewing projects in the Australian public sector in 2009, Crawford and Helm advocated the need to achieve value by:

- Demonstrating accountability and transparency to satisfy multiple stakeholders whilst implementing policy, utilising resources and delivering services; and
- Focusing on improving organisational performance, while implementing and adapting to change. [41]

They also note the significant impact of politics on projects, with changes in ministerial appointment potentially resulting in changes in political direction. They describe ministers as "highly influential and unpredictable stakeholders and sponsors to whom it is necessary to respond as a priority".[42] They also note the many levels of accountability (to parliament, to taxpayers, to the community and to business) and the need for significant compliance with complex legal and legislative frameworks.

In 2010 and writing from the US perspective, Rosacker and Rosacker concurred with Crawford and Helm, noting that, in comparison to the private sector, public sector managers receive a higher level of scrutiny from a broader range of stakeholders, all of whom can potentially challenge their decisions. [43] This accountability means that strategic decisions tend to be in the public domain from very early in the project lifecycle, severely hampering the ability to control and manage IT projects.[44] In line with Brown as well as Crawford and Helm, they note the constraints of laws and regulations, referring specifically to the Clinger-Cohen Act in the US, discussed in more detail in Chapter Four, which requires US IT projects to follow best practice. However, as Rosacker and Rosacker observe, this may not be clearly defined in practical or operational terms, making it difficult for project managers to ascertain what 'best practice' actually means.[45]

If government is different because of its Programme, Policy and Political Context, then the logical conclusion is that all governments must face similar problems with their IT projects. The above discussion suggests some similarities but Dunleavy and Margetts tested this hypothesis in 2006, carrying out a comparative study of seven countries.[46] They scored the performance of IT projects in Australia, Canada, Japan, the Netherlands, New Zealand, the UK and the US between 1990 and 2003 to find sharp variation. The UK leads the field in terms of cancelled or non-functioning projects, while Japan and the Netherlands have the fewest failures.[47] The Japanese claim that only one of their public sector IT projects has been cancelled in the past twenty years, perhaps due to a culture where failure is unacceptable and, therefore, unthinkable.

The fact that some governments have a better record of implementing IT suggests that the problems in the UK are not insuperable. It also suggests that the failures may relate to specific problems with government processes in the UK, rather than with IT projects *per se*. As discussed above and in Chapter One, these include complexity, scale, lack of professional skills and the procurement process. The UK also has a tendency to run services at a national, rather than regional, level: for example, driving licenses are administered centrally in the UK, but locally in many other countries.[48] Automating national government services inevitably results in large-scale, complex IT projects. Dunleavy and Margett's study also points to the culture of 'political hyperactivism' in the UK with Parliament regularly altering legislation and regulations.[49] The resulting redesign of processes may no longer fit the original IT system design, causing major problems during development and implementation, as demonstrated by the doomed IT project at the Child Support Agency in 2003.[50]

Although the literature provides relatively little information about the impact of the Programme, Policy and Political Context, it does confirm some of the specific issues faced by project managers working in this context. Intellect highlights issues of accountability, size and complexity along with legal and political constraints. Hackney and McBride confirm the vertical, insular culture, discussed in Chapter One, whilst Brown highlights complexity, technical over-ambition, a lack of skills, cumbersome processes and, again, cultural issues. Looking at the Australian and US contexts respectively, Crawford and Helm along with Rosacker and Rosacker identify similar issues of accountability, transparency and political short-termism. Dunleavy and Margetts pick up on some of these points, identifying particular problems with IT project implementation in the UK public sector. Overall, this section of the review confirms that the management of the Technical Solution occurs in a highly specific context that impacts upon it in potentially detrimental ways. Therefore, this discussion now turns to the interventions that can be used to improve that project management process, the CSFs.

## 2.4. Intervention

Intervention refers to the effect of one event, action or activity on another, usually describing something deliberate and designed to bring about change. This section of the literature review is concerned with the identification of that action, the application of CSFs to project management. In 1988, de Wit made a clear distinction between project success and project management success.[51] Project success is based on success criteria, the performance of the project's ultimate product, discussed here under the heading 'Outcome' at Section 2.6.[52] Project management success is concerned with CSFs, those inputs to the management of a project that lead directly or indirectly to its success.[53] However, despite de Wit's efforts, there is still considerable overlap between the two in the literature, making it difficult to disentangle them. The purpose of this section is, therefore, to examine how academic thinking about CSFs in relation to project management and projects has evolved over the past thirty years. It begins with an overview of the generic project management literature before considering IT project management and then cross comparing. It should be noted that the two are often treated as interchangeable, an approach that is questioned here. Both have an extensive literature base, narrowed down as a result of the systematic approach to this literature review.

### 2.4.1. CSFs in the Generic Project Management Literature

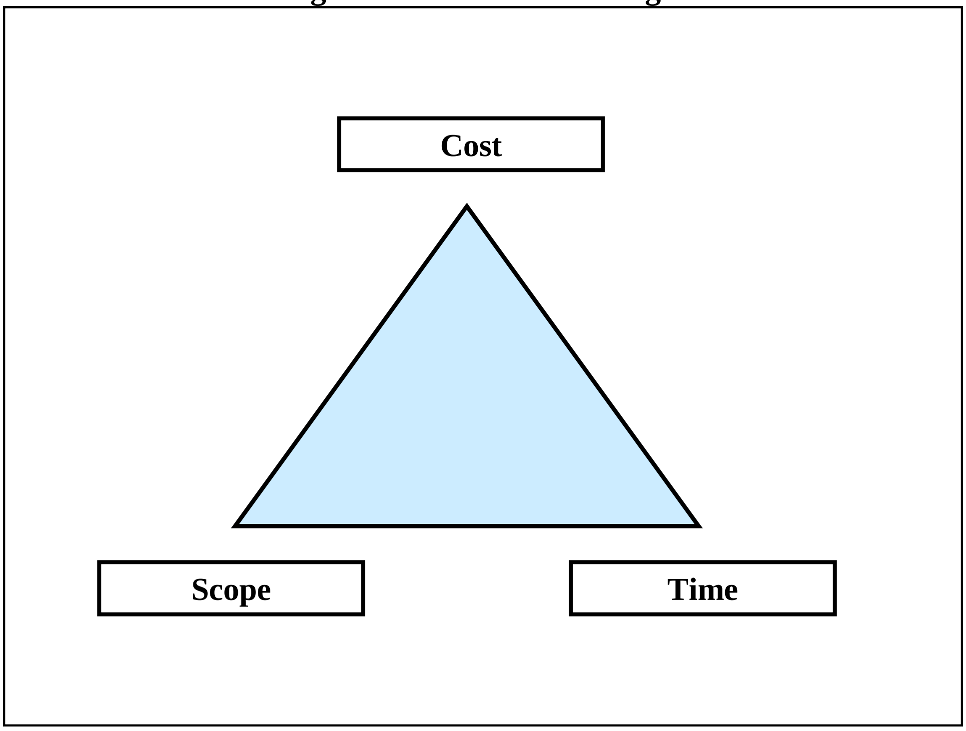
The idea of CSFs derived from the work of Daniel in 1961 and was formally defined by Rockart in 1979.[54] He suggested that a CSF analysis would identify "...the limited number of areas in which results, if they are satisfactory, will ensure successful competitive performance for the organization".[55] Working with Bullen, he later broadened the definition, seeing their utility as a planning tool for IT projects, although they are also used extensively in generic project management.[56] In 1984, Boynton and Zmud offered the following definition:

> Those few things that must go well to ensure success for a manager or an organization *(sic.)*, and therefore, they represent those managerial or enterprise areas that must be given *special* and *continual* attention to bring about high performance (emphasis in original).[57]

This focus on a 'few key areas' has resulted in a significant number of studies over the past fifty years attempting to produce a definitive list.[58] Early work tended to concentrate on the three classical elements of project management, the so-called 'iron triangle', as shown at Figure 2.3: the management of resource consumption (cost); the setting of specifications, requirements or quality (scope); and delivering to a finite timescale (time).[59] Whilst still extensively used, the iron triangle is subject to a range of criticisms.[60] Jugdev and Muller observe that calculations about cost, scope and time are made during the planning phase.[61] As such, Atkinson labels them as "two best guesses and a phenomenon", based on incomplete data and highly likely to change over the project lifecycle.[62] In addition, they only measure the project delivery phase, ignoring any longer term benefits from the product and reflecting only the concerns of the project team, rather than the broader aspirations of the stakeholders.[63]

Despite these criticisms, the iron triangle persists. In 2003, Dvir et al studied a range of projects, including a number in the Defence context, to find that a well designed initiation phase is the most important factor in project success; organisational set-up and project structure are not good predictors. Formal design and planning documents

**Figure 2.3. The Iron Triangle**




**Source: Atkinson, R., 'Project management: cost, time and quality, two best guesses and a phenomenon, it's time to accept other success criteria', *International Journal of Project Management*, 1999, Vol. 17, No. 6, pages 337-342, this page 338.**

help in meeting time and budget constraints as well as ensuring customer satisfaction, whilst scope changes during the project lifecycle are unlikely to improve the end product and may actually detract from user satisfaction.[64] Their work highlights the rigour of the iron triangle in keeping the project on track, confirmed by Jugdev and Muller's defence of its continued utility in 2005. If used intelligently, they argue, it can add value, providing a means of clearly assessing the efficiency and effectiveness of the project management as well as checking the business value of the outcomes.[65] However, limiting measurement to the iron triangle provides only tactical or operational value rather than any strategic worth.[66]

Since the 1980s, much research has taken place to move the idea of CSFs beyond the iron triangle and a number of themes have emerged, including the differentiation of the project from its product; consideration of more complex, multi-dimensional and integrated CSF frameworks; the examination of organisational and managerial variables beyond the immediate project; the rise of a contingency based approach; and, most recently, strategic project management. The emerging realisation that the project should be differentiated from its product can be tracked through a series of seminal papers by Pinto and his fellow researchers, as shown at Table 2.4. These stem from a 1986 paper written by Slevin and Pinto, presenting a comprehensive list of ten CSFs, confirmed in three subsequent studies. In 1987, Schultz, Slevin and Pinto categorised these ten factors as either 'strategic', important during the planning phase, or 'tactical', important during the project phase.[67] In 1988 and 1989, working with Slevin and then Covin, Pinto confirmed "that CSFs vary throughout a project lifecycle with some important in the early stages whilst others become critical later".[68] The important factors in the early stages are 'internal' (i.e. project related): meeting budget, schedule and technical performance; while 'external factors' (i.e. product related), such as customer needs and satisfaction, become more important later.[69] In other words, the focus is on the project during planning and development but moves to the product during implementation and operations. However, there seems to be an inherent danger in separating the two and, in particular, in not considering the CSFs for the product throughout both lifecycles.

Further work with Slevin in 1989 looked at 159 R&D projects, including computer software and hardware development, to identify four additional factors, also shown at Table 2.4. The first ten are within the control of the project team, while the final four may not be.[70] These are: the 'characteristics of the project team leader'; 'power and politics' (the degree of political activity within the organisation and the perception that the project may further the self-interests of specific individuals); 'environment' (the likelihood of external factors affecting the operations of the project team, either positively or negatively); and 'urgency' (the perceived importance of the project or the need to implement it as soon as possible). Based on this research, Pinto and Covin went on to compare R&D with construction projects, again confirming that factors vary over the lifecycle.[71]

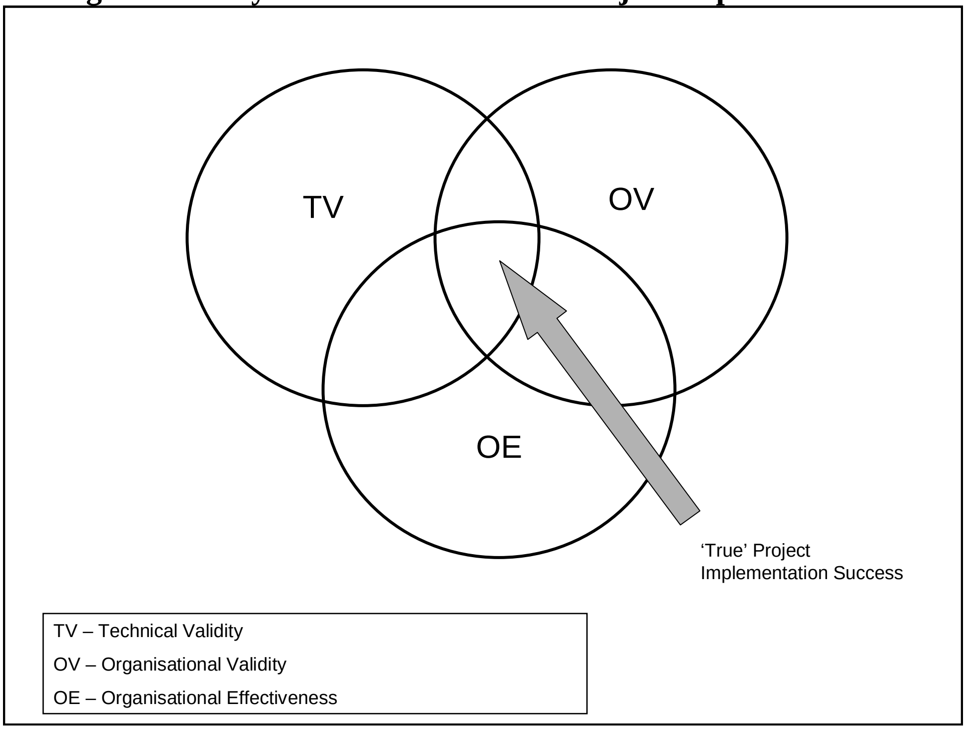
## Table 2.4. Slevin and Pinto: Ten CSFs

<table>
<tr><th>Source</th><th>CSFs</th></tr>
<tr><td>Slevin, D.P. and Pinto, J.K., ‘The Project Implementation Profile: New Tool for Project Managers’, Project Management Journal, 1986, Vol.17, No.4, pages 57-71.</td><td rowspan="2">1.Project mission 2.Top management support<br>3.Schedule/plans 4.Client consultation<br>5.Personnel 6.Technical tasks<br>7.Client acceptance 8.Monitoring and feedback<br>9.Communication 10.Troubleshooting</td></tr>
<tr><td>Pinto, J.K. and Slevin, D.P., ‘Critical Factors in Successful Project Implementation’, IEEE Transactions on Engineering Management, 1987, Vol.34, No.1, pages 22-28.</td></tr>
<tr><td>Schultz, R.L., Slevin, D.P. and Pinto, J.K., ‘Strategy and Tactics in a Process Model of Project Implementation’, Interfaces, 1987, Vol.17, No.3, pages 34-46.</td><td>Planning Phase (Strategy):<br>Clearly defined goals Sufficient resource<br>Top management support Schedule/plans<br>Project Process (Tactics):<br>Personnel Client consultation<br>Communication Troubleshooting<br>Client acceptance Monitoring and feedback</td></tr>
<tr><td>Pinto, J.K. and Slevin, D.P., ‘Critical Success Factors across the Project Life Cycle’, Project Management Journal, 1988, XIX, pages 65-75.</td><td rowspan="2">1.Project mission 2.Top management support<br>3.Schedule/plans 4.Client consultation<br>5.Personnel 6.Technical tasks<br>7.Client acceptance 8.Monitoring and feedback<br>9.Communication 10.Troubleshooting</td></tr>
<tr><td>Pinto, J.K. and Prescott, J.E. 'Variations in Critical Success Factors over the Stages in the Project Life Cycle', International Journal of Project Management, 1988, Vol. 14, No. 4, pages 5-18.)</td></tr>
<tr><td>Pinto, J.K. and Slevin, D.P., 'Critical Success Factors in R&D Projects', Research Technology Management, 1989, Vol. 32, No.1, pages 31-36.</td><td>1.Project mission 2.Top management support<br>3.Schedule/plans 4.Client consultation<br>5.Personnel 6.Technical tasks<br>7.Client acceptance 8.Monitoring and feedback<br>9.Communication 10.Troubleshooting<br>Plus<br>Characteristics of the project team leader<br>Power and politics<br>Environmental events<br>Urgency</td></tr>
<tr><td>Pinto, J.K. and Slevin, D.P., 'Project Success: Definitions and Measurement Techniques', Project Management Journal, 1989, Vol. 19, No. 1, pages 67-75</td><td>CSF Framework:<br>Technical validity<br>Organisational validity<br>Organisational effectiveness</td></tr>
<tr><td>Pinto, J.K. and Covin, J.G., 'Critical Factors in Project Implementation: a Comparison Study of Construction and R&D Projects', Technovation, 1989, Vol.9, No.1, pages 49-51.</td><td>Construction: Conceptual – Mission<br>Construction: Planning - Mission; Power and Politics; Technical Tasks<br>Construction: Execution - Mission; Schedule; Client consultation; Client Acceptance<br>Construction: Termination - Technical tasks; Mission; Communication; Troubleshooting<br>R&D: Conceptual - Mission; Client Consultation; Personnel; Urgency<br>R&D: Planning - Mission; Environmental effects; Schedule; Monitor and feedback; Client acceptance<br>R&D: Execution - Mission; Technical tasks; Top management support<br>R&D: Termination - Mission; Schedule; Client acceptance; Technical tasks; Personnel</td></tr>
</table>

**Source: Author**

In 1989, Pinto and Slevin integrated and synthesised their earlier work to develop a framework for project management success, shown at Figure 2.4. It describes an overlap between technical validity (budget and schedule), organisational validity (client satisfaction in terms of product use and benefits to the end user through increased efficiency or employee effectiveness) and organisational effectiveness (value in terms of positive impact, merit or improved efficiency), demonstrating that the factors leading to project success are multi-dimensional and interlinked.[72] Two key themes emerge from this: the project must be technically correct and perform as intended, while the project team must work with the client organisation to ensure acceptance of the project.[73]

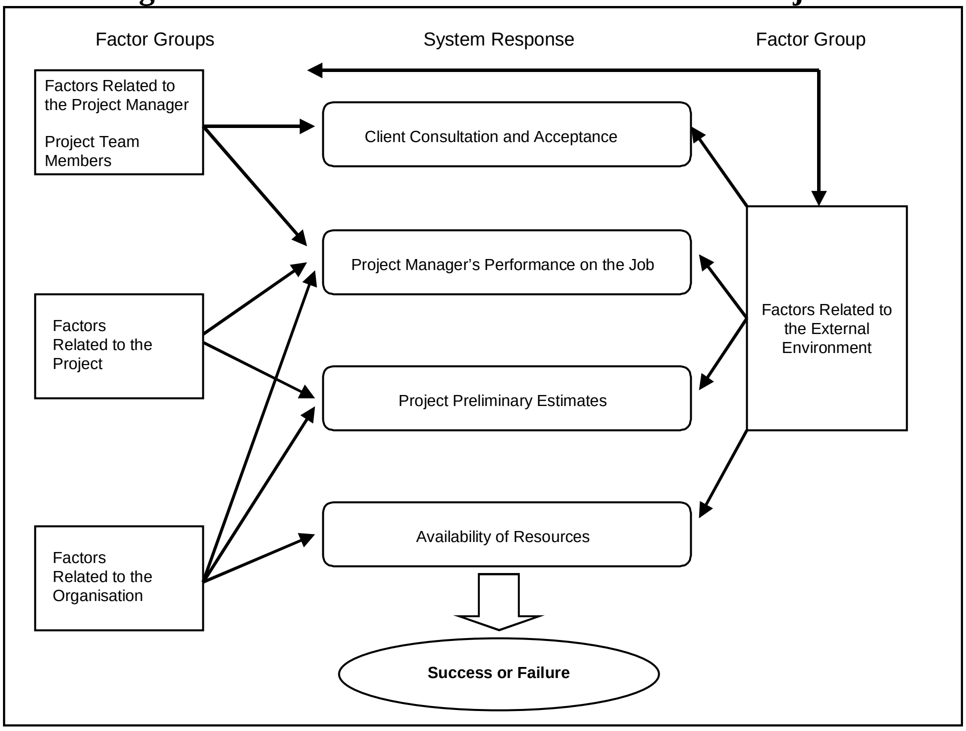
**Figure 2.4. Key Factors in Successful Project Implementations**




**Source: Pinto, J.K. and Slevin, D.P., 'Project Success: Definitions and Measurement Techniques', *Project Management Journal,* 1989, Vol. 19, No. 1, pages 67-75, this page 69.**

Despite this early work on frameworks, the mid 1990s saw Belassi and Tukel complaining about the continued proliferation of lists of CSFs, varying in scope and purpose and either too general or too specific.[74] They argue that it is not individual CSFs that cause project management success or failure but a combination of multiple factors varying in importance as the project progresses through its lifecycle. Their argument confirms and extends the work of Pinto and his colleagues. Belassi and Tukel created a framework, shown at Figure 2.5, consisting of four categories of CSFs relating to the project; the project manager and team; the organisation; and the external environment.[75] The full description of these factors is shown at Appendix 2.

**Figure 2.5. Critical Success/Failure Factors in Projects**




**Source: Belassi, W. and Tukel, O.I., 'A New Framework for Determining Critical Success/Failure Factors in Projects', *International Journal of Project Management,* 1996, Vol. 14, No.3, pages 141-152.**

This developed thinking about CSFs by integrating the project dimensions with both organisational and environmental factors. In addition, the framework clearly identifies the implications of these factors not being addressed, as well as detailing the relationships between individual factors and between different groups of factors. Belassi and Tukel stress that these interrelationships are as important as the individual factors. Therefore, it is a combination of several factors from various groups that might lead to success or failure. As they rightly observe, lists of CSFs provide no mechanism for taking these interrelationships into account.[76]

In line with Belassi and Tukel's work, the 1990s saw an increasing emphasis on the organisational and managerial elements of a project, although less emphasis on environmental factors. In 1992 and still listing CSFs, Freeman and Beale offer communication management, personal growth, efficiency of execution, managerial implications, organisational implications (customer satisfaction), manufacturability and business performance.[77] In 1993, Turner highlighted the need to achieve the business purpose and provide satisfactory benefit to the owner, user and stakeholders.[78] Considering the impact of managerial and organisational variables on project success in 1996, Tischler et al focused on the project team: its coherence; managers who are leaders; the level of technical qualifications; the stability of key personnel throughout the development phase; and a professionally experienced project manager.[79] In 1999, Dvir and Ben David also focused inwards to the organisation of the project team but with some reference to wider organisational factors: team cohesion; the project team's perception of the project's importance; the readiness to accept new ideas; creating an atmosphere of partnership; involvement and identification of team members; distribution of lessons learned from previous projects; creating an organisational culture that encourages cooperation; and a sense of identification with the project goals.[80]

As well as this growing awareness of organisational issues, there has also been recognition that not all projects are the same and that they should, therefore, be managed in different ways using different CSFs. Pinto and Covin highlight the academic tendency to characterise all projects as similar, ignoring any difference in goals or degree of uncertainty confronted.[81] Comparing construction and R&D projects in 1989, they noted that some CSFs were common to both types of project, but that there were also significant differences.[82] A year later, Pinto and Mantel also examined different types of project to find variance.[83] They argue that each project is unique and, therefore, little in the way of general project management theory can be applied to a particular project in a specific context.[84] Thinking along similar lines in 2001, Shenhar moved the discussion towards the application of contingency theory to project management.[85] Proposed by Burns and Stalker[86] in 1961, Lawrence and Lorsch further extended classical organisational contingency theory in 1967,[87] as did Perrow[88] that same year. In its generic form, it states that a range of external conditions (contingency factors) impact on the organization. The effectiveness of that organisation then depends on how it deals with these factors to maintain its fit with the environment.

Pich et al also picked up on this idea that projects depend on their context, the 'state of their world', and the chosen network of actions within that context.[89] In their view, the project management discipline with its requirement for task scheduling and risk management represents an 'instructionist' approach, meaning that pre-specified actions are triggered by pre-determined signals. In order to be able to take the appropriate action, the project manager needs to have sufficient available information about the state of the world. However, with a project operating in an ambiguous or complex context, there is likely to be inadequate information and it is then a combination of knowledge and skills that enables the selection of the best course of action. Similarly, in 2010, Lauras et al highlight the difficulty faced by the project manager in trying to control a number of performance indicators or CSFs.[90] They question whether this is possible in a very complex project environment, particularly if that project is unique and subject to its context.[91] That same year, Howells et al proposed their Project Contingency Theory (PCT), arguing that every project operates in a different context and should be managed accordingly.[92] They argue that the one size fits all approach is sub-optimal and that a project's structure and management practices should be tailored to suit its context. Despite these persuasive arguments, application of contingency theory to project management remains rare.[93]

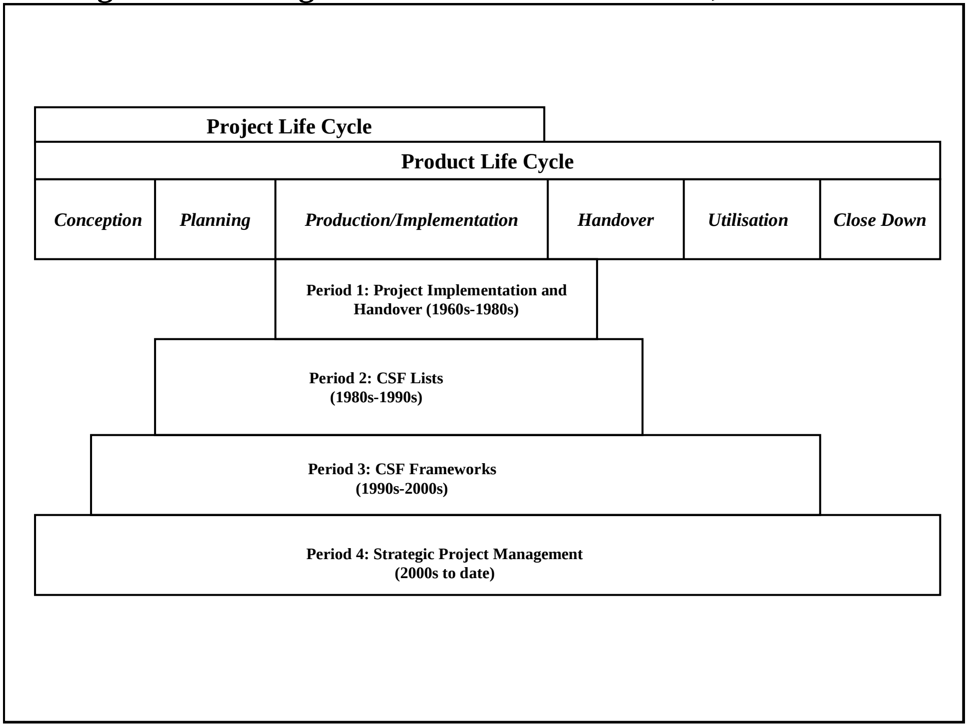
In 2001, Lyneis et al moved the debate into the strategic management arena, raising a number of important issues on the way. Concurring with Pich et al, they argue that project management takes a partial or narrow view, focusing on either soft or hard factors when both are simultaneously important.[94] They also contend that, if each project is unique, then learning across projects is difficult, which may be why project managers continue to make mistakes. Given this, project managers need to think about projects strategically during the design phase; when determining which indicators to measure, monitor and control; as part of the risk management process; to incorporate learning from past projects; and when making mid-course corrections.

In 2004, Shenhar argued for Strategic Project Leadership, particularly for strategic projects initiated to create a company's future competitive advantage.[95] Not only is every project unique, but different types of project require different types of leadership. In 2006, Milosevic and Srivannaboon also considered the alignment of project management with business strategy, looking at how project management influences business strategy and *vice versa*.[96] Linked to this and writing in the same year, Dvir et al define four factors for success with an essential and urgent operational need being the most important.[97] If a project is considered important by its end-users, then it has a better chance of being completed successfully. The other three factors are the cohesion of the development team; the exact definition of the operational and technical requirements of the end-product; and the importance of learning mechanisms with specific reference to the success of Defence projects.[98] Learning from past experience, they argue, can substantially improve the chance of success. In 2009, Pinto et al moved the discussion beyond the project team to discuss the relationships among project stakeholders and the importance of trust, particularly between project team and contractors.[99]

In 2009, Cooke-Davies et al explored how an organisation's strategy might influence not only the nature of the projects that it undertakes but also the appropriateness of the project management processes that it adopts.[100] The degree of fit between an organisation's strategic drivers of value and the configuration of its project management system influences the value that it obtains from its project management. Project success is, therefore, related to the right management approach, which is, in turn, related to the characteristics of the specific project. They suggest that a project could have a similar influence on organisational strategy.

This summary of academic progress to date on CSFs and generic project management is supported by the work of Jugdev and Muller in 2005. [101] Their timeline, shown at Figure 2.6, describes the evolution of academic understanding, confirming and updating previous work by Kloppenborg and Opfer in 2002.[102] It demonstrates how the focus has shifted from the project lifecycle to incorporate the product lifecycle and from lists of CSFs to more sophisticated frameworks to describe interventions that might lead to success. More recently, the emphasis has switched to strategic project management. Jugdev and Muller based their study on 30 North American articles, using supplementary evidence from a few non-specified European articles to verify their findings. It is, therefore, US-centric and does not differentiate between generic and IT project management. Whilst broadly confirming Jugdev and Muller's work, this discussion demonstrates that thinking about CSFs has not evolved in neat incremental stages but that ideas have emerged and re-emerged at various points

**Figure 2.6. Changes in the Measures of Success, 1960 to 2005**




**Source: Jugdev, K. and Muller, R., 'A Retrospective Look at our Evolving Understanding of Project Success', *Project Management Journal*, December, 2005, Vol. 36, No. 4, pages 19-31, this page 23.**

without becoming fully embedded as theory. This results in considerable overlap in the defined periods, making them slightly artificial. Overall, however, this review confirms the gradual move from lists to frameworks and to ideas about contingency and strategic management, along with the extension of the lifecycle from project to product. This suggests that that the notion of 'a few key areas' applicable to all projects in all contexts is too simplistic for an increasingly complex world and that it is the work on contingency theory and the resulting frameworks that may contain the answers to project failure.

There is evidently much to learn from the project management literature and much to inform anyone embarking on an IT project. However, this review now turns to the scholarly debate surrounding IT project management to compare the evolution of thinking. The discussion begins by questioning whether this differentiation is useful to an examination of CSFs in terms of IT project management or whether the same rules apply to a project whatever its ultimate product.

### 2.4.2. CSFs in the IT Project Management Literature

Research on IT project management shows the same tendency to produce lists of CSFs. However, there are some evident differences from the generic studies. From early on, the IT project management literature contains reference to the complex organisational and cultural issues. There is also an earlier move to CSF frameworks. It is likely that these differences are due to the unique nature of IT projects. In 1986, Spector and Gifford noted that IT design is one of the least classical of the engineering disciplines with products that are often poorly understood, unmanageably complex and unreliable.[103] Pinto and Covin highlight the greater risks, unique requirements and processes, unpredictable outcomes and difficulties with the scheduling of IT projects.[104] In 1996, Morris suggested that these characteristics of IT projects might be the cause of failure:

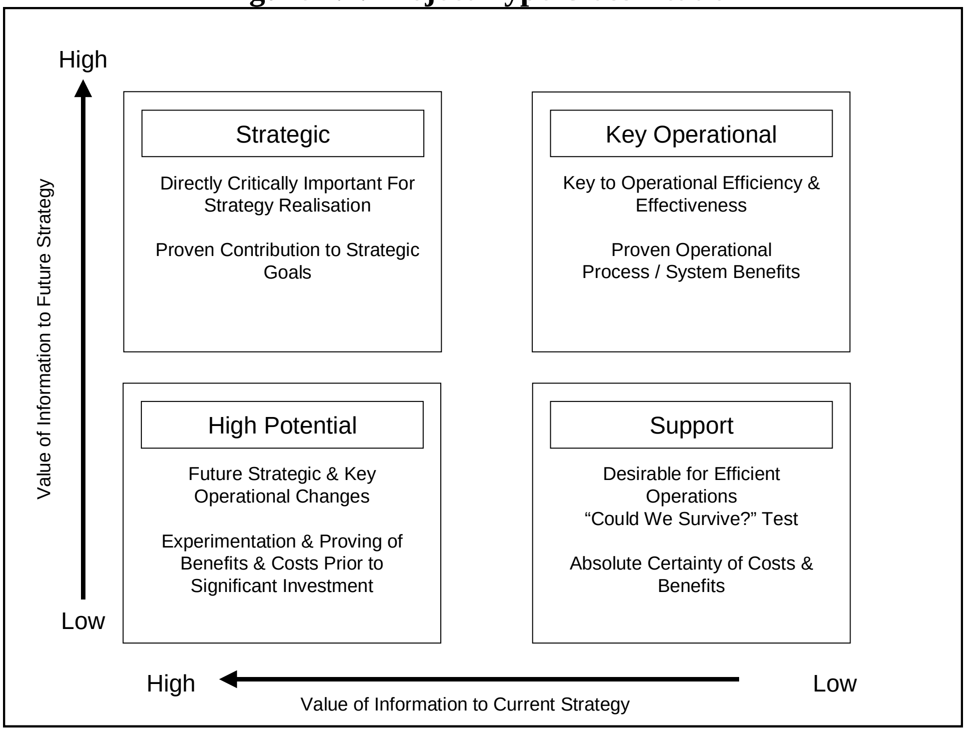
> IT projects do indeed pose a particular class of management difficulty. The essence of this difficulty is the way that information technology is so intimately bound into its organisational contexts. As a result, issues of organisational effectiveness and user involvement are both more complex and more prominent in IT projects than they are in most other project industries. This puts much greater emphasis on the tasks of project definition and user involvement in IT than in other project situations.[105]

In 2005, Fitzgerald and Russo argued that the many studies of IT projects indicate that failure is largely due to organisational and social rather than technical factors.[106] In 2006, Kappelman et al went so far as to assert that "IT projects never fail because of technical causes, despite the fact that people and process problems may manifest technically".[107] The technical problems with IT projects can be traced back to people and process, which then exploit any inherent product risks, such as large size, high complexity or novel technology.[108]

The generic project management literature recognises that there are specific types of project in specific contexts, leading to the application of contingency theory rather than rigid project management protocols and moving thinking towards strategic project management. It is evident that there is a strong argument for differentiating IT projects from other forms of project. However, is it then sufficient to say that all IT projects fit into the same category or are there different types of IT project? The discussion about IT project type has expanded into a whole literature on IT portfolio management, which is beyond the scope of this review. Therefore, this discussion focuses on the work initiated by McFarlan in 1981, who argues that the differentiation of IT projects provides a means of assessing specific risks prior to project implementation. In his view, the level of risk is determined by the size and structure of the project combined with the organisation's experience with the technology involved.[109]

Ward and Griffiths picked up on this work in 1996 with their portfolio model for identifying types of IT project, as shown at Figure 2.7.[110] They argue that the main point of an information system is to add value by exploiting information as a core business resource but that there are four different types of IT project that might deliver this value. A strategic IT project is associated with business drivers,

**Figure 2.7. Project Type Classification**




**Source: Ward, J. and Griffiths, P., *Strategic Planning for Information Systems*, (Chichester, Wiley, 1996), page 364.**

objectives or measure of success and is crucial to strategic and competitive business initiatives. As such, it represents the greatest potential value to the business. A high potential project has unproven but potential value to the business and needs to be rapidly evaluated to confirm this. Most projects are key operational, supporting primary processes that are essential to the day-to-day running of the organisation. Support projects are necessary but have low intrinsic value to the business.

Ward and Griffith's work provides a useful precursor to the use of CSFs in project management. The first stage is to understand the type of project that needs to be managed and then to identify the CSFs that are most likely to be relevant to such a project. Different projects require different management approaches.[111] Potentially, this improves the identification of those areas of management that need special and continual attention to deliver success, whilst further reinforcing the need for a contingency approach to projects rather than attempting to apply a general-purpose set of tools.[112]

These observations justify the decision to review the project management literature in two parts. They also explain the much earlier concentration on socio-technical and organisational factors in the IT project management literature and the greater concentration on frameworks as opposed to lists as a means of capturing the ensuing complexity. Of particular interest here is work by Markus and Robey in 1983, Davis et al in 1992, Sauer in 1993, Heeks et al in 1999 and Fortune and Peters in 2005, all of whom attempt to group and coherently integrate lists of CSFs into frameworks, describing not only the areas that need to be managed to achieve success but also the interactions between them.

In 1984, Markus noted that,

> The impacts of systems are not caused by system technology or by the people and organisations that use them but by the interaction between specific system design features and the related features of the organisational setting.[113]

In her work with Robey the previous year, she set out the concept of 'organisational validity', predating Pinto and Slevin's framework linking organisational validity with technical validity and organisational effectiveness by five years, to identify four levels of analysis that can be used to explain IT implementation problems, as shown at Table 2.5.[114] Pliskin et al went on to suggest a fifth level, the culture-system level,

**Table 2.5. Levels of Analysis**

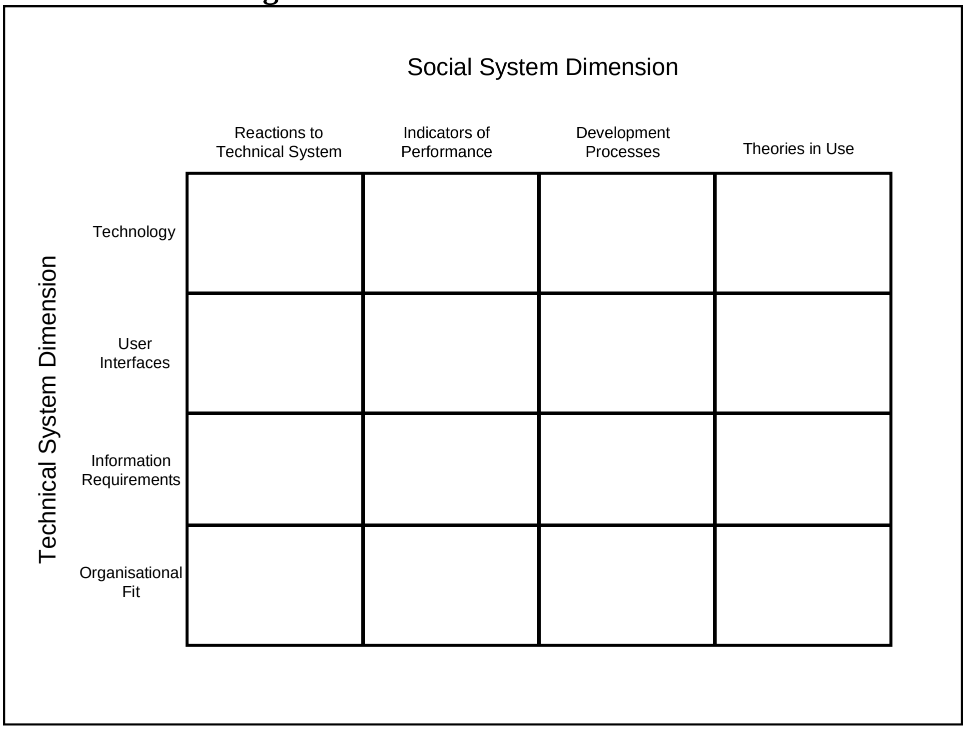
| Level | Description |
|---|---|
| User-System Level | Degree of fit between users' psychological characteristics and system design attributes in terms of users' motivations or cognitive styles |
| Structure-System Level | Match between the structural characteristics of an organisation and different system design attributes |
| Power-System Level | Distribution of power within an organisation and whether it is at odds with that existing in the organisational context of use |
| Environment-System Level | Fit between the system design characteristics and the environment of the organisation in which it is used |

**Source: Markus, M.L. and Robey, D. 'The Organisational Validity of Management Information Systems', *Human Relations*, 1983, 36, pages 203-226.**

concerned with "the fit between the organisational culture presumed in the design of the system and the actual organisational culture in the implementing organisation".[115] Markus and Robey caution that "it is by no means certain that validity will lead to effective use or invalidity to ineffective use".[116] This depends on whether the information system matches the organisational thinking and behaviour patterns, as well as the effectiveness of those patterns in the first place. In other words, an organisationally valid information system might not deliver significant benefits if it merely automates inefficient ways of working; alternatively, there might be resistance to the implementation of an invalid system but it could yield major improvements in organisational effectiveness.[117] There is evidently a much earlier realisation of the need for the IT project manager to be aware of the organisational 'fit' of the project than was evident in the generic literature.

In 1992, Davis et al created a framework based on two premises: 'an information system is a social system that uses information technology' and IS success or failure cannot be explained in terms of either the IT alone or the social system alone.[118] This confirms the views discussed: the IT system is inextricably bound with its context. Accordingly, this framework has two dimensions, one concerned with the social system and the other with the technical aspects, as shown at Figure 2.8. Each dimension is divided into four, giving 16 areas of 'potentially useful data for a failure

**Figure 2.8. Two Dimensional Matrix**




**Source: Davis, G.B. et al., 'Diagnosis of an Information System Failure', *Information and Management,* 1992, 23, 293-318.**

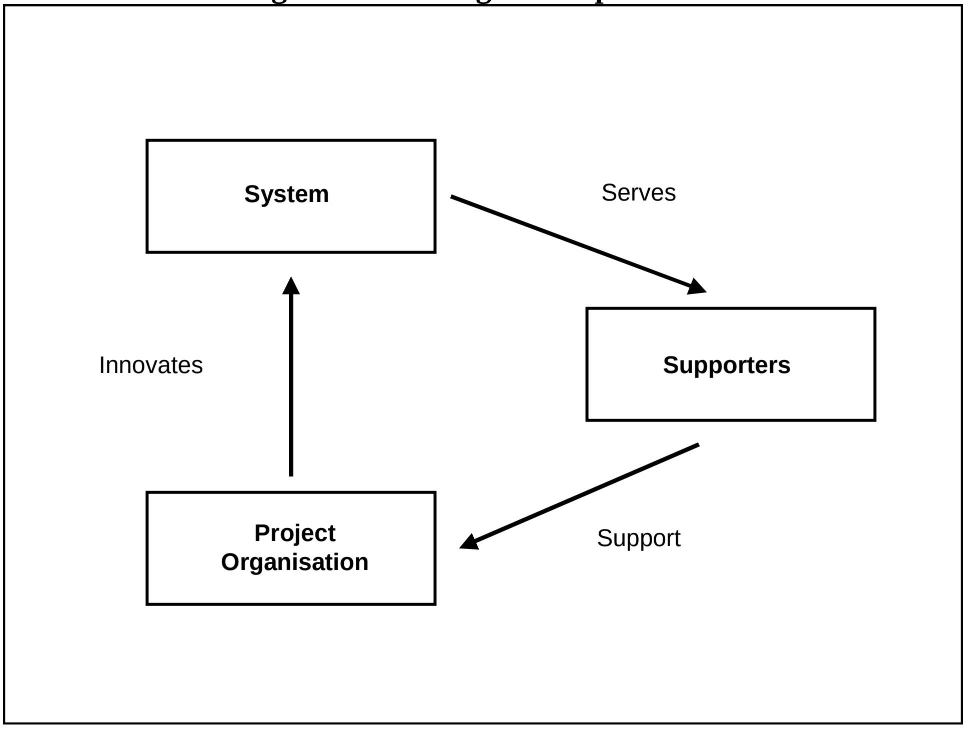
diagnosis'.[119] Mitev argues that this approach is too narrow, claiming that,

> The social system dimension must include the larger social and political processes through which the interests of different social groups interact with one another and with the technology. This implies that macro-social and historical factors must be investigated as well as the multi-causal relationship more immediately involved in failure.[120]

She raises the spectre of the wider environment and its impact on the project, questioning whether it is sufficient to focus on the technology, the managerial issues surrounding the project, the organisational structure, culture and context. She also highlights Belassi and Tukel's view of the importance of interrelationships between factors.

Following on from Davis, Sauer focuses on the social and organisational context but also highlights the importance of interrelationships. He developed the Triangle of Dependence Approach in 1993 as "a tool to aid analysis of the information systems process".[121] His framework, shown at Figure 2.9, demonstrates that each relationship is subject to a variety of influences, making some aspects uncontrollable

**Figure 2.9. Triangle of Dependence**

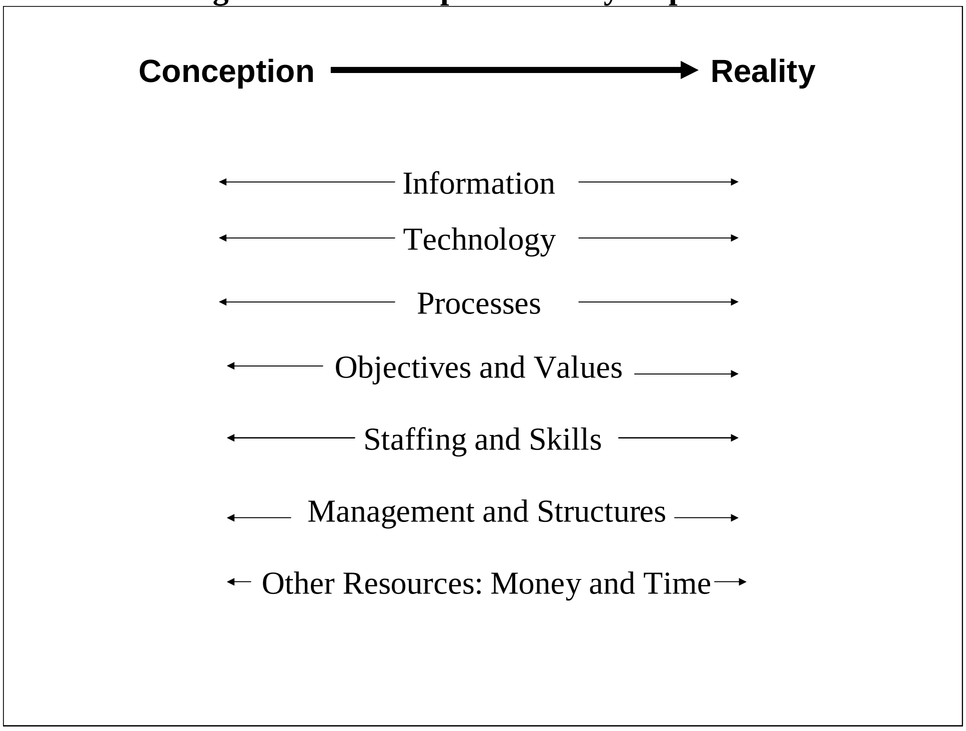



**Source: Sauer, C., *Why Information Systems Fail: A Case Study Approach,* (Waller, 1993).**

but providing scope to manage others. The information system relies on the project organisation to maintain it; the project organisation relies on supporters for resources; and the supporters expect benefits. If there are any flaws in any of these relationships, then it is likely to have a negative impact on the IT project, leading to failure or termination. Again, Sauer recognises the need for organisational 'fit'.

Picking up on these ideas in 1999, Heeks et al argue that a successful information system matches the technical, social and organisational factors in its specific context, as well as the perceptions of its key stakeholders.[122] Their resulting model is shown at Figure 2.10. Reality describes the current state of the specific context; the Conception is the desired state, which refers to the new information system design. Ideally, a system will match existing realities or only require very limited change along these seven dimensions. This proposition has links back to the work of Markus and Robey and to Pliskin's observation that the system design has to fit the organisational context.

**Figure 2.10. Conception-Reality Gap Model**



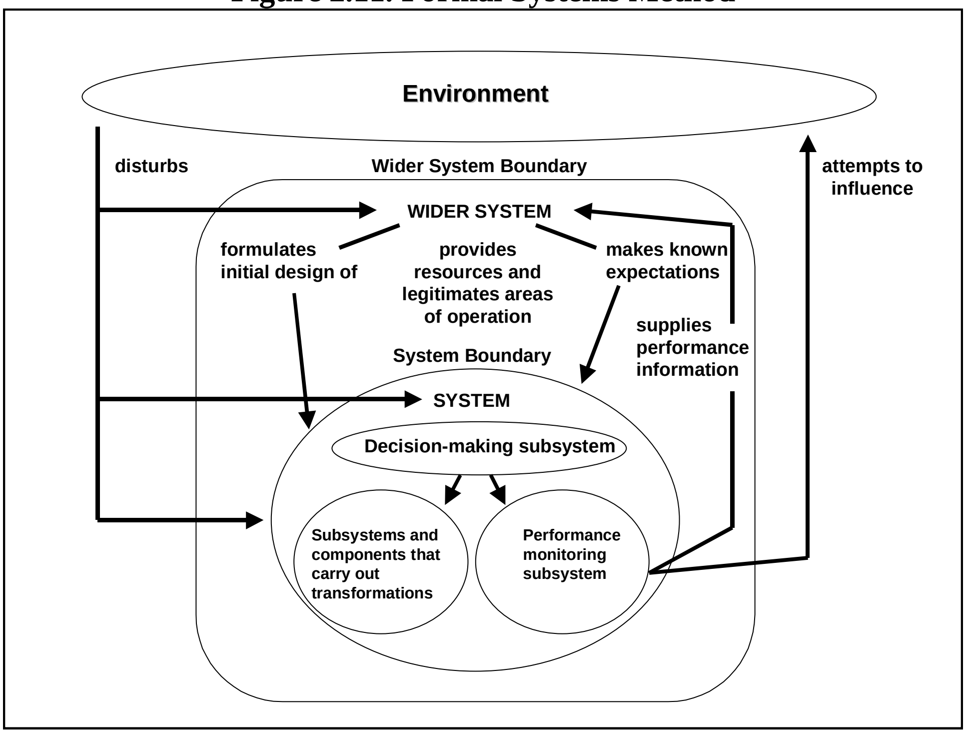

**Source: Heeks, R., Mundy, D. and Salazar, A.** ***Why Health Care Information Systems Succeed or Fail.*** **(Manchester, Institute for Development Policy and Management, Manchester University, 1999).**

The flaw in this argument is that an information system that exactly matches its organisational context is unlikely to change it.[123] Yet, the purpose of IT is to support and generate organisational change, which brings an inherent risk of failure, depending on the degree of change.[124] In 1992, for example, the London Ambulance Services Computer Aided Despatch system famously failed because the speed and depth of change were simply too aggressive for the circumstances.[125] Heeks et al conclude that success becomes more likely when change is limited. Therefore, an IT project faces a trade-off between change and risk. Reducing the size of change may increase the chance of success but decrease the organisational benefits; increasing the size of change may reduce the chance of success but increase the benefits.[126] The Conception-Reality Gap Model highlights the role of change in the success or failure of an information system. It is also concerns the match of that information system to a highly specific and unique context. However, unlike Markus and Robey's earlier work, it takes no account of the surrounding environment.

Fortune and Peters created the Formal Systems Model (FSM) through a series of papers published in 1990,[127] 1992,[128] 1993[129] and 1994.[130] They propose a "common conceptual framework for analysis" specifically aimed at understanding complex 'human activity systems', people engaged in purposeful activity that is likely to involve the interaction of a range of sub-systems.[131] They adapted earlier work by Checkland, who identified that any system needed to have a continuous purpose or mission; a measure of performance; a decision-taking process; a degree of connectivity between the components; an environment with which the system interacts; boundaries separating the system from the wider system and the wider system from the environment; resources; and some guarantee of continuity.[132]

In 2005, they related the FSM to IT projects, describing the systems representation as "a model of a robust system capable of purposeful activity *without failure*" (emphasis in original).[133] The FSM, shown at Figure 2.11, shows a project managed in such a way that all possible points of failure are controlled and all possible CSFs managed. It consists of a system (the Formal System), a wider system, representing the next

**Figure 2.11. Formal Systems Method**




**Source: Fortune, J. and Peters, G., *Information Systems: Achieving Success by Avoiding Failure*, (Chichester, Wiley, 2005), page 121.**

hierarchical level, and an environment. The wider system affects the system by decision makers and monitoring the performance of the system as a whole. The defining the purpose and setting objectives, providing resources, influencing the environment disturbs the system both directly and indirectly through the wider system and *vice versa*. The Formal System has a decision-making sub-system, a performance monitoring sub-system and a set of sub-systems that carry out the tasks.

The FSM encapsulates much of the research that has gone before. It sits the project firmly in its context and environment. It picks up on subjective issues, like expectations management, the need for decision-making processes and the requirement for the project to 'fit' the organisation and beyond. It also very clearly shows the interrelationships between the factors and the groups of factors. As such, it brings together much of the thinking about both generic projects and IT projects, so providing an ideal means of scrutinising the Intervention, the application of the identified CSFs in the case study, reported in Chapters 5 and 6.

As identified by Chua in 2009, there are two threads of research on IT project management.[134] He termed the first thread 'specific factors', the CSF lists, while the second thread looks at the systemic nature of IT project management, its particular organisational context and the emergent properties that result in its overall success or failure. It is not a single set of static factors but a series of issues and actions. The literature review undertaken for this study found a similar differentiation but has focused this discussion of IT project management on the second thread, which is where the major difference with the generic project management literature is highlighted. These frameworks show the move to a broader definition of IT project management that incorporates the organisation and structure of the project, its context and, ultimately, its environment. There has been a much greater move in the IT literature to synthesise factors into interrelating groups.

Both threads are used to compare the two bodies of literature with the frameworks disassembled into their component parts, capturing their elements, if not their interrelationships. Whilst recognising the importance of the three-dimensional frameworks, the lists provide a much more pragmatic means of examining whether the same 'few key areas' are being identified in both bodies of literature. This comparison is based on research carried out by White and Fortune in 2002. The first stage of their work was a survey of 236 project managers. They were asked to identify the CSFs for projects and this revealed that the iron triangle was still the most commonly cited measure.[135] In 2006, Fortune and White compared their empirical research with the literature base, undertaking a comprehensive review of 63 publications on CSFs in generic project management in an attempt to combine the lists into a definitive set.[136] They found only limited agreement. The three most cited were the importance of a project receiving support from senior management; clear and realistic objectives; and producing an efficient plan.[137]

Of the publications reviewed, 81% included at least one of these but only 17% included all three.[138] This list is shown at Table 2.6 to form the basis of a comparison with those CSFs identified in this review of the IT project management literature. The purpose is to consider whether the IT literature places the same emphasis on the same factors or whether it identifies different factors. Although the CSFs identified in the IT literature were interpreted fairly broadly to fit with the CSFs identified by Fortune and White, there were two areas where there was no correspondence. Rather surprisingly, there was no reference to 'project sponsor/champion' for which 12

**Table 2.6. Critical Success Factors Compared**

| **Generic Project Management CSFs Identified by Fortune & White, 2006** | **IT Project Management CSFs** |
|---|---|
| Support from senior management<br>(39 citations) | Ginzberg (1981); Beath (1983); Cerveny (1986); DeLone, (1988); Ewusi-Mensah (1991); Weill (1992); Yap (1992); King (1994); CHAOS (1994); Beynon-Davies (1995); Thong (1996a); Ewusi (1997); Yap (1997); Keil (1998); CHAOS (1999); Whittaker (1999); Keil (2000); Caldeira (2002); Goulielmos (2003); Huang (2004); Wallace (2004); Fortune (2006); Kappelman (2006); Standing (2006); Fowler (2007); Chua (2009)<br>(26 citations) |
| Clear realistic objectives<br>(31 citations) | Beath (1983); Glaser (1984); Lyytinen (1987); Curtis (1988); Sauer (1988); Boehm (1989); Pinto (1990); Rainer (1991); CHAOS (1994); Wateridge (1995); Flowers (1996); Ewusi (1997); Keil (1998); Wateridge (1998); Atkinson (1999); CHAOS (1999); Wallace (1999); Whittaker (1999); Keil (2000); Wright (2002); Yardley (2002); Huang (2004); Wallace (2004); Wallace (2004a); Fortune (2006); Kappelman (2006); Standing (2006); Chua (2009)<br>(28 citations) |
| Strong detailed plan kept up-to-date<br>(29 citations) | CHAOS (1994); Keil (1998); Atkinson (1999); CHAOS (1999); Wallace (1999); Wallace (2004); Wallace (2004a); Fortune (2006); Kappelman (2006); Standing (2006); Chua (2009)<br>(11 citations) |
| Good communication/feedback<br>(27 citations) | Curtis (1988); Rainer (1991); Beynon-Davies (1995); Flowers (1996); Krauth (1999); Wallace (1999); Huang (2004); Wallace (2004); Kappelman (2006)<br>(9 citations) |
| User/client involvement<br>(24 citations) | Beath (1983); Markus (1983); Lyytinen (1987); Pinto (1990); Raymond (1990); Ewusi-Mensah (1991); Rainer (1991); Symons (1991); Yap (1992); Sauer (1993); CHAOS (1994); CHAOS (1994); Wateridge (1995); Flowers (1996); Thong (1996); Yap (1997); Keil (1998); Wateridge (1998); Krauth (1999); CHAOS (1999); Wallace (1999); Keil (2000); Beynon-Davies (2002); Wright (2002); Yardley (2002); Goulielmos (2003); Huang (2004); Wallace (2004); Wallace (2004a); Kappelman (2006); Standing (2006); Fowler (2007); Chua (2009)<br>(33 citations) |
| Skilled/suitably qualified/sufficient staff/team<br>(20 citations) | McFarlan (1981); Curtis (1988); Boehm (1989); Yap (1992); Barki (1993); King (1994); CHAOS (1994); Beynon-Davies (1995); Flowers (1996); Ewusi (1997); Keil (1998); CHAOS (1999); Wallace (1999); Zeiger (1999); Keil (2000); Sumner (2000); Brown (2001); Beynon-Davies (2002); Caldeira (2002); Goulielmos (2003); Huang (2004); Wallace (2004); Wallace (2004a); Kappelman (2006); Fowler (2007)<br>(25 citations) |

| Generic Project Management CSFs Identified by Fortune & White, 2006 (continued from previous page) | IT Project Management CSFs (continued from previous page) |
|---|---|
| Effective change management (19 citations) | Beynon-Davies (1995); Keil (2000); Goulielmos (2003); Wallace (2004); Kappelman (2006) (5 citations) |
| Competent project manager (19 citations) | Boehm (1989); Sauer (1993); CHAOS (1994); Beynon-Davies (1995); Huang (2004); Wallace (2004); Kappelman (2006); Standing (2006); Fowler (2007) (9 citations) |
| Strong business case/sound basis for project (16 citations) | Pinto (1990); CHAOS (1999); Wallace (1999); Whittaker (1999); Yardley (2002); Kappelman (2006) (6 citations) |
| Sufficient/well allocated resources (16 citations) | Glaser (1984); Lyytinen (1987); Sauer (1988); Pinto (1990); Beynon-Davies (1995); Wateridge (1998); Atkinson (1999); Wallace (1999); Yardley (2002); Wallace (2004); Wallace (2004a); Kappelman (2006); Chua (2009) (13 citations) |
| Good leadership (15 citations) | Beynon-Davies (1995); CHAOS (1999); Caldeira (2002); Goulielmos (2003); Wallace (2004); Standing (2006) (6 citations) |
| Proven/familiar technology (14 citations) | Zmud (1980); McFarlan (1981); Beath (1983); Boehm (1989); Rainer (1991); Barki (1993); Beynon-Davies (1995); Flowers (1996); Ewusi (1997); Keil (1998); CHAOS (1999); Krauth (1999); Whittaker (1999); Keil (2000); Sumner (2000); Brown (2001); Beynon-Davies (2002); Wright (2002); Huang (2004); Wallace (2004); Wallace (2004a); Chua (2009) (22 citations) |
| Realistic schedule (14 citations) | Glaser (1984); Sauer (1988); Boehm (1989); Pinto (1990); Beynon-Davies (1995); Flowers (1996); Wateridge (1998); Wallace (1999); Whittaker (1999); Yardley (2002); Wallace (2004); Wallace (2004a); Kappelman (2006); Standing (2006); Chua (2009) (15 citations) |
| Risks addressed/assessed/managed (13 citations) | Keil (1998) (1 citation) |
| Project sponsor/champion (12 citations) | (0 citations) |
| Effective monitoring/control (12 citations) | Boehm (1989); Flowers (1996); Wateridge (1998); Wallace (1999); Whittaker (1999); Yardley (2002); Wallace (2004); Wallace (2004a); Chua (2009) (9 citations) |
| Adequate budget (10 citations) | Boehm (1989); Yap (1992); Wateridge (1995); Wateridge (1998); Yardley (2002); Wallace (2004); Wallace (2004a); Chua (2009) (8 citations) |
| Organisational adaptation/culture/structure (10 citations) | Markus (1983); Lyytinen (1987); Sauer (1988); Barki (1993); Pliskin (1993); Beynon-Davies (1995); Flowers (1996); Atkinson (1999); Krauth (1999); Wallace (1999); Zeiger (1999); Keil (2000); Beynon-Davies (2002); Caldeira (2002); Goulielmos (2003); Huang (2004); Wallace (2004); Wallace (2004a); Fowler (2007) (19 citations) |
| Good performance by suppliers/contractors/consultants (10 citations) | Boehm (1989); Yap (1992); King (1994); Beynon-Davies (1995); Thong (1996a); Yap (1997); Atkinson (1999); Whittaker (1999); Sumner (2000); Goulielmos (2003); Wallace (2004); Chua (2009) (12 citations) |
| Planned close down/review/acceptance of possible failure (9 citations) | (0 citations) |
| Training provision (7 citations) | Beynon-Davies (1995); Flowers (1996); Atkinson (1999); Krauth (1999); Sumner (2000); Wright (2002); Huang (2004); Fowler (2007); Chua (2009) (9 citations) |
| Political stability (6 citations) | Flowers (1996); Wallace (1999); Wallace (2004); Wallace (2004a) (4 citations) |
| Correct choice/past experience of project management methodology/tools (6 citations) | Rainer (1991); CHAOS (1999); Whittaker (1999); Zeiger (1999); Keil (2000); Goulielmos (2003); Huang (2004); Wallace (2004); Fowler (2007); Chua (2009) (10 citations) |
| Environmental influences (6 citations) | Markus (1983); Sauer (1993); Atkinson (1999); Wallace (1999); Beynon-Davies (2002); Caldeira (2002); Goulielmos (2003); Wallace (2004); Wallace (2004a) (9 citations) |
| Past experience (learning from) (5 citations) | Beynon-Davies (1995); Goulielmos (2003) (2 citations) |
| Project size (large)/level of complexity (high)/number of people involved (too many)/duration (over three years) (4 citations) | Zmud (1980); McFarlan (1981); Beath (1983); Barki (1993); Sauer (1993); CHAOS (1994); Beynon-Davies (1995); CHAOS (1999); Wallace (1999); Brown (2001); Beynon-Davies (2002); Wallace (2004); Wallace (2004a); Chua (2009) (14 citations) |
| Different viewpoints (appreciating) (3 citations) | Lyytinen (1987); Raymond (1990); Ewusi-Mensah (1991); Symons (1991); Beynon-Davies (1995); Dodd (1995); Wateridge (1995); Dhillon (1998); Keil (1998); Heeks (1999) (10 citations) |

**Source: Author**

citations had been found by Fortune and White or ‘planned close down/review/acceptance’ for which nine citations had been found.

However, it may be that project sponsor/champion is simply subsumed into senior management support in the IT literature. Two of the top three CSFs for IT project management were the same as those for generic project management, ‘Clear Realistic Objectives’ and ‘Support from Senior Management’, as shown at Table 2.7. However, ‘User/Client Involvement’ featured as the most important CSF, replacing ‘Support from Senior Management’ in top place and appearing instead of ‘Strong Detailed Plan Kept Up-to-Date’. Of the 58 publications reviewed, 84% included at least one of these top three CSFs in comparison to 81% identified by Fortune and White and only 13% (17% for Fortune and White) identified all three.

**Table 2.7. Top Three CSFs: Generic and IT Project Management Compared**

| Generic Project Management | IT Project Management |
|---|---|
| Support from senior management | User/Client involvement |
| Clear realistic objectives | Clear realistic objectives |
| Strong detailed plan kept up-to-date | Support from senior management |

**Source: Author**

Therefore, the CSFs identified for IT project management broadly support the findings of Fortune and White in 2006 but also confirm the increased emphasis in IT project management on the organisational and cultural issues. This comparison provides the basis to consider whether the CSFs identified from the analysis of the ten major reports, which will be discussed in Chapter Four, are correct and comprehensively considered, thereby answering the first of the three subsidiary questions that stem from the overarching research question: are the lessons learned from previous complex IT projects in government correct and comprehensively considered?

This systematic review of both the generic and IT project management literature confirms that a great deal of work has been carried out to find ways of improving project management. There is sufficient understanding of the CSFs to enable good practice in the planning and management of all IT Projects.[139] Despite this effort, projects are still failing. According to Collins, the problem with IT failures is not a shortage of best practice, but the lack of adherence.[140] Part of the remit for this review was to seek evidence regarding the application of CSFs in practice and their effect. However, despite this extensive research, this question appears to have been neither asked nor answered and there is little evidence that the guidance is being followed comprehensively, although there is anecdotal evidence that it is not.[141] Sauser et al reported in 2009 that, despite their academic popularity, the identification of CSF lists and frameworks seems to have had little impact on project management practices.[142] In their view, few organisations are actually using these findings to improve their project management processes.[143] However, this is based on the continued failure rates rather than scrutiny of the understanding and application of CSFs in practice. In 1988, de Wit questioned the utility of CSFs as good indicators or pre-conditions of success or failure and concluded that, while their presence might not guarantee successful IT project management, their absence is likely to lead to failure.[144] Therefore, the discussion moves to consideration of the project or, using the CIMO terminology, the Mechanism.

## 2.5. Mechanism

In this instance, Mechanism explains the relationship between the Intervention and the Outcome. Referring back to the conceptual framework, this is described as the 'Technical Solution', where decisions are taken about the product, the project and its management in relation to the surrounding contextual layers. Therefore, the focus of this section is the project itself. The purpose is to untangle the definitions of 'project' and 'project management' in order to identify the processes that explain the relationship between the Intervention, the application and understanding of the performance or, in other words, the CSFs, and the Outcome, the impact of those CSFs on the delivered product.

In Chapter One, the pragmatic decision to use the term 'project' throughout this thesis rather than 'programme' or 'mega-project' was noted. However, there are clear differences. In 2005, the Office of Government Commerce (OGC) defined a project as a "particular way of managing activities to deliver specific outputs over a specific period and within cost, quality and resource constraints"; a programme as a "management framework for coordinating related projects to deliver outcomes and benefits" and a portfolio as "the selection and coordination of an organisation's complete set of projects and programmes".[145] It should be noted that exceptions to these definitions abound: the Manhattan Project and the Human Genome Project, for example, were more correctly categorised as programmes, whilst the DII Programme began life as a project but was later renamed.[146]

The OGC's definition of a project with its emphasis on "managing activities" and "delivering specific outputs" could just as easily describe project management; projects are often defined in this way in both operational documents and the academic literature. For example, Gottschalk and Karlsen describe a project as a temporary organisational structure with a unique, goal-oriented work system that integrates technical, procedural, organisational and human elements, identifies and allocates resources, and organises and structures activities in accordance with business and technical requirements.[147] This definition emphasises the management of the project: creating a work system, integrating elements, identifying and allocating resources and so on. Shenhar and Dvir also describe a project as a temporary organisation and process set up to achieve a specified goal under the constraints of time, budget and other resources.[148] The Project Management Institute's (PMI) Project Management Body of Knowledge (PMBOK) confirms this view, defining a project as:

> A temporary endeavor (*sic*) undertaken to create a unique product, service or result. The temporary nature of projects indicates a definite beginning and end. The end is reached when the project's objectives have been achieved or when the project is terminated because its objectives will not or cannot be met, or when the need for the project no longer exists.[149]

Therefore, projects are unique and temporary, set up to deliver a new product or service within clear start and end dates, rather than being part of the everyday business process. They are completed when they meet their goals and objectives or, alternatively, they are cancelled.

However, given this tendency to link the definition of project management with the definition of a project, how is the definition of project management different? Writing in 1999, Atkinson revives Oisen's 1950s definition, which synthesised a number of prevalent views:

> The application of a collection of tools and techniques...to direct the use of diverse resources toward the accomplishment of a unique, complex, one-time task within time, cost and quality constraints. Each task requires a particular mix of these tools and techniques structured to fit the task environment and life cycle (from conception to completion) of the task.[150]

The basis of this description continues to be used. For example, the British Standard for Project Management (BS6079-2 2000) refers to the planning, monitoring and control of all aspects of a project and the motivation of all those involved to achieve the project objectives on time and to the specified cost, quality and performance.[151] In 2002, Yardley proposed the process of controlling the achievement of the project objectives, which he defines as time, cost and scope. However, there is a confusing overlap. When defining a project, the OGC highlights cost, quality and resource constraints;[152] Shenhar and Dvir talk about time, budget and other resource constraints.[153] On the other hand, when defining project management, Oisen refers to time, cost and quality[154]; the British Standards Institute details cost, quality and performance.[155] It is evident that definitions for both a project and project management often include the success criteria and that the same success criteria, the iron triangle, are used for both, despite the fact that alternative measures of success have been suggested over the years, as discussed above. However, there is some evidence that the shift to broader CSFs is permeating these definitions. In 1995, the UK Association of Project Managers, defined project management as:

> The planning, organisation, monitoring and control of all aspects of a project and the motivation of all involved to achieve the project objectives safely and within agreed time, cost and performance criteria.[156]

In 2006, this became:

> The process by which projects are defined, planned, monitored, controlled and delivered such that the agreed benefits are realised.[157]

This clarification of the project process, managing the project through a series of stages, is known as the project lifecycle. Probably the most common description of this in IT is the Systems Development Life Cycle (SDLC):

- Feasibility study

- Systems investigation
- Systems analysis
- Systems design
- Implementation
- Review and Maintenance.[158]

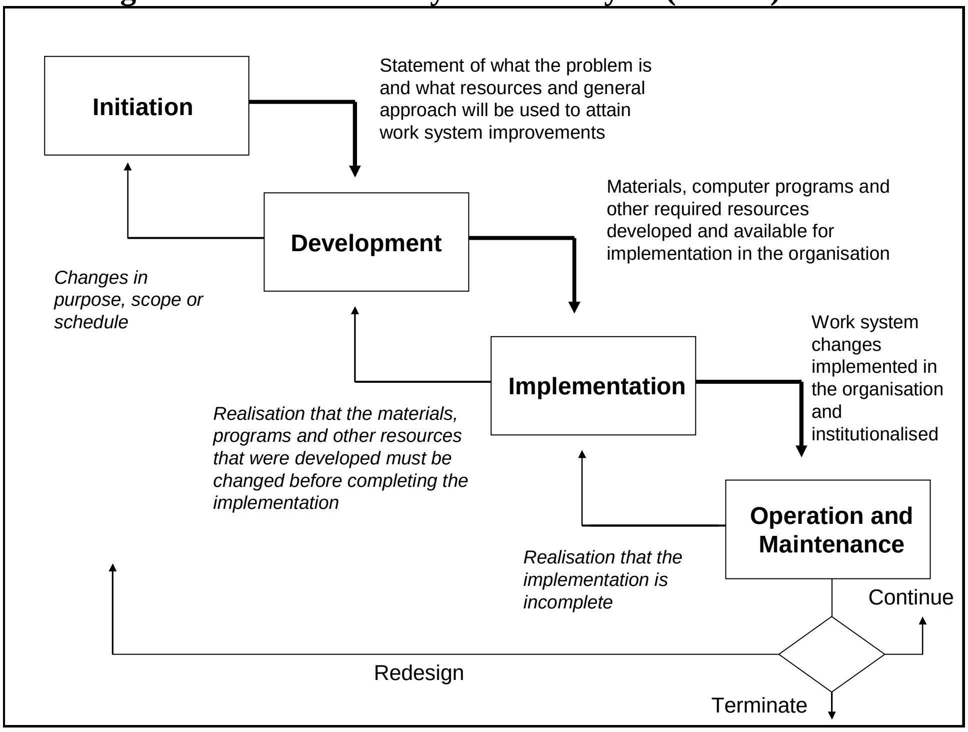
A current and popular means of controlling the CSFs across this lifecycle is to conduct project reviews at key stages. Despite this, there is little in the literature that assesses the utility of such reviews. In 2007, Liu and Yetton conducted a study of the construction and IT sectors in Australia to examine whether project reviews across the lifecycle have any effect on the ultimate performance of the product.[159] They found that the outcome was largely dependent on the certainty of the task so conducting reviews in a high task uncertainty environment, such as might be found early in a project's lifecycle and in an IT project, had a negative effect on performance.[160]

Much of the early research on IT projects was centred on similar tools and methodologies for project management.[161] However, Fortune and Peters argue that the SDLC is not completely comprehensive, ignoring the 'pre-feasibility' stage where a need has been identified but not tested further.[162] More critically, these stages are seen from the perspective of the system developer and not from the point of view of the organisation.[163] Elvin points out that these models were developed to solve problems in the 1970s and 1980s in very different organisational contexts.[164] Therefore, they have limitations when dealing with large projects and significant business change in the 2000s.[165] These inadequacies have not gone unnoticed and, during the last decade, the practice of software development has transformed from traditional life-cycle methods to more flexible and dynamic approaches that produce systems in much shorter timescales.[166] This point was discussed in Section 2.3 in terms of the need for platform and agile development in government. However, it is unlikely that these advances alone are sufficient to improve the success rate of IT projects.

It is evident that projects have to be viewed as continuous management processes, rather than simply an issue of software development. Winter et al argue that the SDLC is focused on a single system, the IT, ignoring the other systems impacted by an IT project, especially the social systems.[167] Given this, Alter has adapted the

SDLC model to produce the Work System Life Cycle (WSLC) model, as shown at Figure 2.12.[168] In Alter's view, an organisation is made up of a set of work systems in which humans and/or machines perform a business process using information, technology and other resources to produce products and/or services for internal or external customers. This perspective brings the wider business context firmly into the frame, giving a much broader view beyond the immediate project lifecycle and providing a much closer match with current thinking.

**Figure 2.12. The Work System Life Cycle (WSLC) Model**




**Source: Alter, S. 'Which Life Cycle – Work System, Information System or Software?'** ***Communications of the Association for Information Systems*****, October 2001, 7, Article 17, page 12.**

The Mechanism explains the relationship between the Intervention and the Outcome. As the OGC notes, a project provides a particular way of managing activities to give specific outputs. These activities occur through a number of stages, which have been redefined over time to accommodate wider organisational factors and more iterative processes. The interaction between the project, the process of project management and the product impacts ultimately on the performance of the organisation. This is discussed further in the next section, which considers the Outcome.

## 2.6. Outcome

Companies that formally define success, consistently measure their progress towards it and act on the results have improved IT project outcomes, according to Thomas and Fernandez in 2008.[169] The final element for examination in this literature review is the Outcome, the formal definition of success. In line with Thomas and Fernandez's findings, this section asks three subsidiary questions of the literature:

1. What is the effect of the Intervention?
2. How will the impact of the Intervention be measured?
3. What are the intended/unintended effects?

In terms of the conceptual framework, Outcome refers to the impact of the CSFs or, in CIMO terminology, the effect of the Intervention on the Mechanism, which should result in improved performance. Examining scholarly thinking on defining success reveals that it is fraught with difficulty. If success is hard to define, then its antithesis, failure, is also difficult to capture. Describing the precise nature of success and failure is complicated by their rich variety, their multi-causal nature and the fact that levels of success and failure vary over the project lifecycle. Therefore, there is a need for a much broader and more complex definition of success in both the generic and the IT project management literature. In 1992, DeLone and McLean claimed that IT project success and failure are opposite sides of the same coin and the ensuing discussion is based on this premise.[170] However, whether discussing success or failure, most research is based on unarticulated or unclear definitions. Shenhar and Levy note that project success is probably the most frequently discussed topic in the field of project management but the least agreed upon.[171] Baccarini confirms that there is no consistent interpretation and no accepted methodology for measuring it.[172]

### 2.6.1. Effect of the Intervention

The Intervention, the application of CSFs to the management of an IT project, should have the effect of mitigating and managing potential risks, those factors or conditions that threaten the successful completion of a project. Therefore, risks are the mirror image of CSFs. Failure to understand, identify and manage these risks is a frequently cited cause of problems in IT project management.[173] However, by identifying and analysing potential threats, action can be taken to reduce the possibility of failure. Since the 1970s, both academics and practitioners have written about risks associated with software projects, using anecdotal evidence or studies limited to a narrow portion of the development process.[174] Despite these efforts, there are relatively few tools available to identify project risk factors and a lack of theory to explain the linkages between project risk and project performance. Writing in 2006, Kappelman et al noted that IT project management is embarrassingly immature in the mastery of risks yet there are significant symptoms or early warning signs of trouble long before failure.[175]

As with CSFs, several lists of risk factors have been published, such as those by Alter and Ginzberg[176] in 1978, McFarlan[177] in 1981, Boehm[178] in 1991, Heemstra and Kusters[179] in 1996, Moynihan[180] in 1997 and Schmidt, Lyytinen, Keil and Cule[181] in 2001. Despite this work, there has been little attempt to rank the lists, to establish the underlying dimensions of project risk or to develop good assessment instruments.[182] According to Wallace et al, their influence on a project in terms of its outcomes remains largely unexplored.[183] Therefore, this discussion focuses on the work by Boehm, Keil et al and Wallace et al to investigate the relationship between the project and risk.

Boehm used his experiences in the Defence industry in the 1980s to build a top ten list of software risk items, as shown at Table 2.8. These risk items have been mapped back to the CSFs previously identified in Table 2.6 to show that there is a clear relationship, particularly with regard to two of the top three: user/client involvement and clear realistic objectives. However, it is evident that Beohm's identification of risk is firmly fixed in the project and its lifecycle without really considering the product lifecycle, the organisational impacts or the external environment. In 1998, Keil et al assembled three panels of experienced project managers from different parts of the world and asked them to rank and rate risk in terms of importance to software

**Table 2.8. Top Ten List of Software Risk Items**

| Risk Item | CSFs (Table 2.5) |
|---|---|
| Personnel shortfalls | Skilled/suitably qualified/sufficient staff/team |
| Unrealistic schedules and budgets | Realistic schedule<br>Adequate budget |
| Developing the wrong software functions | Clear realistic objectives |
| Developing the wrong user interface | User/client involvement |
| Goldplating | Strong detailed plan kept up to date |
| Continuous stream of requirements changes | Strong detailed plan kept up to date |
| Shortfalls in externally furnished components | Technology<br>Good performance by suppliers/contractors/consultants |
| Shortfalls in externally performed tasks | Good performance by suppliers/contractors/consultants |
| Real-time performance shortfalls | Proven/familiar technology |
| Straining computer science capabilities | Proven/familiar technology |

**Source: Boehm, B. and Ross, R., 'Theory-W Software Project Management: Principles and Examples', *IEEE Transactions of Software Engineering*, 1989, Vol. 15, No. 7, pages 902-916.**

projects.[184] The resulting list is shown at Table 2.9, again compared with Table 2.6, to show that the top three relate directly back to the top three CSFs for IT project management as identified by this study. There is little comparison with Boehm's work. As identified above, this could be due to the fact that he considered only those factors over which the project manager has a degree of control. All three panels identified the same factors, suggesting that there are universal sets of risks with global

**Table 2.9. Risk Factors in Order of Importance**

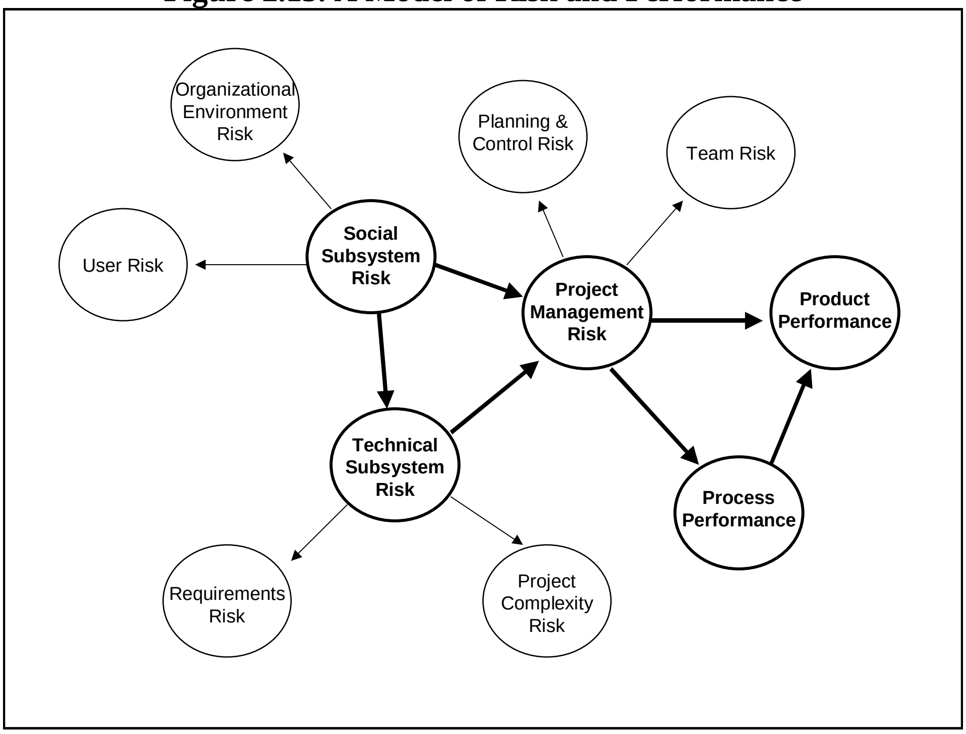
| Risk Factor | CSFs (Table 2.5) |
|---|---|
| Lack of top management commitment | Support from senior management |
| Failure to gain user commitment | User/client involvement |
| Misunderstanding the requirements | Clear realistic objectives |
| Lack of adequate user involvement | User/client involvement |
| Failure to manage user expectations | User/client involvement |
| Changing scope/objectives | Clear realistic objectives<br>Effective monitoring/control |
| Lack of required knowledge/skills in project personnel | Skilled/suitably qualified/sufficient staff/team |
| Lack of frozen requirements | Clear realistic objectives |
| Introduction of new technology | Proven/familiar technology |
| Insufficient/inappropriate staffing | Skilled/suitably qualified/sufficient staff/team |
| Conflict between user departments | Organisational adaptation/structure/culture |

**Source: Adapted by author from Keil, M., Cule, P.E., Lyttinen, K. and Schmidt, R.C., 'A Framework for Identifying Software Project Risks', *Communications of the ACM*, November 1998, Vol.41 No.11, pages 76-83.**

relevance. Those considered most serious were often seen as being outside the control of the project manager. A key point from this work is the need to look beyond the immediate project management risks by considering four key areas: support for, and commitment to, the project (customer mandate), the management of ambiguity and change (scope and requirements), a risk management process (execution) and the ability to respond to changes in the environment (environment).[185]

A series of papers by Keil's team appeared in 2004. Wallace and Keil confirmed the four areas discussed above through an extensive analysis of the original data.[186] Then Wallace et al surveyed 507 software project managers to identify six dimensions based on the original four areas: organisational environment risk; user risk (lack of user involvement); requirements risk; project complexity risk; planning and control risk; and team risk.[187] These were confirmed by Wallace et al and also related to the socio-technical literature to create the framework shown at Figure 2.13.[188] This has links back to the frameworks developed by Pinto and Slevin as well as Belassi and Tukel, along with the frameworks developed for IT project management success, discussed in Sections 2.4.1 and 2.4.2. It demonstrates that the project team's response to risk influences project performance or outcome (the success of the system developed) and process performance (the success of the development process). It also demonstrates that poorly managed projects are likely to deliver products that fail to

**Figure 2.13. A Model of Risk and Performance**




**Source: Wallace, L., Keil, M. and Rai, A.,'How Software Project Risk Affects Project Performance: an Investigation of the Dimensions of Risk and an Exploratory Model', *Decision Sciences*, Spring 2004, Vol. 35, No. 2, pages 289-321, this page 294.**

satisfy user needs or are unsatisfactory in other ways. Similarly, projects that incur cost and schedule overruns are less likely to deliver a successful product. Risk to project management has a negative impact on process and product performance, whilst process performance has a positive impact on product performance.

Therefore, the effect of the Intervention, understanding and applying CSFs to project management, should result in the mitigation of risks, although it is acknowledged that scholarly theory is currently immature in terms of identifying those risks. The application of CSFs should enable better management of the Critical Failure Factors. The purpose of the next section is to consider the impact of the CSFs or, in CIMO terminology, the effect of the Intervention on the Mechanism to produce a certain Outcome. The aim of this thesis is ultimately to analyse the impact of identified CSFs on the management and subsequent performance of a major government IT project. Therefore, the conclusions drawn from this literature review are reviewed to provide a clear definition and measure of 'performance'.

### 2.6.2. Measuring the Outcome

As well as being a measure of project management, the iron triangle, discussed in Section 2.4, is also used to define project success. However, as with the CSFs for project management, the scholarly debate has extended beyond this to include much wider organisational factors, as indicated by Cleland in 1986:

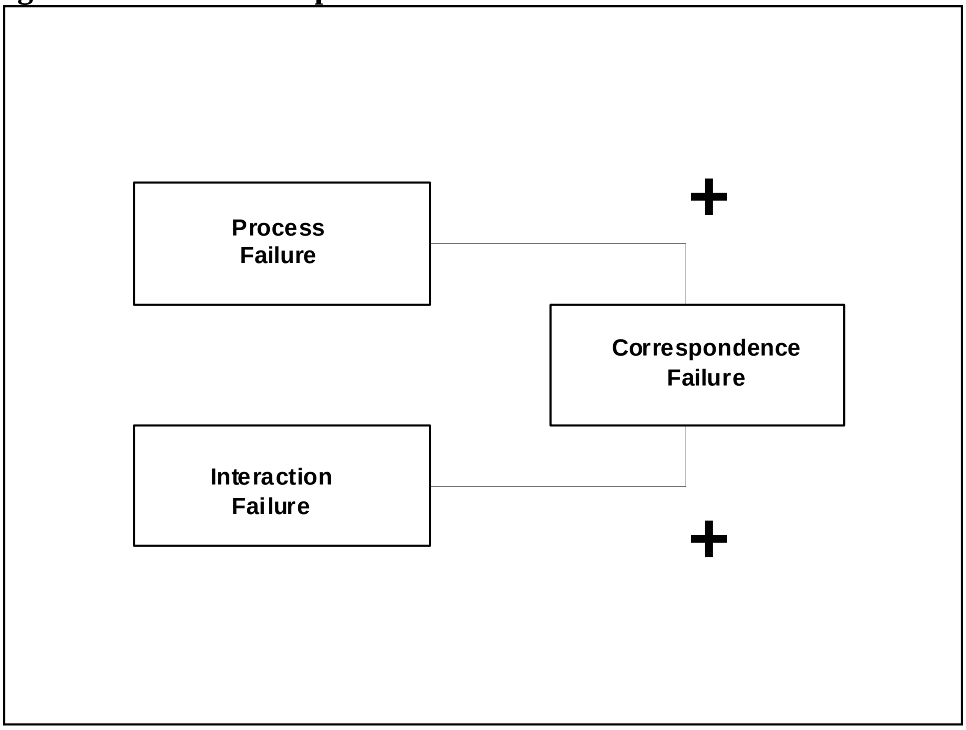
> Project success is meaningful only if considered from two vantage points: the degree to which the project's technical performance objective was attained on time and within budget; the contribution that the project made to the strategic mission of the enterprise.[189]

Pinto and Slevin believe that the iron triangle persists as a definition because time, cost and scope are controlled by the project team, set by the project stakeholders and provide self-imposed boundaries for the project management, making them easy to measure.[190] Yardley agrees that time and cost are highly visible and easily measured against planned and agreed targets.[191] However, he notes that failing to meet the constraints of the iron triangle does not necessarily mean a failed project. A beneficial increase in scope may result in an increase in budget and time; conversely, a project could fail to deliver benefits despite having met its iron triangle constraints.[192] Some projects are perceived as a success by the project team but regarded as a failure by the users.[193] Others are considered failures initially but then hailed as a success.[194]

This argument revives the differentiation between the project lifecycle and the product lifecycle, discussed in Section 2.4.1. In 1999, Lim and Mohamed described the micro and macro definition of success or failure. The micro view assesses project delivery (Type I), whilst the macro view assesses the product in terms of customer use and satisfaction (Type II).[195] Therefore, they argue, any assessment of the project outcome should be delayed until the operational stage.[196] In 2005, Fortune and Peters used a similar method to define failure: Type-1 failures relate to project management, occurring when the objectives, including cost, timescales and requirements, are not fully met; Type-2 failures relate to the project outcomes, resulting in inappropriate or undesirable consequences or side effects for the organisation.[197]

In 1986, Stuckenbruck argued that, even in the same organisation, different people are likely to view success in different ways at different times.[198] However, these different people can be fitted into recognisable groups who pursue the same interests and share the same values, which then define the desirable features of an information system in their view. These groups are more properly defined as stakeholders, "all those claimants inside and outside the organisation who have a vested interest in the organisation and have a vested interest in the problem and its solution".[199] Over time, the definition of success has begun to consider the stakeholders and their views.[200] In 1987, in a seminal piece on project failure, Lyytinen and Hirschheim identified three traditional failure concepts, as shown at Figure 2.14: correspondence (the match of the information system to the initial design objectives); process (the match to resource allocation); and interaction (the match with user requirement).[201] Their work strongly relates to that of Pinto and Slevin, Markus and Robey, Davis et al and Sauer, as discussed above, whose CSF frameworks show very similar linkages and interactions. 'Expectation Failure' expresses the interests and values of the stakeholders and is a superset of the other three forms of failure, highlighting the importance of the user in assessing the success of a project, thereby shifting the discussion to the softer behavioural and organisational issues, and clearly relating the IT project to the social context.[202]

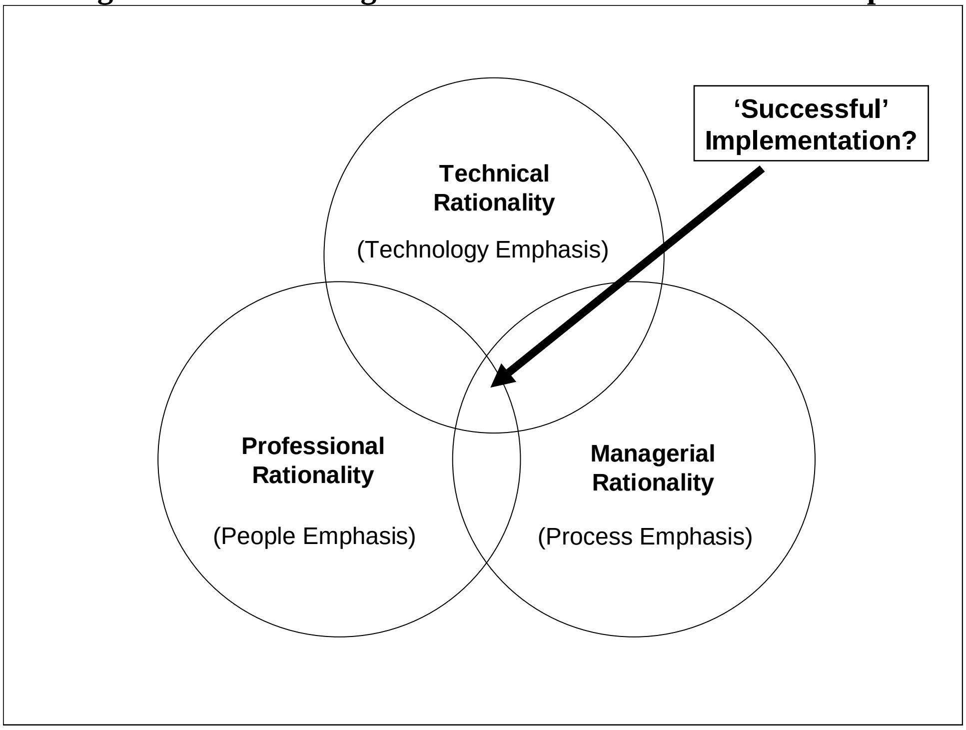
**Figure 2.14. Relationship between the Three Traditional Failure Notions**




**Source: Lyytinen, K and Hirschheim, R. Information Systems Failures: a Survey and Classification of the Empirical Literature. *Oxford Surveys in Information Technology*, Vol.4, 1987, Pages 257-309.**

Heeks et al picked up on this idea of expectation failure in their 1999 work on health care information systems, highlighting the role of stakeholder groups and considering the impact if one particular group dominates the design process.[203] IT design is an objective and rational entity and, as such, does not in itself incorporate particular cultural or political values. However, that objectivity is threatened if one stakeholder group imposes their specific rationality on the design, as shown at Figure 2.15. If the IT professionals dominate, then the design will be based on their technical rationality and dominated by technology. Managerial rationality is based on an amalgam of process; external stakeholder groups, such as shareholders or governments; legal or bureaucratic rationalities; and money. Therefore, if managers dominate the design process, a finance and process-based worldview is likely to dominate. In the work of Heeks et al, the third rationality is Medical, adjusted to Professional Rationality here in order to make it more generally applicable. Professionals have their own objective rationality and, if they dominate the design process, then it is people who override the process and technology components of the information system. In other words, different stakeholders groups pursue different interests resulting in different values and, therefore, as Walsham noted, they define success in different ways.[204]

**Figure 2.15. Achieving Balance between Stakeholder Groups**




**Source: Adapted by Author from Heeks, R., Mundy, D. and Salazar, A., *Why Health Care Information Systems Succeed or Fail*, (Manchester, Institute for Development Policy and Management, Manchester University, 1999).**

Heeks et al foresee difficulties if one viewpoint dominates the design.[205] The resulting product is unlikely to match the perceived realities of the other stakeholders, resulting in an expectation failure. In other words, there will be a large gap between the formal rational design conceptions and the more informal behavioural realities of the organisation. Walsham describes this difference as a "dynamic socio-political process", which operates at multiple levels within the social context. The aim is to ensure that all stakeholders are involved in the initial design of the system, so that their views are aligned and given equal weighting.[206] This reasoning suggests that there are no general IT project failures, but that failure means a mismatch between the design realities and the desired realities of a group of stakeholders. Therefore, IT project failure can be defined as the inability of an information system to meet a specific stakeholder group's expectations, a view supported by Dodd and Fortune[207] and by Dhillon.[208]

In addition, a range of factors have been identified that might influence a stakeholder's perception, resulting in their definition of success being misinformed or unrealistic. In 1997, Shenhar and Levy argued that success is often defined using simplistic *formulae*. For example, stakeholders are often asked to rate project success on a scale spanning from total failure to total success, thereby involving all performance criteria in one score.[209] In 2004, Dix et al specifically categorised different stakeholders to show their different priorities with regard to a project, which results in a decreasing priority of needs, as shown at Table 2.10, and inevitably impacts on their definition of success.[210]

**Table 2.10. Different Categories of Stakeholder**

| Category | Priority |
|---|---|
| Primary stakeholders | Actually use the system and whose needs are usually predominant |
| Secondary stakeholders | Do not directly use the system but receive output from it and provide input |
| Tertiary stakeholders | Directly affected by the success or failure of the system in some way |
| Facilitating stakeholders | Involved in the design, development and maintenance of the system |

**Source: Dix, A., Finlay, J., Abword, D. and Beale, R., *Human-Computer Interaction*, 3rd Ed., (Harlow, Pearson Education, 2004).**

More recent work by Snow et al raises questions about the difficulty of ensuring a valid assessment not just from stakeholders but also from the project team.[211] Their research on optimistic and pessimistic bias in the reporting of software project status found that project managers are twice as likely to present an optimistic view when reporting to senior management.[212] They concluded that this was due to a reluctance to transmit bad news or, in Walsham's words, due to the 'dynamic socio-political process'. This links back to work by Cole in 1997, who recognised the problem of getting organisations to talk honestly about their experience of IT project failure[213] along with work by Oz and Sosik in 2000 concerning the importance of communication between the project team and senior management, as well as between the project team and the users.[214] Despite these concerns about validity, stakeholder assessments have a strong influence on the final evaluation of the project.[215] In terms of IT projects and from an IT project manager's perspective, meeting user requirements is an extremely important means of defining success.[216] In fact, Myers suggests that the users' perception is the only valid means of evaluating a project.[217]

In 2005, Fortune and Peters attempted to bring these views together to offer a clear definition of success, incorporating not only the stakeholder view but also that of the project team, as well as encompassing the longer-term perspective:

> The system achieved what was intended of it; it was operational at the time and cost that were planned; the project team and the users are pleased with the result and they continue to be satisfied afterwards.[218]

This potentially provides a simple and straightforward means of defining project success or failure. However, in 2008, Thomas and Fernandez criticised this reliance on user satisfaction to define success.[219] In their view, there is a lack of strong theoretical evidence for its use.[220] In line with the issues raised above, they argue that success and failure are difficult to define and measure because they mean different things to different people and there is no commonly agreed definition.[221] Whilst their comments are recognised, it is apparent that success needs to be measured in a number of ways and there is a general acceptance that the perception of the stakeholders, particularly primary stakeholders, should be incorporated into that measure. As Saarinen noted in 1996, success "cannot be assessed by a simplistic one-dimensional measure of success" but is a multi-dimensional construct.[222] Therefore, the discussion now moves to the options for measuring the Outcome.

Drawing on the above discussion, Pinto and Mantel suggest three distinct factors against which success or failure can be assessed:

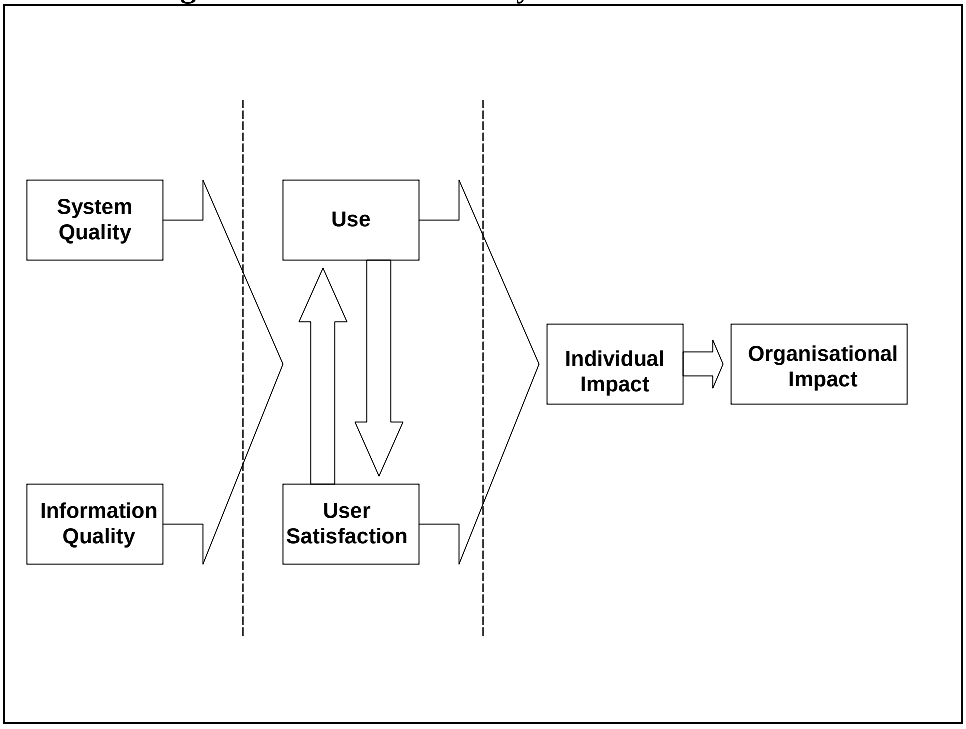
- The implementation process, measured in terms of whether the system is on schedule, to budget, meeting technical goals and so on;
- The value and usefulness of the project as perceived by the project team; and
- The client satisfaction with the project delivered.[223]

Their work signals the move to a more framework-based measure of success. Two years later, in 1992, DeLone and McLean wrote their seminal article on the quest for the so-called dependent variable, information system success.[224] Prior to this, research was concerned with measuring independent variables, such as cost, time or the extent of use. The original article has been cited over 500 times in the Ebsco database, indicating the importance of their work.

Using a literature base of 180 conceptual and empirical studies on information systems success that had appeared in seven leading publications between 1981 and 1987, DeLone and McLean categorised them according to a pre-defined taxonomy describing six major dimensions or categories of success: system quality, information quality, use, user satisfaction, individual impact and organisational impact. In doing so, they found nearly as many measures as studies. Some researchers had concentrated on the desired characteristics of the information system itself (system quality). Other studies focused on the product (information quality), whilst others considered the interaction of the product with the recipients (use or user satisfaction). Still others were interested in the influence of the information system on management decisions (individual impact) or the effect on organisational performance (organisational impact). DeLone and McLean synthesised these elements to produce a model, shown at Figure 2.16.

This model was not tested empirically but a number of studies have since done so to confirm the significance of the dimensions of success and the relationships between them. For example, in 1994, Seddon and Kiew surveyed 104 users of a university accounting system to find significant relationships between system quality, user satisfaction and individual impact; between information quality, user satisfaction and individual impact; and between user satisfaction and individual impact.[225] In 2002, Rai et al surveyed 274 users of a university IT system to find that all interactions between all of the success dimensions were significant.[226]

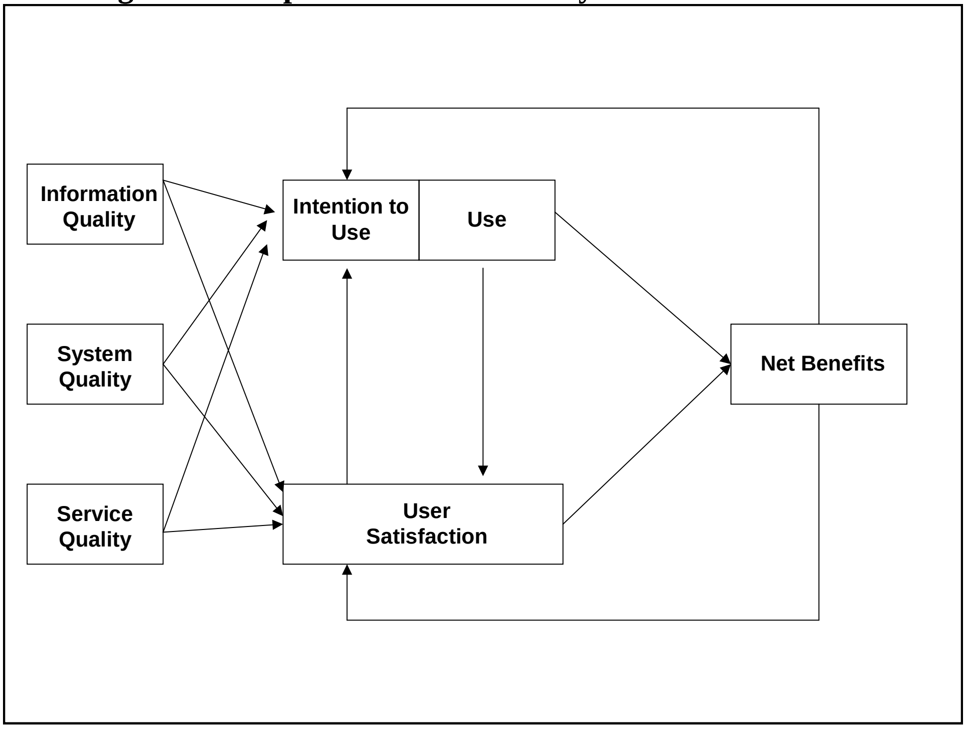
**Figure 2.16. Information Systems Success Model**




**Source: DeLone, W.H. and McLean, E.R., 'Information Systems Success: the Quest for the Dependent Variable', *Information Systems Research*, 1992, Vol.3, No.1, pages 60-95, this page 87.**

In 1997, Seddon revised the model, questioning DeLone and McLean's attempt to combine variance and process models as well as process and causal explanations in their model.[227] He also argued for the removal of 'system use' as a success variable, as it describes behaviour, considered an inappropriate element in a causal model. In 2003, DeLone and McLean reviewed the work undertaken since the publication of their original model and, as a result, refined it, as shown at Figure 2.17.[228] They refuted Seddon's arguments, finding the reformulation complicated and not in keeping with their original intent. They argued that simply looking at use without considering the nature, extent, quality and appropriateness of use is insufficient. Guimaraes et al tested this model in 2009 through a series of structured discussions with top managers, users and IT personnel, to identify the need to add both an IT and a corporate perspective.[229] They also advise against a standard measure for system quality, which has to be measured according to the features that are important to the specific system objectives and particular user or management expectations. They argue that researchers employ user satisfaction as a surrogate measure for success. That same year, Petter and McLean carried out a meta-analysis, looking at 52 empirical studies that examined relationships within the information systems model.[230] They found support for these relationships and thereby confirmed the model's validity.

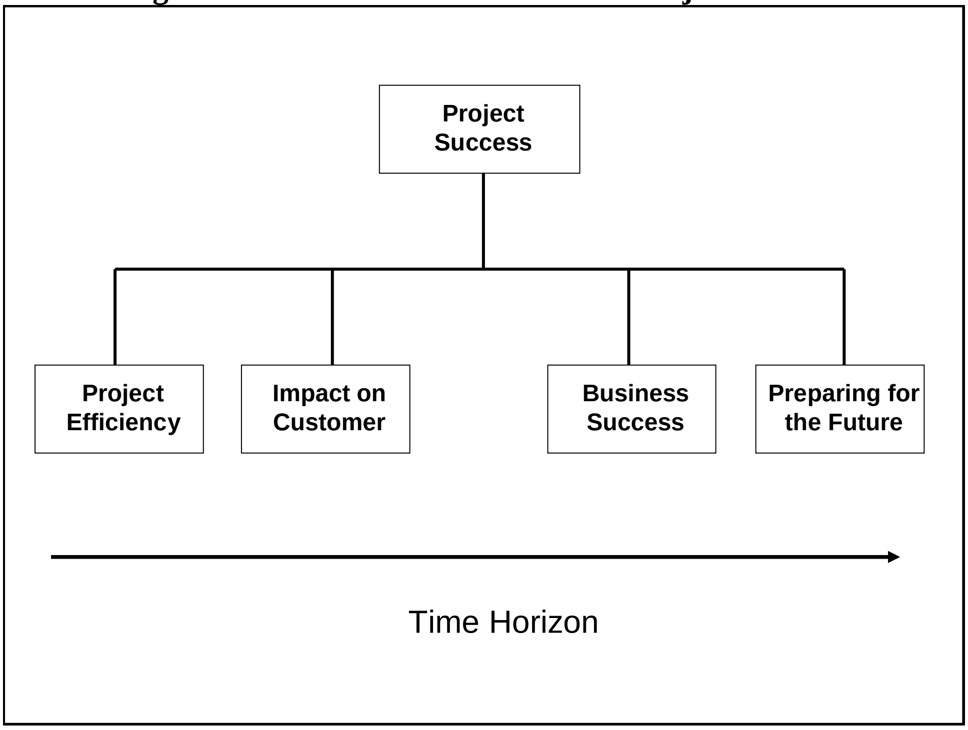
**Figure 2.17. Updated Information Systems Success Model**




**Source: DeLone, W.H. and McLean, E.R., 'The DeLone and McLean Model of Information Systems Success: a Ten-Year Update', *Journal of Management Information Systems*, 2003, Vol. 19, No.4, pages 9-30.**

In 1997, Shenhar and Levy constructed a similarly multidimensional framework derived from a survey of 127 projects, shown at Figure 2.18.[231] They identified four dimensions of success: project efficiency; impact on customers; business and direct success; and preparing for the future.[232] They note that these dimensions are hierarchical and addressed differently for different projects. However, project efficiency is important in the delivery phase, while the rest are important post-delivery.

**Figure 2.18. The Four Dimensions of Project Success**

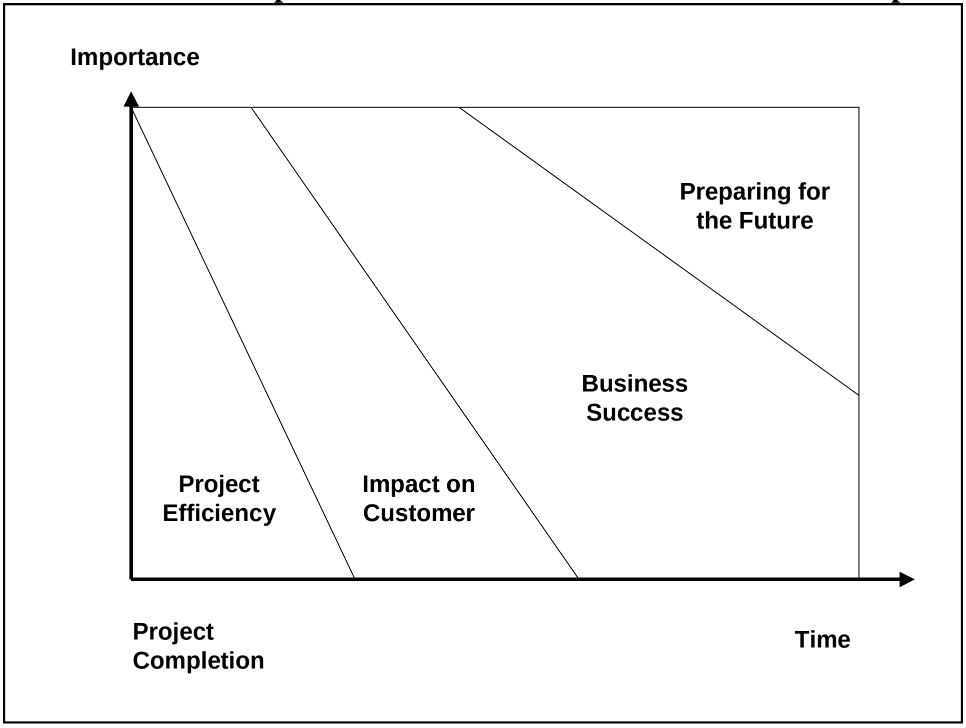



**Source: Shenhar, A.J. and Levy, O., 'Mapping the Dimensions of Project Success', *Project Management Journal,* June 1997, Vol. 28, No. 2, pages 5-14, this page 11.**

In line with Pinto's work described above, Shenhar et al also concluded that different factors are important at different times, as shown at Figure 2.19. During project execution, project efficiency is the only dimension that can be measured. Once the project is complete, the importance of this dimension declines and the second dimension, impact on the customer and customer satisfaction becomes more important. The third dimension, business and direct success can only be judged later. It takes a year or two before a new product starts to bring in profit or establish market share. Preparing for the future can only be recognised and assessed much later. The long-term benefits of projects will affect the organisation only after three or even five years.

It is evident from this discussion that a range of factors make up the ultimate performance of an IT project. The iron triangle remains a key measure of the project management lifecycle and, as such, cannot be discounted. In addition, the impact of the project on the stakeholder is critical as well as wider organisational benefits and

**Figure 2.19. Relative Importance of Success Dimensions and Time Dependency**




**Source: Shenhar, A.J. and Levy, O., 'Mapping the dimensions of project success', *Project Management Journal,* June 1997, Vol 28, No. 2, pages 5-14, this page 11.**

the project's contribution to strategic goals. Therefore, 'performance' in this context can be defined and measured in terms of:

- Reducing the risk of escalation to cost, time and scope;
- Reducing the resource demands of cost, time and scope;
- Meeting the expectations of the stakeholders, including the project team, in terms of value and usefulness;
- Improving the scale or certainty of business benefits;
- Improving the scale or certainty of the project's contribution to defined strategic goals; and
- Avoidance of identified strategic environment factors known to undermine delivery or future performance.

This last factor is largely derived from the discussion of Context, but the environment is highlighted as a key factor throughout this review of the literature. Based on the evidence relating to the interaction of factors and the uniqueness of projects, it is recognised that these measures of performance may be competing and may also carry different weightings depending on the type of project under review.

### 2.6.3. Intended and Unintended Effects

There has been reference in the above discussion to the importance of learning from previous experience and research suggests that IT projects continue to be susceptible to failure because organisations fail to do so.[233] The academic study of organisational learning considers organisations to be capable of observing their own actions, experimenting to discover the effects of alternative actions and then of modifying their actions to improve performance.[234] This emphasises the contribution of learning to the enhancement of organisational effectiveness. However, in 2001, Hillam and Edwards noted that many organisations do not critically examine the causes for project failure and this prevents them from learning from their mistakes.[235] It is acknowledged that it is difficult for organisations to unlearn what they already know,[236] that they may learn inappropriate behaviours[237] or that they may develop 'competency traps', in which knowledge gained from past successes is incorrectly applied to present problems.[238] Therefore, while the literature tends to see organisational learning as a positive force, there are occasions where it might also result in negative consequences.

A good deal of evidence suggests that an organisation's own experience provides a base of knowledge.[239] However, research also identifies the difficulty of learning from experience. Robey and Newmand carried out a longitudinal study of recurring failure at one organisation.[240] Despite costly mistakes, the organisation showed a persistent pattern of dependence on unproven software and failure to resolve ongoing conflict between the users and the IT professionals. Ultimately, this pattern of failure was reversed but it was unclear to the researchers why past experience was ignored and why these dysfunctional patterns of behaviour were allowed to continue for so long.

Keil and Robey note the strong commitment to IT projects in certain organisations, with resources still being allocated despite public controversy and strong opposition.[241] Empirical research carried out by Keil and Mann showed that 81 per cent of respondents indicated that this had happened in one or more of the last five projects with which they had been associated.[242] Clearly, there needs to be a balance between obtaining commitment and resources for potential IT projects and withdrawing commitment or redirecting projects that are failing. This social and organisational phenomenon, known as the "escalation of commitment to a failing course of action",[243] raises the question of how troubled projects can be terminated or redirected before they consume additional resources. This is due to a combination of factors, including psychological, social and organisational.[244]

Clearly, the learning process is more complex than simply adjusting action based on experience. This suggests that the history of an organisation cannot be discounted: recent experience always contends with previous experience. In cases where a particular information system has proved to be successful, an organisation may persist in its use long after it has ceased to be effective.[245] Thus, favourable experience with an information system can inhibit the use of other systems that could be more effective.[246] Therefore, older organisational knowledge may create a barrier to the acquisition of more relevant knowledge based on more recent experiences. Much of the research relevant to information systems deals directly or indirectly with overcoming barriers to acquiring new knowledge.[247] Martins and Kambell carried out a case study that showed how managers with more favourable experience in implementing information systems tend to interpret new information systems as opportunities rather than threats.[248] This demonstrates the importance of experience with technologies that are similar to those being adopted. From this, it can be concluded that an organisation's experience with information systems may affect subsequent implementation success.

There is an argument that organisations like the public sector have learned to fail. Meyer and Zucker's theory of 'permanently failing' organisations is an attempt to explain the apparently irrational occurrence of projects that perform poorly but are nevertheless maintained.[249] The theory states that where performance and persistence are decoupled, there must exist a group of dependent actors (workers with non-transferable skills, for example) who derive benefit from the continued persistence of the project. The actions of these actors may force the organisation into poor performance. Their work applied to the private sector but may be just as applicable to the public sector.

### 2.7. Summary

The discussion began with an examination of the Context, which highlighted the lack of research into the government context and its impact on the management of IT projects. However, there is some evidence that specific elements of this Programme, Policy and Political Context create a difficult culture in which to operate, thereby constraining the processes of project management and making IT projects more problematic. This seems to be particularly so in the case of the UK. This proposition will be examined further in the first section of the case study, which is presented in Chapter Five and considers the Programme, Policy and Political Context in relation to the DII Programme.

In terms of the Intervention, scholarly thinking on CSFs was examined in relation to generic project management before considering IT project management. This demonstrated the evolution of thinking in generic project management: the differentiation of the project from the product lifecycle; the move to multi-dimensional frameworks, emphasising not only the importance of CSFs but the criticality of their interactions; the extension of the iron triangle to incorporate wider organisational and environmental factors as well as an increased focus on stakeholders, including the project team; the recognition of different project types operating in unique contexts and, therefore, requiring different approaches, leading to a contingency approach to project management and the more recent idea of strategic project management.

IT project management has followed a similar route but has moved more rapidly towards organisational factors and an emphasis on the end-user. This is largely due to the unique nature of IT projects, which are complex, unpredictable and closely tied to their organisational context. Within this, different types of IT project may require different types of management. Understanding the type of project enables greater clarity in assessing the risks to its successful management and identification of the most relevant CSFs. The Formal Systems Method (FSM) encapsulates much of the previous research, clearly considering both the context and the environment, picking up on subjective issues, such as expectations and decision-making, whilst also showing the interrelationships. As such, it provides an ideal measure of the impact of the CSFs on the performance of an IT project. Having reviewed the IT project management literature, the CSFs were extracted and compared to work on generic project management carried out by Fortune and White in 2006. This corroborated their findings with two of the top three CSFs for IT project management being the same as those for generic project management. 'User/Client Involvement' was identified as the most important factor rather than 'Support from Senior Management' and 'Strong Detailed Plan Kept Up-to-Date' did not feature for IT project management. Finally, in this section, the lack of research into the application of CSFs in practice, along with the outcome of that application was identified.

The discussion about the Mechanism critiqued definitions of 'project' and 'project management'. It also looked at the project lifecycle, questioning the utility of project reviews, particularly for IT projects, and noting the move to more dynamic development lifecycles and attempts to incorporate some organisational elements. The discussion then moved to the Outcome, firstly reviewing the effect of the Intervention by examining the study of risk management. This is at an immature stage in the IT project management literature but follows the same move from lists to frameworks as the work on CSFs. The top three risk factors were the mirror image of the top three CSFs for IT project management, further corroborating the CSFs identified in the literature. This section then considered the evolution of definitions of success and, from this, created a clear definition and measure of 'performance'. Finally, some key themes relating to learning from experience were discussed, including the failure to learn and the commitment to troubled projects.

### 2.7.1. Confirming the Research Gap

This literature review has revealed two gaps in the literature. Firstly, there is a lack of research on IT project management in the public sector in general and the MoD in particular. This analysis has shown the importance of understanding the organisational context, particularly with regard to organisational fit and meeting the expectations of the stakeholders involved in the project. Set against this, though, are the specific issues of IT project management in the public sector, contextual issues that appear to draw government organisations together as a coherent mass, so making generic lessons highly applicable, if they have the ability to become learning organisations. Secondly, there is sufficient understanding of the CSFs to enable good practice but little evidence that this is being applied in practice. Research activity has been concerned with identifying CSFs, rather than seeking evidence that they are being understood and used to good effect. This research asks whether the lessons learned from previous complex IT projects in government have been used to improve the performance of subsequent projects. The findings of this literature review confirm that there is no evidence that this question has been answered previously. The next stage, therefore, is to identify a suitable research methodology in order to collect the required empirical evidence to do so.

## References


[1] Shenhar, A.J. and Dvir, D., *Reinventing Project Management: The Diamond Approach to Successful Growth and Innovation*, (Boston, Harvard Business School Press, 2007), page 94.
[2] Pinto, J.K. and Covin, J.G., 'Critical Factors in Project Implementation: a Comparison Study of Construction and R&D Projects', *Technovation*, 1989, Vol.9, No.1, pages 49-51.
[3] Savage, M., 'Labour's Computer Blunders Cost £26bn', *The Independent*, 19th January 2010, http://www.independent.co.uk/news/uk/politics/labours-computer-blunders-cost-16326bn-1871967.html, downloaded 29th March 2010.
[4] Zhou, L., Vasconcelos, A. and Nunes, M., 'Supporting Decision Making in Risk Management Through an Evidence-Based Information Systems Project Risk Checklist', *Information Management & Computer Security*, 2008, Vol. 16, No. 2, pages 166 – 186.
[5] Aveyard, H., *Doing a Literature Review in Health and Social Care*, (Maidenhead, Open University Press, 2007).
[6] Cronin, P., Ryan, F. and Coughlan, M., 'Undertaking a Literature Review: a Step by Step Approach', *British Journal of Nursing*, 2008, Vol. 17, No. 1, pages 38-43, this page 38.
[7] Cronin, P., Ryan, F. and Coughlan, M., 'Undertaking a Literature Review: a Step by Step Approach', *British Journal of Nursing*, 2008, Vol. 17, No. 1, pages 38-43, this page 38.
[8] Aveyard, H., *Doing a Literature Review in Health and Social Care*, (Maidenhead, Open University Press, 2007).
[9] Aveyard, H., *Doing a Literature Review in Health and Social Care*, (Maidenhead, Open University Press, 2007).
[10] Urquhart, C., 'Systematic Reviewing, Meta-Analysis and Meta-Synthesis for Evidence-Based Library and Information Science', *Proceedings of the Seventh International Conference on Conceptions of Library and Information Science: Unity in Diversity, Information Research,* September 2010, Vol. 15, No. 3. http://informationr.net/ir/15-3/colis7/colis708.html. Downloaded 14th October 2010.
[11] Cronin, P., Ryan, F. and Coughlan, M., 'Undertaking a Literature Review: a Step by Step Approach', *British Journal of Nursing*, 2008, Vol. 17, No. 1, pages 38-43, this page 39.
[12] Stern P. and Harris, C., 'Women's Health and the Self-Care Paradox: A Model to Guide Self-Care Readiness – Clash Between the Client and Nurse', *Health Care for Women International*, 1985, Vol. 6, pages 151–163.
[13] Aveyard, H., *Doing a Literature Review in Health and Social Care*, (Maidenhead, Open University Press, 2007), page 12.
[14] Andrews, R., 'The Place of Systematic Reviews in Education Research', *British Journal of Education,* 2005, Vol. 53, No. 4, pages 399-416, this pages 399-400.
[15] Tranfield, D., Denyer, D. and Smart, P., 'Towards a Methodology for Developing Evidence-Informed Management Knowledge by Means of Systematic Review', *British Journal of Management*, 2003, Vol. 14, No. 3, page 207-222, this page 207.
[16] Denyer, D. and Tranfield, D., 'Producing a Systematic Review', In: Buchanan, D.A. and Bryman, A, *The Sage Handbook of Organisational Research Methods,* (Los Angeles, Sage, 2009), pages 671-689, this page 677.
[17] Denyer, D. and Tranfield, D., 'Producing a Systematic Review', In: Buchanan, D.A. and Bryman, A, *The Sage Handbook of Organisational Research Methods,* (Los Angeles, Sage, 2009), pages 671-689.
[18] Denyer, D. and Tranfield, D., 'Producing a Systematic Review', In: Buchanan, D.A. and Bryman, A, *The Sage Handbook of Organisational Research Methods,* (Los Angeles, Sage, 2009, pages 671-689, this page 671.
[19]Andrews, R., 'The Place of Systematic Reviews in Education Research', *British Journal of Educational Studies*, 2005, Vol. 53, No.4, pages 399-416.
[20] Denyer, D., Tranfield, D. and van Aken, J.E, 'Developing Design Propositions through Research Synthesis', *Organization Studies*, Vol. 29, No.3, pages 393-415.
[21] Advanced Institute of Management Research, *The Stages of a Systematic Review*, http://www.networkedcranfield.com/logicofenquiry/gst/SR/stages/Pages/default.aspx, downloaded 10th March 2011.
[22] Wallace, M. and Wray, A., *Critical Reading and Writing for Postgraduates,* (London, Sage, 2006).
[23] Bates, M., 'The design of Browsing and Berrypicking Techniques for On-line Search Interface', *Online Review*, 1989, Vol. 13, No. 5, pages 407–431.
[24] Intellect, *Getting IT Right for Government*, (London, HMSO, 2000).

[25] Rosacker, K.M. and Rosacker, R.E., 'Information Technology Project Management within Public Sector Organizations', *Journal of Enterprise Information Management*, 2010, Vol.23, No.5, pages 587-594.
[26] Hackney, R.A. and McBride, N.K., 'The Efficacy of Information Systems in the Public Sector: Issues of Context and Culture', *The International Journal of Public Sector Management*, 1995, Vol. 8, No.6, pages 17-30.
[27] Hackney, R.A. and McBride, N.K., 'The Efficacy of Information Systems in the Public Sector: Issues of Context and Culture', *The International Journal of Public Sector Management*, 1995, Vol. 8, No.6, pages 17-30.
[28] Brown, T., 'Modernisation or Failure? IT Development Programmes in the UK Public Sector', *Financial Accounting and Management IT*, Vol. 17, No. 4, November 2001, pages 363-381.
[29] Brown, T., 'Modernisation or Failure? IT Development Programmes in the UK Public Sector', *Financial Accounting and Management IT*, Vol. 17, No. 4, November 2001, pages 363-381.
[30] Brooks, F.P., *The Mythical Man Month*, (Addison-Wesley, 1995).
[31] Brown, T., 'Modernisation or Failure? IT Development Programmes in the UK Public Sector', *Financial Accounting and Management IT*, Vol. 17, No. 4, November 2001, pages 363-381.
[32] Brown, T., 'Modernisation or Failure? IT Development Programmes in the UK Public Sector', *Financial Accounting and Management IT*, Vol. 17, No. 4, November 2001, pages 363-381.
[33] Brown, T., 'Modernisation or Failure? IT Development Programmes in the UK Public Sector', *Financial Accounting and Management IT*, Vol. 17, No. 4, November 2001, pages 363-381.
[34] Brown, T., 'Modernisation or Failure? IT Development Programmes in the UK Public Sector', *Financial Accounting and Management IT*, Vol. 17, No. 4, November 2001, pages 363-381.
[35] Brown, T., 'Modernisation or Failure? IT Development Programmes in the UK Public Sector', *Financial Accounting and Management IT*, Vol. 17, No. 4, November 2001, pages 363-381.
[36] Thomas, D., 'The Gremlins Strike – Again', *The Sunday Telegraph*, 30 November 2003, page 20.
[37] Great Britain, Institute for Government, *System Error: Fixing the Flaws in Government IT*, (Institute for Government, London, 2011), page 10.
[38] Great Britain, Institute for Government, *System Error: Fixing the Flaws in Government IT*, (Institute for Government, London, 2011), page 10.
[39] Brown, T., 'Modernisation or Failure? IT Development Programmes in the UK Public Sector', *Financial Accounting and Management IT*, Vol. 17, No. 4, November 2001, pages 363-381.
[40] Brown, T., 'Modernisation or Failure? IT Development Programmes in the UK Public Sector', *Financial Accounting and Management IT*, Vol. 17, No. 4, November 2001, pages 363-381..
[41] Crawford, L.H. and Helm, J., 'The Value of Project Management in the Public Sector', *Project Management Journal*, 2009, Vol. 40, No.1, pages 73-88.
[42] Crawford, L.H. and Helm, J., 'The Value of Project Management in the Public Sector', *Project Management Journal*, 2009, Vol. 40, No.1, pages 73-88.
[43] Rosacker, K.M. and Rosacker, R.E., 'Information Technology Project Management within Public Sector Organizations', *Journal of Enterprise Information Management*, 2010, Vol. 23, No. 5, pages 587-594.
[44] Rosacker, K.M. and Rosacker, R.E., 'Information Technology Project Management within Public Sector Organizations', *Journal of Enterprise Information Management*, 2010, Vol. 23, No. 5, pages 587-594.
[45] Rosacker, K.M. and Rosacker, R.E., 'Information Technology Project Management within Public Sector Organizations', *Journal of Enterprise Information Management*, 2010, Vol. 23, No. 5, pages 587-594.
[46] Dunleavy, P., Margetts, H., Bastow, S. and Tinkler, J., 'Government IT Performance and the Power of the IT industry: a Cross-National Study', paper presented at the *Annual American Political Science Association Conference*, Chicago 1st September 2004. Panel 25-2, *Digital Policy Issues: Inequality, E-government*, 4th Sept. http://www.apsanet.org.
[47] Dunleavy, P., Margetts, H., Bastow, S. and Tinkler, J., 'Government IT Performance and the Power of the IT industry: a Cross-National Study', paper presented at the *Annual American Political Science Association Conference*, Chicago 1st September 2004. Panel 25-2, *Digital Policy Issues: Inequality, E-government*, 4th Sept. http://www.apsanet.org.
[48] Cross, M., 'Special Report: Public Sector IT Failures', *Prospect*, October 2005, pages 48-52, this page 50.
[49] Dunleavy, P., Margetts, H., Bastow, S. and Tinkler, J., 'Government IT Performance and the Power of the IT industry: a Cross-National Study', paper presented at the *Annual American Political Science*

*Association Conference*, Chicago 1st September 2004. Panel 25-2, *Digital Policy Issues: Inequality, E-government*, 4th Sept. http://www.apsanet.org.

[50] Great Britain, House of Commons, Work and Pensions Committee, *Management of Information Technology Projects: Making IT Deliver for DWP Customers,* HC 311, Third Report, Session 2003-04, (London, HMSO, 2004).

[51] de Wit, A., 'Measurement of Project Success', *International Journal of Project Management*, 1988, Vol. 6, No. 3, pages 164-170.

[52] de Wit, A., 'Measurement of Project Success', *International Journal of Project Management*, 1988, Vol. 6, No. 3, pages 164-170.

[53] de Wit, A., 'Measurement of Project Success', *International Journal of Project Management*, 1988, Vol. 6, No. 3, pages 164-170.

[54] Rockart, J., 'Chief Executives Define their Own Information Needs', *Harvard Business Review,* March/April 1979, pages 81-92.

[55] Rockart, J., 'Chief Executives Define their Own Information Needs', *Harvard Business Review,* March/April 1979, pages 81-92, this page 85.

[56] Bullen, C.V. and Rockart, J.F., 'A Primer on Critical Success Factors', *Center for Information Systems Research Working Paper, No 69,* (Cambridge, MA, Sloan School of Management, MIT, 1981).

[57] Boynton, A.C. and Zmud, R.W., 'An Assessment of Critical Success Factors', *Sloan Management Review*, 1984, Vol. 25, No. 4, pages 17-27.

[58] Fortune, J. and White, D., 'Framing of Project Critical Success Factors by a Systems Model', *International Journal of Project Management,* 24, 2006, pages 53-65, this pages 53-54.

[59] Yardley, D., *Successful IT Project Delivery: Learning the Lessons of Project Failure,* (London, Addison-Wesley, 2002).

[60] Belassi, W. and Tukel, O.I., 'A New Framework for Determining Critical Success/Failure Factors in Projects', *International Journal of Project Management*, 1996, Vol. 14, No.3, pages 141-152.

[61] Jugdev, K. and Muller, R., 'A Retrospective Look at our Evolving Understanding of Project Success', *Project Management Journal*, December, 2005, Vol. 36, No. 4, pages 19-31, this page 24.

[62] Atkinson, R., 'Project Management: Cost, Time and Quality, Two Best Guesses and a Phenomenon, It's Time to Accept Other Success Criteria', *International Journal of Project Management*, 1999, Vol. 17, No. 6, pages 337-342.

[63] Jugdev, K. and Muller, R., 'A Retrospective Look at our Evolving Understanding of Project Success', *Project Management Journal*, December, 2005, Vol. 36, No. 4, pages 19-31.

[64] Dvir, D., Raz, T. and Shenhar, A.J., 'An Empirical Analysis Of The Relationship Between Project Planning And Project Success', *International Journal of Project Management*, 2003, Vol.21, No.2, Pages 89-95.

[65] Jugdev, K. and Muller, R., 'A Retrospective Look at our Evolving Understanding of Project Success', *Project Management Journal*, December, 2005, Vol. 36, No. 4, pages 19-31, this page 19.

[66] Jugdev, K. and Muller, R., 'A Retrospective Look at our Evolving Understanding of Project Success', *Project Management Journal*, December, 2005, Vol. 36, No. 4, pages 19-31, this page 19.

[67] Schultz, R.L., Slevin, D.P. and Pinto, J.K., 'Strategy and Tactics in a Process Model of Project Implementation', *Interfaces*, 1987, Vol.17, No.3, pages 34-46.

[68] Pinto, J.K. and Covin, J.G., 'Critical Factors in Project Implementation: A Comparison Study of Construction and R&D Projects', *Technovation*, 1989, Vol.9, No.1, pages 49-51.

[69] Pinto, J.K. and Covin, J.G., ' Critical Factors in Project Implementation: A Comparison Study of Construction and R&D Projects', *Technovation*, 1989, Vol.9, No.1, pages 49-51.

[70] Pinto, J.K. and Slevin, D.P., 'Critical Success Factors in R&D Projects', *Research Technology Management*, 1989, Vol. 32, No.1, pages 31-36.

[71] Pinto, J.K. and Covin, J.G., 'Critical Factors in Project Implementation: a Comparison Study of Construction and R&D Projects', *Technovation*, 1989, Vol.9, No.1, pages 49-51.

[72] Pinto, J.K. and Slevin, D.P., 'Project Success: Definitions and Measurement Techniques', *Project Management Journal*, 1989, Vol. 19, No. 1, pages 67-75.

[73] Pinto, J.K. and Slevin, D.P., 'Project Success: Definitions and Measurement Techniques', *Project Management Journal*, 1989, Vol. 19, No. 1, pages 67-75.

[74] Belassi, W. and Tukel, O.I., 'A New Framework for Determining Critical Success/Failure Factors in Projects', *International Journal of Project Management*, 1996, Vol. 14, No.3, pages 141-152.

[75] Belassi, W. and Tukel, O.I., 'A New Framework for Determining Critical Success/Failure Factors in Projects', *International Journal of Project Management*, 1996, Vol. 14, No.3, pages 141-152.

[76] Fortune, J. and Peters, G., *Information Systems: Achieving Success by Avoiding Failure.* (Chichester, Wiley, 2005), page 192.
[77] Freeman, M. and Beale, P., 'Measuring Project Success', *Project Management Journal*, 1992, Vol. 23, No.1, pages 8-17.
[78] Turner, J.R., *The Handbook of Project-based Management*, (McGraw-Hill, 1993).
[79] Tishler, A., Dvir, D., Shenhar, A., Lipvetsky, S., 'Identifying Critical Success Factors in Defense Development Projects: a Multivariate Analysis', *Technology Forecasting and Social Change*, 1996, Vol.51, No.2, pages 151-171.
[80] Dvir, D. and Ben David, A., 'Team Characteristics, Organizational Culture and Project Success: a Neural Network Approach', *International Journal of Industrial Engineering: Special Issue on Project Management*, 1999, Vol. 6, No.2, pages 151-160.
[81] Pinto, J.K. and Covin, J.G., 'Critical Factors in Project Implementation: a Comparison Study of Construction and R&D Projects', *Technovation*, 1989, Vol.9, No.1, pages 49-51.
[82] Pinto, J.K. and Covin, J.G., 'Critical Factors in Project Implementation: a Comparison Study of Construction and R&D Projects', *Technovation*, 1989, Vol.9, No.1, pages 49-51.
[83] Pinto, J.K. and Mantel, S.J., 'The Causes of Project Failure', *IEEE Transactions of Engineering Management*, 1990, 37, 269-276.
[84] Pinto, J.K. and Covin, J.G., 'Critical Factors in Project Implementation: a Comparison Study of Construction and R&D Projects', *Technovation*, 1989, Vol.9, No.1, pages 49-51.
[85] Shenhar, A.J., 'One Size Does Not Fit All Projects: Exploring Classical Contingency Domains', *Management Science*, Vol.47, No.3, pages 394-414.
[86] Burns, T. and Stalker, G.M., *The Management of Innovation*, (Oxford, OUP, 1994).
[87] Lawrence, P. R. and Lorsch, J. W., *Organization and Environment: Managing Differentiation and Integration*, (Boston, MA, Harvard University, 1967).
[88] Perrow, C., 'A Framework for the Comparative Analysis of Organizations', *American Sociological Review*, Vol.32, No.2, pages 194–208.
[89] Pich, M.T., Loch, C.H. and de Meyer, A., 'On Uncertainty, Ambiguity and Complexity in Project Management', *Management Science*, 2002, Vol. 48, No. 8, pages 1008-1023.
[90] Lauras, M., Marques, G. and Gourc, D., 'Towards a Multi-Dimensional Project Performance Measurement System', *Decision Support Systems*, 2010, 48, pages 342-353.
[91] Lauras, M., Marques, G. and Gourc, D., 'Towards a Multi-Dimensional Project Performance Measurement System', *Decision Support Systems*, 2010, 48, pages 342-353.
[92] Howell, D., Windahl, C. and Seidel, R. 'A Project Contingency Framework Based on Uncertainty and its Consequences', *International Journal of Project Management*, 2010, Vol. 28, pages 256-264, this page 256.
[93] Howell, D., Windahl, C. and Seidel, R. 'A Project Contingency Framework Based on Uncertainty and its Consequences', *International Journal of Project Management*, 2010, Vol. 28, pages 256-264, this page 257.
[94] Lyneis, J.M., Cooper, K.G. and Els, S.A., 'Strategic Management of Complex Projects: a Case Study using System Dynamics', *System Dynamics Review*, 2001, Vol. 17, No.3, pages 237-260.
[95] Shenhar, A.J., 'Strategic Project Leadership: Towards a Strategic Approach to Project Management', *R&D Management*, Nov2004, Vol. 34 Issue 5, p569-578
[96] Milosevic, D.Z. and Srivannaboon, S., 'A Theoretical Framework for Aligning Project Management with Business Strategy', *Project Management Journal*, 2006, Vol. 37, No.3, pages 98-110.
[97] Dvir, D., Ben David, A., Sadeh, A. and Shenhar, A.J., 'Critical Managerial Factors Affecting Defense Projects Success: A Comparison between Neural Network and Regression Analysis', *Engineering Applications of Artificial Intelligence*, 2006, Vol.19, No.5, pages 535-543.
[98] Dvir, D., Ben David, A., Sadeh, A. and Shenhar, A.J., 'Critical Managerial Factors Affecting Defense Projects Success: A Comparison between Neural Network and Regression Analysis', *Engineering Applications of Artificial Intelligence*, 2006, Vol.19, No.5, pages 535-543.
[99] Pinto, J.K., Slevin, D.P. and English, B., 'Trust in Projects: An Empirical Assessment of Owner/Contractor Relationships', *International Journal of Project Management*, 2009, Vol. 27, pages 638-648.
[100] Cooke-Davies, T.J., Crawford, L.H. and Lechler, T.G., 'Project Management Systems: Moving Project Management from an Operational to a Strategic Discipline', *Project Management Journal*, 2009, Vol.40, No.1, pages 110-123.
[101] Jugdev, K. and Muller, R., 'A Retrospective Look at Our Evolving Understanding of Project Success', *Project Management Journal*, December, 2005, Vol. 36, No. 4, pages 19-31, this page 19.

[102] Kloppenborg, T.J. and Opfer, W.A., 'The Current State of Project Management Research: Trends, Interpretations and Predictions', *Project Management Journal*, 2002, Vol. 33, No. 2, pages 5-18.
[103] Spector, A. and Gifford, D., 'A Computer Science Perspective of Bridge Design', *Communications of the ACM*, April 1986, Vol. 29, No. 4, pages 268-283.
[104] Pinto, J.K. and Covin, J.G., 'Critical factors in Project Implementation: a Comparison Study of Construction and R&D projects', *Technovation*, 1989, Vol.9, No.1, pages 49-51.
[105] Morris, P.W.G., 'Project Management: Lessons from IT and non-IT Projects', In: Earl, M.J., *Information Management, the Organisational Dimension*, (Oxford, OUP, 1996).
[106] Fitzgerald, G., and Russo, N., 'The Turnaround of the London Ambulance Service Computer-Aided Despatch System (LASCAD)', *European Journal of Information Systems*, 2005, Vol.14, pages 244-257.
[107] Kappelman,L.A., McKeeman, R. and Zhang, L., 'Early Warning Signs of IT Project Failure: the Dominant Dozen.' *Information Systems Management*, 2006, pages 31-36.
[108] Kappelman,L.A., McKeeman, R. and Zhang, L., 'Early Warning Signs of IT Project Failure: the Dominant Dozen.' *Information Systems Management*, 2006, pages 31-36.
[109] McFarlan, F.W., 'Portfolio Approach to Information Systems', *Harvard Business Review*, 1981, Sept-Oct, pages 142-150.
[110] Ward, J. and Griffiths, P., *Strategic Planning for Information Systems*, (Chichester, Wiley, 1996), page 364.
[111] McFarlan, F.W., 'Portfolio Approach to Information Systems', *Harvard Business Review*, 1981, Sept-Oct, pages 142-150.
[112] McFarlan, F.W., 'Portfolio Approach to Information Systems', *Harvard Business Review*, 1981, Sept-Oct, pages 142-150.
[113] Markus, M.L. *Systems in Organisations: Bugs and Features*, (Pitman, 1984).
[114] Markus, M.L. and Robey, D. 'The Organisational Validity of Management Information Systems', *Human Relations*, 1983, 36, pages 203-226.
[115] Pliskin, N. et al. 'Presumed Versus Actual Organisational Culture: Managerial Implications for Implementation of Information Systems', *The Computer Journal*, 1993, 36, 143-152.
[116] Markus, M.L. and Robey, D. 'The Organisational Validity of Management Information Systems', *Human Relations*, 1983, 36, pages 203-226.
[117] Markus, M.L. and Robey, D. 'The Organisational Validity of Management Information Systems', *Human Relations*, 1983, 36, pages 203-226.
[118] Davis, G.B. et al., 'Diagnosis of an Information System Failure', *Information and Management*, 1992, 23, 293-318.
[119] Davis, G.B. et al., 'Diagnosis of an Information System Failure', *Information and Management*, 1992, 23, 293-318.
[120] Mitev, N.N., 'More than a Failure? The Computerized Reservation Systems at French Railways', *Information Technology and People*, 1996, 9, pages 8-19.
[121] Sauer, C., *Why Information Systems Fail: A Case Study Approach*, (Waller, 1993).
[122] Heeks, R., Mundy, D. and Salazar, A., *Why Health Care Information Systems Succeed or Fail*, (Manchester, Institute for Development Policy and Management, Manchester University, 1999).
[123] Heeks, R., Mundy, D. and Salazar, A., *Why Health Care Information Systems Succeed or Fail*, (Manchester, Institute for Development Policy and Management, Manchester University, 1999).
[124] Dodd, W. and Fortune, J. 'An Electronic Patient Record Project in the United Kingdom: Can it Succeed?' in: *Medinfo '95*, R.A. Greenes, H.E. Peterson and D.J. Protti (eds), (Healthcare Computing and Communications Canada, Edmonton, 1995), pages 301-304.
[125] Heeks, R., Mundy, D. and Salazar, A., *Why Health Care Information Systems Succeed or Fail*, (Manchester, Institute for Development Policy and Management, Manchester University, 1999).
[126] Heeks, R., Mundy, D. and Salazar, A., *Why Health Care Information Systems Succeed or Fail*, (Manchester, Institute for Development Policy and Management, Manchester University, 1999).
[127] Fortune, J. and Peters, G., 'The Formal System Paradigm for Studying Failures', *Technology Analysis and Strategic Management*, 1990, Vol.2, No.4, pages 383-390.
[128] Peters, G. and Fortune, J., 'Systemic Methods for the Analysis of Failure', *Systems Practice*, 1992, Vol.5, No. 5, pages 529-542.
[129] Fortune, J., *Systems Paradigms*, (Milton Keynes, Open University Press, 1993).
[130] Fortune, J. and Peters, G., 'Systems Analysis of Failures as a Quality Management Tool', *British Journal of Management*, 1994, Vol.5, pages 205-213.
[131] Fortune, J. and Peters, G., 'The Formal System Paradigm for Studying Failures', *Technology Analysis and Strategic Management*, 1990, Vol.2, No.4, pages 383-390.

132 Checkland, P., *Systems Thinking, Systems Practice*, (Chichester, Wiley, 1981).
133 Fortune, J. and Peters, G., *Information Systems: Achieving Success by Avoiding Failure*, (Chichester, Wiley, 2005), page 121.
134 Chua, A.Y.K., 'Exhuming IT Projects from their Graves: an Analysis of Eight Failure Cases and their Risk Factors', *Journal of Computer Information Systems*, Spring 2009, http://findarticles.com/p/articles/mi_hb5785/is_200904/ai_n32326224/?tag=content;col1, downloaded 31 March 2010
135 White, D. and Fortune, J., 'Current Practice In Project Management: An Empirical Study', *International Journal of Project Management*, 2002, Vol. 20, No. 1, pages 1-11.
136 Fortune, J. and White, D., 'Framing of Project Critical Success Factors by a Systems Model', *International Journal of Project Management*, 2006, Vol. 24, pages 53-65.
137 Fortune, J. and White, D., 'Framing of Project Critical Success Factors by a Systems Model', *International Journal of Project Management*, 2006, Vol. 24, pages 53-65, this page 54.
138 Fortune, J. and White, D., 'Framing of Project Critical Success Factors by a Systems Model', *International Journal of Project Management*, 2006, Vol. 24, pages 53-65, this page 54.
139 Great Britain, House of Commons, Work and Pensions Committee, *Department of Work and Pensions Management of Information Technology Projects: Making IT Deliver for DWP Customers.* Third Report of Session 2003-04, Volume 1, HC 311, (London, HMSO, 2004), page 38.
140 Great Britain, House of Commons, Work and Pensions Committee, *Department of Work and Pensions Management of Information Technology Projects: Making IT Deliver for DWP Customers.* Third Report of Session 2003-04, Volume 1, HC 311, (London, HMSO, 2004), page 39.
141 Great Britain, House of Commons, Work and Pensions Committee, *Department of Work and Pensions Management of Information Technology Projects: Making IT Deliver for DWP Customers.* Third Report of Session 2003-04, Volume 1, HC 311, (London, HMSO, 2004), page 38-39.
142 Sauser, B., Reilly, R.,and Shenhar, A., 'Why Projects Fail? How Contingency Theory Can Provide New Insights - A Comparative Analysis of NASA's Mars Climate Orbiter Loss', *International Journal of Project Management*, 2009, Vol.27, No.7, pages 665-679, this page 665.
143 Sauser, B., Reilly, R.,and Shenhar, A., 'Why Projects Fail? How Contingency Theory Can Provide New Insights - A Comparative Analysis of NASA's Mars Climate Orbiter Loss', *International Journal of Project Management*, 2009, Vol.27, No.7, pages 665-679, this page 665.
144 de Wit, A., 'Measurement of Project Success', *International Journal of Project Management*, 1988, Vol. 6, No. 3, pages 164-170.
145 Great Britain, Cabinet Office, Office of Government Commerce, *The Centre of Excellence: a Pocket Guide*, (London, HMSO, 2005), page 5. www.ogc.gov.uk/documents/TheCentreOfExcellencePocketbook.pdf, downloaded 19th November 2007.
146 Meredith, J.R. and Mantel Jr., S.J., *Project Management: A Managerial Approach*, 3rd edition, (New York, Wiley, 1995).
147 Gottschalk, P. and Karlsen, J.T., 'A Comparison of Leadership Roles in Internal IT Projects Versus Outsourcing Projects', *Industrial Management and Data Systems*, 2005, Vol. 105, No. 9, pages 1137-1149, this page 1137.
148 Shenhar, A.J. and Dvir, D., *Reinventing Project Management: The Diamond Approach to Successful Growth and Innovation*, (Boston, Harvard Business School Press, 2007), page 94.
149 Project Management Institute, *A Guide to the Project Management Body of Knowledge(PMBOK@Guide)*, 4th Edition, (PMI, 2008).
150 Atkinson, R., 'Project Management: Cost, Time and Quality, Two Best Guesses and a Phenomenon, It's Time to Accept Other Success Criteria', *International Journal of Project Management*, 1999, Vol. 17, No. 6, pages 337-342, this page 337.
151 British Standard Institute, *Project Management – Part 2: Vocabulary*, (BSI, London, 2000).
152 Great Britain, Cabinet Office, Office of Government Commerce, *The Centre of Excellence: a Pocket Guide*, (London, HMSO, 2005), page 5. www.ogc.gov.uk/documents/TheCentreOfExcellencePocketbook.pdf, downloaded 19th November 2007.
153 Shenhar, A.J. and Dvir, D., *Reinventing Project Management: The Diamond Approach to Successful Growth and Innovation*, (Boston, Harvard Business School Press, 2007).
154 Atkinson, R., 'Project Management: Cost, Time and Quality, Two Best Guesses and a Phenomenon, It's Time to Accept Other Success Criteria', *International Journal of Project Management*, 1999, Vol. 17, No. 6, pages 337-342, this page 337.
155 British Standard Institute, *Project Management – Part 2: Vocabulary*, (London, BSI, 2000).

[156] Association of Project Management, *Body of Knowledge*, Version 2, (Princes Risborough, APM, 1995).
[157] Association of Project Management, *Body of Knowledge*, 5th Edition (Princes Risborough, APM, 2006).
[158] Avison, D. and Fitzgerald, G., *Information Systems Development Methodologies, Techniques and Tools.* (McGraw-Hill, 2003).
[159] Liu, L. and Yetton, P., 'The Contingent Effects on Project Performance of Conducting Project Reviews and Deploying Project Management Offices', *IEEE Transactions on Engineering Management*, 2007, Vol.54, No.4, pages 789-799.
[160] Liu, L. and Yetton, P., 'The Contingent Effects on Project Performance of Conducting Project Reviews and Deploying Project Management Offices', *IEEE Transactions on Engineering Management*, 2007, Vol.54, No.4, pages 789-799.
[161] Lyytinen, K. and Robey, D., 'Learning Failure in IS Development', *Information Systems Journal*, Vol. 9, 1999, pages 85-101.
[162] Fortune, J. and Peters, G., *Information Systems: Achieving Success by Avoiding Failure*, (Wiley, 2005), page 22.
[163] Fortune, J. and Peters, G., *Information Systems: Achieving Success by Avoiding Failure.* (Wiley, 2005), page 22.
[164] Elvin, R., 'Managing Information Systems Projects: The Need for a New Approach', *Proceedings of the 4th UK Academy of Information Systems Conference*, York, (London, McGraw-Hill, 1999), pages 159-165.
[165] Elvin, R., 'Managing Information Systems Projects: The Need for a New Approach', *Proceedings of the 4th UK Academy of Information Systems Conference*, York, (London, McGraw-Hill, 1999), pages 159-165.
[166] Lyytinen, K. and Robey, D., 'Learning Failure in IS Development', *Information Systems Journal*, Vol. 9, 1999, pages 85-101.
[167] Winter, M.C., Brown, D.H. and Checkland, P.B., 'A Role for Soft Systems Methodology in Information Systems Development', *European Journal of Information Systems,* Vol. 4, 1995, pages 130-142.
[168] Alter, S., 'Which Life Cycle – Work System, Information System or Software?' *Communications of the Association for Information Systems*, October 2001, 7, Article 17, page 12.
[169] Thomas, G. and Fernandez, W., 'Success in IT Projects: A Matter of Definition?' *International Journal of Project Management*, 2008, Vol. 26, pages 733-742.
[170] DeLone, W.H. and McLean, E.R., 'Information Systems Success: the Quest for the Dependent Variable', *Information Systems Research*, 1992, Vol.3, No.1, pages 60-95.
[171] Shenhar, A.J. and Levy, O., 'Mapping the Dimensions of Project Success', *Project Management Journal*, June 1997, Vol. 28, No. 2, pages 5-14.
[172] Baccarini, D., 'The Logical Framework Method for Defining Project Success', *Project Management Journal*, 1999, Vol.30, No.4, pages 25-32.
[173] Wallace, L., Keil, M. and Rai, A., 'How Software Project Risk Affects Project Performance: An Investigation of the Dimensions of Risk and an Exploratory Model', *Decision Sciences*, Spring 2004, Vol. 35, No. 2, pages 289-321.
[174] Keil, M., Cule, P.E., Lyttinen, K. and Schmidt, R.C., 'A Framework for Identifying Software Project Risks', *Communications of the ACM*, November 1998, Vol.41 No.11, pages 76-83.
[175] Kappelman,L.A., McKeeman, R. and Zhang, L., 'Early warning Signs of IT Project Failure: the Dominant Dozen.' *Information Systems Management*, 2006, pages 31-36.
[176] Alter, S. and Ginzberg, M., 'Managing Uncertainty in MIS Implementation', *Sloan Management Review*, 1978, Vol.20, No.1, pages 23-31.
[177] McFarlan, F.W., 'Portfolio Approach to Information Systems', *Harvard Business Review*, 1981, Vol. 59, No. 5, pages 142-150.
[178] Boehm, B. and Ross, R., 'Theory-W Software Project Management: Principles and Examples', *IEEE Transactions of Software Engineering*, 1989, Vol. 15, No. 7, pages 902-916.
[179] Heemstra, F.J. and Kusters, R.J., 'Dealing with Risk: a Practical Approach', *Journal of Information Technology,* 1996, Vol. 11, No. 4, pages 333-346.
[180] Moynihan, T, 'How Experienced Project Managers Assess Risk', *IEEE Software*, 1997, Vol. 14, No.3, pages 35-41.
[181] Schmidt, R., Lyytinen, K., Keil, M. and Cule, P., 'Identifying Software Project Risks: An International Delphi Study', *Journal of the Management of Information Systems,* Spring 2001, Vol. 17, No. 4, pages 5-36.

[182] Wallace, L., Keil, M. and Rai, A., 'Understanding Software Project Risk: a Cluster Analysis', *Information and Management*, 2004, Vol.42, pages 115-125.
[183] Wallace, L., Keil, M. and Rai, A., 'Understanding Software Project Risk: a Cluster Analysis', *Information and Management*, 2004, Vol.42, pages 115-125.
[184] Keil, M., Cule, P.E., Lyttinen, K. and Schmidt, R.C., 'A Framework for Identifying Software Project Risks', *Communications of the ACM*, November 1998, Vol.41 No.11, pages 76-83.
[185] Keil, M., Cule, P.E., Lyttinen, K. and Schmidt, R.C., 'A Framework for Identifying Software Project Risks', *Communications of the ACM*, November 1998, Vol.41 No.11, pages 76-83.
[186] Wallace, L. and Keil, M., 'Software Project Risks and their Effect on Outcomes', *Communications of the ACM*, April 2004, Vol, 47, No.4, pages 68-73.
[187] Wallace, L., Keil, M. and Rai, A., 'Understanding Software Project Risk: a Cluster Analysis', *Information and Management*, 2004, Vol.42, pages 115-125.
[188] Wallace, L., Keil, M. and Rai, A.,'How Software Project Risk Affects Project Performance: an Investigation of the Dimensions of Risk and an Exploratory Model', *Decision Sciences*, Spring 2004, Vol. 35, No. 2, pages 289-321.
[189] Cleland, D.I. 'Measuring Success: the Owner's Viewpoint', *Proceedings of the 18th annual Seminar/Symposium*, (Montreal, Canada, Upper Darby, PA: Project Management Institute, 1986), page 6.
[190] Pinto, J.K. and Slevin, D.P., 'Critical Success Factors across the Project Life Cycle', *Project Management Journal*, 1988, XIX, pages 65-75, this page 67.
[191] Yardley, D., *Successful IT Project Delivery: Learning the Lessons of Project Failure*, (Addison-Wesley, 2002).
[192] Great Britain, Parliamentary Office of Science and Technology, *Government IT Projects*, Report 200, (London, HMSO, 2000).
[193] Pinto, J.K. and Slevin, D.P., 'Critical Success Factors across the Project Life Cycle', *Project Management Journal*, 1988, XIX, pages 65-75.
[194] de Wit, A., 'Measurement of Project Success', *International Journal of Project Management*, 1988, Vol. 6, No. 3, pages 164-170.
[195] Lim, C.S. and Mohamed, M.Z., 'Criteria of Project Success: an Exploratory Re-Examination', *International Journal of Project Management*, 1999, Vol.17, No.4, pages 243-248.
[196] Lim, C.S. and Mohamed, M.Z., 'Criteria of Project Success: an Exploratory Re-Examination', *International Journal of Project Management*, 1999, Vol.17, No.4, pages 243-248.
[197] Fortune, J. and Peters, G., *Learning from Failure*, (Wiley, 1995).
[198] Shenhar, A.J. and Levy, O., 'Mapping the Dimensions of Project Success', *Project Management Journal*, June 1997, Vol. 28, No. 2, pages 5-14.
[199] Mason, R.O. and Mitroff, I.I. 'A Program for Research on Management Information Systems', *Management Science*, Vol. 9, No. 5, pages 475-487.
[200] Lester, D.H., 'Critical Success Factors for New Product Development', *Research Technology Management*, 1998, Vol.41, No.1, pages 36-43.
[201] Lyytinen, K and Hirschheim, R., 'Information Systems Failures: a Survey and Classification of the Empirical Literature', *Oxford Surveys in Information Technology*, Vol.4, 1987, pages 257-309.
[202] Myers, M.D., 'Qualitative Research in Information Systems', *MIS Quarterly*, Vol.21, No.2, June 1997, pages 241-242, *MISQ Discovery*, archival version, June 1997, www.misq.org/misqd961/isworld/, downloaded 21 February, 2004.
[203] Heeks, R., Mundy, D. and Salazar, A., *Why Health Care Information Systems Succeed or Fail*, (Manchester, Institute for Development Policy and Management, Manchester University, 1999).
[204] Walsham, G., *Interpreting Information Systems in Organisations*, (Chichester, Wiley, 1993).
[205] Heeks, R., Mundy, D. and Salazar, A., *Why Health Care Information Systems Succeed or Fail*, (Manchester, Institute for Development Policy and Management, Manchester University, 1999).
[206] Heeks, R., Mundy, D. and Salazar, A., *Why Health Care Information Systems Succeed or Fail*, (Manchester, Institute for Development Policy and Management, Manchester University, 1999).
[207] Dodd, W. and Fortune, J. 'An Electronic Patient Record Project in The United Kingdom: Can it Succeed?', in: *Medinfo '95*, R.A. Greenes, H.E. Peterson and D.J. Protti (eds), (Edmonton, Canada, Healthcare Computing and Communications, 1995), pages 301-304.
[208] Dhillon, G. *The Clinical Information System: A Case of Misleading Design Decisions*, Case 1-98-IT06, (Hershey, PA, Idea Group Publishing, 1998).
[209] Shenhar, A.J. and Levy, O., 'Mapping the Dimensions of Project Success', *Project Management Journal*, June 1997, Vol. 28, No. 2, pages 5-14.

[210] Dix, A., Finlay, J., Abword, D. and Beale, R., *Human-Computer Interaction*, 3rd Ed., (Harlow, Pearson Education, 2004).
[211] Snow, A.P., Keil, M. and Wallace, L.,' 'The Effects of Optimistic and Pessimistic Biasing on Software Project Status Reporting', *Information and Management*, 2007, Vol. 44, pages 130-141
[212] Snow, A.P., Keil, M. and Wallace, L.,' 'The Effects of Optimistic and Pessimistic Biasing on Software Project Status Reporting', *Information and Management*, 2007, Vol. 44, pages 130-141.
[213] Cole, A., 'Runaway Projects: Cause and Effects', *Software World*, 1997, Vol. 26, No.3, pages 3-5.
[214] Oz, E. and Sosik, J.J., 'Why Information Systems Projects are Abandoned: A Leadership and Communication Theory and Exploratory Study', *Journal of Computer Information Systems*, 2000, vol. 41, No.12, pages 66-78.
[215] Walsham, G., *Interpreting Information Systems in Organisations*, (Chichester, Wiley, 1993).
[216] Fortune, J. and White, D., 'Framing of Project Critical Success Factors by a Systems Model', *International Journal of Project Management*, 2006, Vol. 24, pages 53-65, this page 54.
[217] Myers, M., 'Dialetical Hermeneutics: a Theoretical Framework for the Implementation of Information Systems', *Information Systems Journal*, 1994, Vol. 5, pages 51-70.
[218] Fortune, J. and Peters, G., *Information Systems: Achieving Success by Avoiding Failure.* (Wiley, 2005), page 13.
[219] Thomas, G. and Fernandez, W., 'Success in IT Projects: A Matter of Definition?' *International Journal of Project Management*, 2008, Vol. 26, pages 733-742.
[220] Thomas, G. and Fernandez, W., 'Success in IT Projects: A Matter of Definition?' *International Journal of Project Management*, 2008, Vol. 26, pages 733-742.
[221] Thomas, G. and Fernandez, W., 'Success in IT Projects: A Matter of Definition?' *International Journal of Project Management*, 2008, Vol. 26, pages 733-742.
[222] Saarinen, T., 'An Expanded Instrument for Evaluating Information Systems Success', *Information and Management*, 1996, Vol. 31, pages 103-118.
[223] Pinto, J.K. and Mantel, S.J. 'The Causes of Project Failure', *IEEE Transactions of Engineering Management*, 1990, 37, 269-276.
[224] DeLone, W.H. and McLean, E.R., 'Information Systems Success: the Quest for the Dependent Variable', *Information Systems Research*, 1992, Vol.3, No.1, pages 60-95.
[225] Seddon, P.B. and Kiew, M-Y. 'A Partial Test and Development of the DeLone and McLean Model of IS Success', In: DeGross, J.I., Huff, S.L. and Munro, M.C. (Eds), *Proceedings of the International Conference on Information Systems*, (Atlanta, GA, Association for Information Systems, 1994), pages 99-110.
[226] Rai, A., Lang, S.S. and Welker, R.B., 'Assessing the Validity of IS Success Models: an Empirical Test and Theoretical Analysis', *Information Systems Research*, 2002, Vol. 13, No. 1. pages 50-69.
[227] Seddon, P.B., 'A Respecification and Extension of the DeLone and McLean Model of IS Success', *Information Systems Research*, September 1997, Vol. 8, No. 3, pages 240-253.
[228] DeLone, W.H. and McLean, E.R., 'The DeLone and McLean Model of Information Systems Success: a Ten-Year Update', *Journal of Management Information Systems*, 2003, Vol. 19, No.4, pages 9-30.
[229] Guimaraes, T, Armstrong, C.P. and Jones, B.M., 'A New Approach to Measuring Information Systems Quality', *The Quality Management Journal*, 2009, Vol. 16, No. 1, page 42-53.
[230] Petter, S. and McLean, E.R., 'A Meta-Analytic Assessment of the DeLone and McLean IS Success Model: An Examination of IS Success at the Individual Level', *Information and Management*, 2009, Vol. 46, pages 159-166.
[231] Shenhar, A.J. and Levy, O., 'Mapping the Dimensions of Project Success', *Project Management Journal*, June 1997, Vol 28, No. 2, pages 5-14.
[232] Shenhar, A.J. and Levy, O., 'Mapping the Dimensions of Project Success', *Project Management Journal*, June 1997, Vol 28, No. 2, pages 5-14.
[233] Robey, D., Boudreau, M-C, and Rose, G.M., 'Information Technology and Organizational Learning: a Review and Assessment of Research', *Accounting Management and Information Technologies*, Vol. 10, 2000, pages 125-155, this page 127.
[234] Fiol, C.M. and Lyles, M.A., 'Organizational Learning', *Academy of Management Review*, Vol. 10, No.4, October 1985, pages 803-814.
[235] Hilliam, C.E. and Edwards, H.M., 'A Case Study Approach to Evaluation of Information Technology/Information Systems (IT/IS) Investment Evaluation Processes within SMEs', *The Electronic Journal of Information Systems Evaluation*, 2001, Vol. 4, No.2.
[236] Klein, J.I. 'Parenthetic Learning in Organizations: Toward the Unlearning of the Unlearning Model', *Journal of Management Studies*, Vol. 26, No. 3, 1989, pages 291-308.

[237] Robey, D., Boudreau, M-C, and Rose, G.M., 'Information Technology and Organizational Learning: a Review and Assessment of Research', *Accounting Management and Information Technologies*, Vol. 10, 2000, pages 125-155, this page 131.
[238] Miller, D., 'The Architecture of Simplicity', *Academy of Management Review*, Vol.18, No. 1, 1993, pages 116-138.
[239] Robey, D., Boudreau, M-C, and Rose, G.M., 'Information Technology and Organizational Learning: a Review and Assessment of Research', *Accounting Management and Information Technologies*, Vol. 10, 2000, pages 125-155, this page 133.
[240] Robey, D. and Newmand, M., 'Sequential Patterns in Information Systems Development: an Application of a Social Process Model', *ACM Transactions on Information Systems*, Vol. 14, No. 1, pages 30-63.
[241] Keil, M. and Robey, D., 'Turning around Troubled Software Projects: an Exploratory Study of the De-Escalation of Commitment to Failing Courses of Action', *Journal of Management Information Systems*, Vol 15, No. 4, Spring 1999, pages, 63-87, this page 64.
[242] Keil, M., and Mann, J., 'The Nature and Extent of IT Project Escalation: Results from a Survey of IS Audit and Control Professionals', *IS Audit & Control Journal*, Vol.1, 1997, pages 40-48.
[243] Brockner, J., 'The Escalation of Commitment to a Failing Course of Action: Toward Theoretical Progress', *Academy of Management Review*, Vol.17, No.1, 1992, pages 39-61.
[244] Keil, M. and Robey, D., 'Turning Around Troubled Software Projects: an Exploratory Study of the De-Escalation of Commitment to Failing Courses of Action', *Journal of Management Information Systems*, Vol 15, No. 4, Spring 1999, pages, 63-87, this page 66.
[245] Gill, T., 'Early Expert Systems: Where Are They Now?' *MIS Quarterly*, Vol.19, No.1, pages 51-82.
[246] Levitt, B. and March, J.G., 'Organizational Learning', *Annual Review of Sociology*, 1988, pages 319-340.
[247] Robey, D., Boudreau, M-C, and Rose, G.M., 'Information Technology and Organizational Learning: a Review and Assessment of Research', *Accounting Management and Information Technologies*, Vol. 10, 2000, pages 125-155, this page 137.
[248] Martins, L.L. and Kambil, A. 'Looking Back and Thinking Ahead: Effects of Prior Success on Managers' Interpretations of New Information Technologies', *Academy of Management Journal*, Vol.42, No.6, 1999, pages 652-661.
[249] Meyer, M.W. and Zucker, L.G., 'Forever Failing Firms', *Chief Executive*, July-August 1990, pages 68-70.

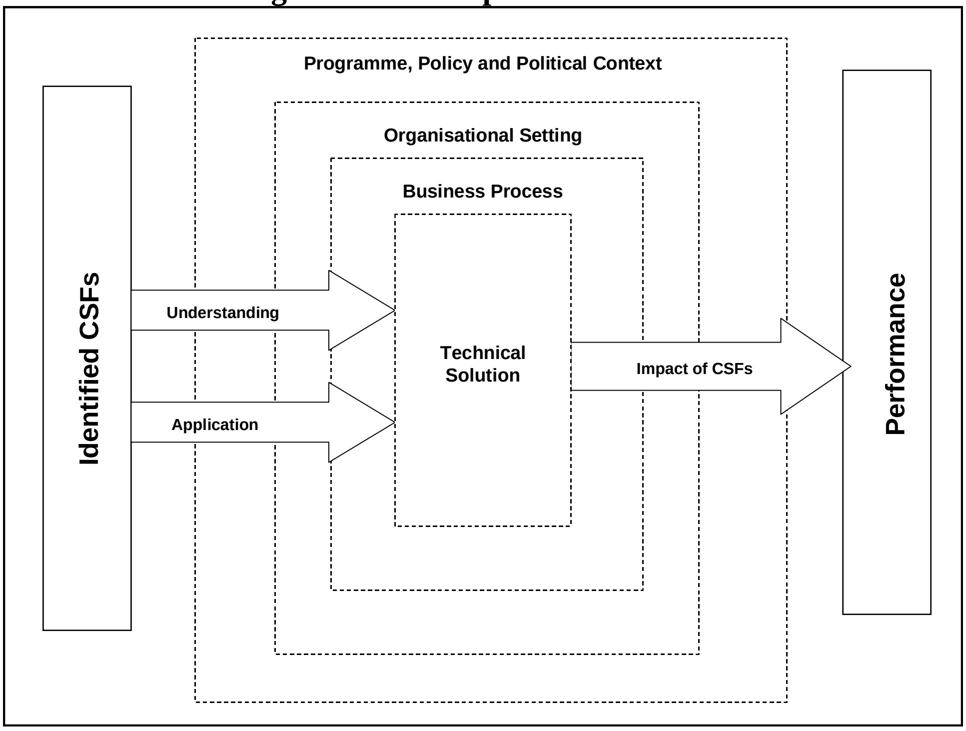
# Chapter Three
# Research Methodology

## 3.1. Cause and Effect: Assessing the Impact of the Independent Variable

The review of the literature presented in the previous chapter identified the high level of research activity on the subject of Critical Success Factors (CSFs) for projects in general and, more specifically, Information Technology (IT) projects. Despite this effort, the public sector continues to suffer from IT project failure, indicating a gap between the academic rhetoric and the practical reality. Whilst there has been much research to identify and confirm the CSFs, there has been little activity in terms of moving the debate onwards by examining the extent to which those CSFs are being understood and applied, and whether outcomes are improving as a result. This observation paraphrases the question that this study sets out to answer: how have the lessons learned from previous complex IT projects in government been used to improve the performance of subsequent projects? In other words, the intention is to explore the effect of one variable on another. The cause or, in research terms, the independent variable, is considered to be the CSFs, which may or may not have an effect on the outcome of the IT project or Technical Solution, which is the dependent variable. The purpose of this study is, therefore, to conduct causal or analytical research and the outcome will be applied research, designed to apply its findings to a specific existing problem, the issue of IT project failure in the public sector.

The logic driving the research approach to this question is structured and shaped by the Conceptual Framework, discussed in Chapter One and shown again at Figure 3.1. The purpose of this chapter is to discuss how to identify and then locate data in order to fully examine each element in this framework, as well as to consider the most appropriate methods for gathering and analysing that data. The first stage in this process is to identify the CSFs contained in the ten reports published by government and related bodies between 2000 and 2006. These are shown at Table 3.1, also reproduced from Chapter One. The second stage is the examination of the IT Project in relation to its context, as well as the extent to which the identified CSFs have been

**Figure 3.1. Conceptual Framework**




**Source: Author**

understood and applied. The final stage is to evaluate the impact of these, whether their application has resulted in improved performance. The detail of this process is considered in this chapter, which begins with a discussion of the philosophical approach to the research, followed by clarification of the research methodology, a

**Table 3.1. Reports of Public Sector IT Project Failure, 2000-2006**

| Reporting Body | Title | Date |
|---|---|---|
| Cabinet Office | Successful IT: Modernising Government in Action (the McCartney Report) | 2000 |
| Organisation for Economic Co-Operation and Development (OECD) | The Hidden Threat to E-Government: Avoiding Large Government IT Failures | 2001 |
| Office of Government Commerce (OGC) | Common Causes of Project Failure | 2002 |
| Intellect | IT Supplier Code of Practice | 2003 |
| Parliamentary Office of Science and Technology (POST) | Government IT Projects | 2003 |
| House of Commons, Work and Pensions Committee | Department of Work and Pensions Management of Information Technology Projects: Making IT Deliver for DWP Customers | 2004 |
| National Audit Office (NAO) | Improving IT Procurement | 2004 |
| Royal Academy of Engineering and the British Computer Society | The Challenges of Complex IT Projects | 2004 |
| National Audit Office (NAO) | Delivering Successful IT-Enabled Business Change | 2006 |

**Source: Author**

systematic outline of the research methods, an explanation of the analysis process and the response to the ethical issues. Concerns about the reliability, validity and generalisability of the data are also considered within this discussion.

## 3.2. Research Philosophy

The first, and perhaps most critical, of the research decisions relates to the philosophical stance taken by the researcher. This provides the foundation for the entire study, influencing further decisions about the research methodology and methods. The two possible options are positivism and interpretivism, terms that describe different ways of thinking about how knowledge is developed and different approaches to the understanding of knowledge, as shown at Table 3.2. Easterby-Smith et al note the "traditional assumption that in science the researcher must maintain complete independence if there is to be any validity in the results produced".[1] Based on this, they show that the two different philosophies result in

**Table 3.2. Research Philosophies**

| | **Positivist Philosophy** | **Interpretivist Philosophy** |
|---|---|---|
| **Basic beliefs** | The world is external and objective | The world is socially constructed and subjective |
| | Observer is independent | Observer is part of what is observed |
| | Science is value-free | Science is driven by human interests |
| **Researcher should** | Focus on facts | Focus on meanings |
| | Look for causality and fundamental laws | Try to understand what is happening |
| | Reduce phenomenon to simplest elements | Look at the totality of each situation |
| | Formulate hypotheses and then test them | Develop ideas through induction from data |
| **Preferred methods include** | Operationalising concepts so that they can be measured | Using multiple methods to establish different views of phenomena |
| | Taking large samples | Small samples investigated in depth over time |

**Source: Easterby-Smith, M., Thorpe, R. and Lowe, A., *Management Research: an Introduction*, (London, Sage, 1991), page 27.**

different relationships between the researcher and the researched: a positivist stance is considered independent of whatever is being observed whilst an interpretivist stance is dependent and, therefore, part of whatever is being observed. However, it can be argued that research, whether it is scientific or based in the social sciences, is not independent or neutral but inevitably reflects the interests, values and assumptions of the researcher and so affects the research decisions.[2] The researcher is generally also the research instrument and, therefore, necessarily involved, whether the research approach is quantitative or qualitative. Therefore, the required data can only be captured and defined according to a specific perspective. Attempts have been made throughout the planning for this study to recognise any influence or limitation stemming from this and, as with the identification of the Conceptual Framework, to overcome this bias by taking a very rigorous and logical approach in an attempt to ensure that any interpretation is firmly fixed in the data, as demonstrated by the process for the literature review.

Either of these philosophical approaches can be adopted in a social science context with positivism emphasising the explanation of human behaviour, whilst interpretivism emphasises the understanding of human behaviour. In both cases, phenomena are identified, measured and evaluated in order to provide either rational explanations or rational understanding.[3] In accordance with Table 3.2, Collis and Hussey note that positivistic approaches attempt to study human behaviour using the same sort of methods employed in the natural sciences.[4] Given that this is a piece of causal research, which seeks to establish relationships between different variables, positivism would seem to be the most viable approach, focusing on facts, looking for causality and reducing phenomena to the simplest elements, as detailed in Table 3.2. However, reflecting on both the research question and the aim, which is to analyse the impact of identified CSFs on the management of the Ministry of Defence's (MoD) DII Programme, it is likely that any proposed CSFs will have a specific meaning and relevance to the people working on the planning, development and implementation of the DII Programme. In addition, these people will have "pre-selected and pre-interpreted this world", which will also motivate their behaviour and choices.[5]

These aspects of human behaviour are shaped by factors that are not always observable and so are not as easily measured as phenomena in the natural sciences. Saunders et al talk about people as 'social actors', taking roles in organisations and interpreting events according to those roles.[6] Inevitably, this means that the views taken by one social actor about a particular situation do not always coincide with those of other social actors. In terms of any research, this means that the views expressed by these social actors cannot always be taken at face value but may require some interpretation by the researcher based on surrounding knowledge. Given this, any system needs to be considered from a range of perspectives. Therefore, this study requires an understanding of the thinking and behaviour of the people working on the

DII Programme so that the project, the success factors and the context can be understood from the point of view of those involved. This relates more naturally to an interpretivist philosophy with its focus on human interests, meanings and understanding of what is happening in specific contexts.

This conclusion is reinforced by returning to the definition of an information infrastructure and following a similar process to that used to determine the Conceptual Framework in Chapter One. The first definition presented was technology-based, "the hardware, software, data and network components that support the flow and processing of information in an organisation".[7] If this had been selected as the working definition for this thesis, then it would most likely have reflected a positivist approach by the researcher. However, the selected definition is an information system that involves interaction between people, processes and technology to support decision-making, co-ordination and control within a specific context that contains social systems, which include a range of cultural, behavioural and other human factors. The subject matter under consideration is indisputably that of the social sciences: people, organisations and the impact of technology. Social science research is fundamentally different to natural sciences, as human beings and how they operate have to be taken into account.[8] In this instance, this matches the preferences of the researcher and, therefore, is taken to be the philosophical starting point for this research.

### 3.3. Research Methodology

Saunders et al define the term 'research methodology' as "the theory of how research should be undertaken", a decision that is dependent on the overarching philosophy.[9] The search for a relevant and viable research methodology for this particular study involved consideration of a range of different approaches to systematic inquiry, ways of obtaining empirical evidence, defined by Collis and Hussey as "data based on observation or experience".[10] Each of the different approaches to empirical data collection is developed according to a particular paradigm and associated epistemological and ontological assumptions, the ways in which knowledge is developed and different approaches to the understanding of knowledge. Given that this research is based on an interpretivist philosophy, the most appropriate methodologies were considered to be case study, action research, ethnography (participant observation), participative inquiry, feminist perspectives and grounded theory.[11] These are all qualitative methods, which Collis and Hussey define as "a subjective approach which includes examining and reflecting on perceptions in order to gain understanding of social and human activities".[12] This fits with the research intent of understanding people and their context.

Some of the identified methodologies were discarded fairly rapidly. For example, participative inquiry involves research into one's own group or organisation,[13] which was evidently not the case in this instance, whilst feminist research perspectives consider gender as a significant factor in understanding the world,[14] whereas this research is, debatably, gender neutral. Action research involves an intervention by a researcher to change a given situation whilst monitoring and evaluating the results.[15] The premise of this research is to trace cause and effect, rather than to create an effect, and to understand the situation, rather than to change it.

Other methodologies were more likely contenders. For example, ethnography requires the researcher to become a working member of the group under study in order to understand the situation from the inside.[16] As the purpose was to obtain the viewpoints of the people involved in the DII project, it was not considered necessary for the researcher to share the same experiences as the subjects and a degree of objectivity was considered imperative if cause and effect were to be systematically traced. The aim of grounded research is to approach the study with no preconceived ideas about what might be discovered or learned. This would have been difficult given the need to identify the relevant CSFs in order to answer the questions, meet the objectives and so achieve the overarching aim.[17]

The most relevant and viable methodology was considered to be case study, which Yin defines as:

> An empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident.[18]

This was considered to be most appropriate for a number of reasons. According to Yin, a case study research methodology is suitable for research questions based on 'how' and 'why' because they deal with operational links needing to be traced over time, rather than frequencies or incidences.[19] This sits well with both the research question that drives this thesis and the causal research approach. Yin's definition also emphasises context and boundaries. The overarching theme of systems thinking in this thesis similarly confirms the importance of context or environment in relation to the system. This is reinforced by studies carried out by Markus and Robey[20] and Orlikowski,[21] which show that IT is neutral with no specific characteristics or qualities of its own; these are derived from the context in which it is implemented and deployed. This means that studying the context is imperative when studying an IT project and a case study provides the means to do this, being an exhaustive investigation into a subject within its contextual setting, leading to an understanding of the dynamics and interrelationships present within that setting, which then impact on the subject.[22] Stake observes that it is also particularly well suited to studying complexity, making it highly appropriate for this study.[23]

In terms of the research philosophy, case studies can be adapted to either a positivist or interpretivist view.[24] In relation to this, they can also be associated with both theory testing, known as deduction, which tends to be positivist, or theory generation, known as induction, which tends to be interpretivist. Collis and Hussey define deductive research as:

> A study in which a conceptual and theoretical structure is developed which is then tested by empirical observation: thus particular instances are deducted from general influences.[25]

Therefore, theory is tested through empirical observation. In inductive research, on the other hand, theory is developed from empirical observation with "general inferences…induced from particular instances", the reverse of the deductive method.[26] The theory underpinning CSFs is that they are "the few key areas where 'things must go right' for the business to flourish".[27] Therefore, the few key areas likely to result in success for an IT project and, more specifically, for an information infrastructure project, need to be identified. These will then be tested against a particular case. This suggests that the logic driving this research is deductive rather than inductive. An inductive approach develops theory by drawing general inferences after observing reality, whilst this study takes a generally applicable theory and then tests it against a particular situation using empirical examination.[28] In this case, the theoretical model is tested against the DII Programme.

The validity of adopting the case study methodology is further confirmed by the strong tradition of case study in the academic field of information systems.[29] As a research methodology, it is, therefore, well suited to this particular research. At its most basic, the case study entails a detailed and intensive analysis of a single case.[30] Indeed, Stake argues that "a case study is intended to catch the complexity of a single case".[31] He expands on this, explaining that "a case study is the study of the particularity and complexity of a single case, coming to understand its activity within important circumstances".[32] Some of the best-known studies in business and management research are based on this kind of design – a single organisation, a single location, a person or an event.[33] Yin advises defining the unit of analysis as a single organisation.[34] In this particular study, this is the UK MoD. A cross-section group within that organisation, the DII Programme, is then defined as the focus of the study.[35]

Despite this, it is often argued that dependence on a single case is problematic, preventing the researcher from providing a generalisable conclusion or theory. However, it is arguable whether the main purpose of the case study is to generalise. Firstly, a case study takes an idiographic approach, exploring the unique features of that case (as opposed to nomothetic, which generates universal principles).[36] The researcher seeks to arrive at a specific conclusion about the case under investigation because it is of particular interest and, strictly speaking, the results cannot be generalised beyond the population studied. Therefore, it is inevitable that the results of this study will be unique to the DII Programme.

Given that the purpose of a case study is not to yield findings that can be applied more generally, it is widely accepted that it is not possible to identify cases that are representative of all others and, therefore, case study research does not require a number of cases to be selected from a defined study population. To clarify this, if the adopted research methodology is a survey, then a representative sample is found, tested and the findings are generalised to the larger population from which the sample was selected, a process known as sampling. However, while it is not possible to generalise from a case study to other populations, it is possible to generalise to theoretical propositions. The critical question is how well the researcher generates theory out of the findings and how well they can then be generalised beyond the original context.[37]

The study of the DII Programme is implicit in the aim of this research. However, in clarifying that aim, a decision had to be taken about which case to examine in order to test the identified CSFs. Collis and Hussey suggest selecting "a critical case which encompasses the issues in which you are most interested".[38] Yin is more specific, identifying four main factors that need to be considered: relevance, feasibility, access and application.[39] 'Relevance' is the extent to which the organisation selected for the case study suits the purpose.[40] The selection of the DII Programme was justified in Chapter One. It is a mega-project, being undertaken by one of the largest and most diverse government departments. It began life in 2001, is due to deliver in 2015 and so fits within the scope of the reports on public sector IT project failure, framed by the McCartney Report of 2000 and the National Audit Office's (NAO) *Delivering Successful IT-Enabled Business Change* in 2006. 'Feasibility' means that the researcher should be able to conceptualise, plan, execute and report back on the research project within the case study organisation.[41] This refers to the practical aspects of the research. Whilst there were other options, such as the NHS National Programme for Information, a similar project being undertaken in similar circumstances, DII was selected because of the researcher's affiliation with, and knowledge of, the MoD, which enabled access to the relevant sources, both in terms of people and documentation. In addition, the DII Group was located nearby, enabling easy access at all times. Finally, the appropriate managerial and operational support was available to ensure successful completion of the study.

The discussion about feasibility incorporates some of the issues of 'Access' and confirms that the full co-operation of the DII Group was secured for the duration of the research. Further practical aspects included the collected data being available in the public domain. However, the potential sensitivity of that data had to be acknowledged and dealt with according to security requirements. The organisation was willing to participate and gave support at both the executive and the operational levels. In addition, there was a clearly identified champion for the study. Finally, Yin also identifies the extent to which the case study method can be applied in a particular situation, a point that he terms ‘Application’.[42] In identifying possible candidates, a number of factors were taken into account. These included size, industry sector and the status of the focus on an IT project. The DII Programme is sufficiently large with around 500 personnel on the MoD side and 1800 on the ATLAS Consortium side. It is being undertaken within the public sector by the MoD, which is very mature in terms of managing major projects. The DII Programme, therefore, provided a potentially fruitful subject for investigation.

Having decided on case study as the research methodology, the next stage was to identify the various possible options and to consider was most appropriate in this instance. Jensen and Rodgers suggest the following types of case study as shown at Table 3.3.[43] Based on these definitions, the case study of the DII Programme is a

**Table 3.3. Types of Case Study**

| Case Study Type | Description |
|---|---|
| Snapshot | Detailed, objective study of one research entity at one point in time |
| Longitudinal | Quantitative and/or qualitative study of one research entity at multiple time points |
| Pre-post | Study of one research entity at two time points separated by a critical event. A critical event is one that on the basis of a theory under study would be expected to impact case observation significantly. |
| Patchwork | A set of multiple case studies of the same research entity, using snapshot, longitudinal and/or pre-post designs. This multi-design approach is intended to provide a more holistic view of the dynamics of the research subject. |
| Comparative | A set of multiple case studies of multiple research entities for the purpose of cross-unit comparison. Both qualitative and quantitative comparisons are usually made. |

**Source: Jensen, J.L. and Rodgers, R., ‘Cumulating the Intellectual Gold of Case Study Research’, *Public Administration Review*, 2001, Vol. 61, No.2, pages 236-246, this page 237-239.**

snapshot, a detailed and objective study, as far as possible, undertaken at one point in time. On reflection and given the length of time of this study, a longitudinal case study would also have been possible. Indeed, some aspects of it are longitudinal, as interviews were held with certain personnel at recurrent points throughout the study. A pre-post case study would only have been possible if the study could have been continued until completion of the DII Programme. However, the timescales for this are still uncertain and it is likely that it would have been beyond the resources available for this research. This same argument applies to both patchwork and comparative case studies, although the original intent was to compare the DII Programme with the NHS National Programme for IT. However, it soon became evident that it was beyond the available resources to look at more than one complex IT mega-project in the required detail.

Myers supplies guidelines for case study work, suggesting that it is based on at least the following four stages:

1. Determining the present situation;
2. Gathering information about the background to the present situation;
3. Gathering more specific data; and
4. Presenting an analysis of findings and recommendations for action.[44]

Therefore, decisions had to be taken regarding the collection of data to inform these stages.

### 3.4. From Methodology to Methods

The research methodology impacts on the selected research methods and dictates decisions about what data to collect, how, why, where and when, as well as how this data will be analysed.[45] To some extent, the answers to these questions are contained within the Conceptual Framework with its basis in systems thinking and its clear distinction between cause (the CSFs) and effect (the performance of the DII Programme). This divides the research into two distinct phases: the identification of the CSFs and then the testing of the understanding and application of those CSFs in a particular project context. However, it is still necessary to identify feasible and desirable research methods for both phases.

#### 3.4.1. Phase One: Identification of the CSFs

The literature review provided the basis for the identification of the CSFs by examining those factors derived from academic study into general project management and, more specifically, IT project management. These academic studies draw on a range of data sources and encompass both theoretical and empirical studies as well as both the public and private sector views. The process for the analysis of this data was discussed in detail in Chapter Two and the outcome of the review was a synthesised list. The synthesised list of CSFs from the academic literature base provides a point of comparison for the CSFs identified in the reports, which are generally based on case studies supported by a relatively cursory examination of the literature. This comparison enables the first of the three subsidiary questions that stem from the research question to be answered: are the lessons learned from previous complex IT projects in government correct and comprehensively considered?

The process for the extraction of the CSFs from the reports on public sector IT project failure began with the McCartney Report of 2000. Eight other reports were then identified that appeared post-McCartney and up to the publication of the NAO's 2006 report on *Delivering Successful IT-Enabled Business Change*, as shown at Table 3.1 above. Neither the academic literature nor these reports specifically examine information infrastructure projects and, given that this is the remit of the DII Programme, analysis of this area was considered critical in order to determine whether infrastructure projects differ from other IT projects and, therefore, have different CSFs. A third level of analysis was undertaken, which was based on secondary data derived from reports on infrastructure projects. The type of infrastructure project and the type of report was carefully considered to ensure that this analysis produced meaningful CSFs. They were selected on the basis of four criteria:

1. The projects had to be public sector infrastructure projects, rather than private sector;
2. The projects had to be complex mega-projects comparable to DII;
3. The reports had to have been carried out by a government auditing body; and
4. The reports had to give sufficient detail to allow a full analysis.

It was not considered essential to select infrastructure projects that fell within the timescale of the 'book-end' reports, although ultimately they did. The main aim was to identify if anything is different about infrastructure projects and their CSFs. On this basis, five accounts of problematic infrastructure projects were selected, as shown at Table 3.4.

**Table 3.4. Reports on Public Sector Infrastructure Projects**

| Reporting Body | Title | Publication Date |
|---|---|---|
| National Audit Office | **The Implementation of the National Probation Service Information Systems Strategy (Home Office)** | 2001 |
| National Audit Office | **New IT Systems for Magistrates' Courts: the Libra Project** | 2003 |
| National Audit Office | **Delivering Digital Tactical Communications through the Bowman CIP Programme (Ministry of Defence)** | 2006 |
| National Audit Office | **The National Programme for IT in the NHS (Department of Health)** | 2006 |
| US General Audit Office | **Information Technology: DoD Needs to Ensure that Navy Marine Corps Intranet Program is Meeting Goals and Satisfying Customers** | 2006 |

**Source: Author**

It is recognised that each of these accounts is only partial and most often undertaken after the event. However, each reflects a particular viewpoint on the project and reveals the essence of the problem as perceived by the investigating body (the relevant Audit Office). These factors were considered to be comparable across all of the reports. Therefore, it was not considered necessary or practicable to supplement this information through additional research.

The most appropriate method of extracting relevant data and identifying the CSFs from both the IT project reports and the information infrastructure reports is content analysis. This research method is used to identify the presence of certain words or phrases within a particular text.[46] The text is broken down into manageable sections, such as word, phrase or sentence, and then coded. The researcher can then carry out further analysis of the codes without losing the linkage back to the original text. The presence, meaning and relationships of these codes are quantified and analysed using conceptual analysis and relational analysis.[47] Conceptual analysis establishes the existence and frequency of concepts in the text by selecting a concept and then recording the number of times that it occurs.[48] As with most other research methods, content analysis begins by identifying a research question and then choosing a sample or samples.[49] The selection of the sample for this process is detailed above and the specified question is 'What CSFs have been identified in these reports?' This might seem a fairly obvious question to pose as all of the reports make recommendations, which could simply be taken as being the identified CSFs and then compared and contrasted. However, other questions stem from this question. What was the relative emphasis on these CSFs in the text? Were they the only CSFs discussed? How precise are the words and phrases used to express the identified CSFs? Does clearer terminology emerge from an examination across all ten reports? Therefore, a fairly detailed degree of scrutiny was required to analyse and synthesise the CSFs from these reports.

Given these issues, it is important to clearly define the terms before counting.[50] The starting point for this was the first of the identified reports, the so-called McCartney Report, *Successful IT: Modernising Government in Action*. This grouped its findings into 11 areas, one of which was the implementation strategy for the 30 recommendations that stemmed from these themes. Therefore, it gives a starting point of 10 terms, identified in Chapter One as:

- Change management;
- Leadership and responsibility;
- Project management;
- Risk management;
- Modular and incremental development;
- Benefit realisation;
- Procurement and supplier relationships;
- Cross-cutting initiatives;
- People and skills;
- Learning lessons.[51]

The central idea in content analysis is selective reduction, which describes the process of going through the text iteratively in order to identify and then refine the themes.[52] The first stage of this selective reduction is the data management, organising the data in a way that will facilitate interpretation. The report under scrutiny was examined in some detail to extract the words, phrases and sentences that relate to success or failure factors, the so-called 'meaning units'. These were copied and pasted into a Microsoft Excel spreadsheet. Breaking the text into meaningful and pertinent units of information allows it to be analysed in greater detail and, therefore, interpreted.[53]

Once selected, the text was coded according to the ten themes identified by McCartney to create manageable content categories.[54]

Relational analysis was then used to further interpret the content categories. This builds on conceptual analysis by examining the relationships among concepts in a text.[55] There are many techniques available to do this or, alternatively, researchers can devise their own procedures according to the nature of their project.[56] Using this form of analysis, the text was studied in relation to McCartney's themes to determine whether they gave a suitable level of detail and precision. This led to the themes being refined and more clearly defined in order to produce a list of CSFs. This same process was undertaken for each of the reports under analysis until a definitive list of CSFs was produced, based on detailed examination of the ten general IT project reports and the five infrastructure reports.

This describes a manual process but, as far back as 1984, Miles and Huberman were recommending the use of software tools, which they believed improved the rigour.[57] Currently, there are several popular software tools on the market that can be used for content analysis. These include Nvivo, maxQDA, ATLAS.ti and Coding Analysis Toolkit (CAT), which all have similar functionality but very different interfaces. They require training in their use and are all fairly expensive. Although it is faster to carry out content analysis by machine, it is also possible, as well as potentially more useful, to code a small sample manually.[58] One of the main advantages of doing this is that the researcher is not alienated from the data.[59] In addition, the manual process that was developed was systematic, comprehensive and transparent, giving a clear audit trail back to the original source data. Against this, it was time and labour intensive with a recognised danger that the researcher would become process oriented, losing sight of the outcome by sticking too long at the relational analysis stage. However, the advantages of the manual process were considered to outweigh the disadvantages in this instance. An example of the spreadsheet that resulted from this process is shown at Table 3.5.

Issues of reliability and validity in relation to content analysis are similar to those encountered when using other research methods. Reliability in this instance refers to the 'stability' of the interpretation of the text, whether the researcher is able to

**Table 3.5. Content Analysis Process: McCartney Report**

| Meaning Unit | Theme | CSF |
|---|---|---|
| IT has to fit closely with the new working practices | Benefits Realisation | Benefits Certainty |
| A clear vision of the context in which IT is being implemented | Business Change | Benefits Certainty |
| Think in terms of change management projects rather than IT projects | Business Change | Clarity and Perception |
| Improve the delivery of the projects themselves | Business Change | Complexity Management |
| Deliver improvements to the way they do business | Project Management | Constraints Certainty |
| Take an overall view of the whole change process | Benefits Realisation | Benefits Certainty |
| Integration (whole change process) is a vital, and ongoing, management task | Business Change | Complexity Management |
| Achieving integration of all the aspects of change requires effective leadership | Leadership and Responsibility | Consistency and Coherence |
| Responsibility for the delivery of a project or programme falls to an individual | Leadership and Responsibility | Consistency and Coherence |
| Good leadership | Leadership and Responsibility | Competence and Capacity |
| Clear responsibility for IT-based change programmes and projects | Leadership and Responsibility | Clarity and Perception |
| A Senior Responsible Owner (SRO) and a description of the SRO Role | Leadership and Responsibility | Clarity and Perception |
| People in place who have the ability to deliver | Leadership and Responsibility | Clarity and Perception |
| Highly skilled and experienced managers are vital to success | People and Skills | Competence and Capacity |
| Improve project management across Government | People and Skills | Competence and Capacity |
| Matching project managers to projects | Project Management | Constraints Certainty |
| Increasing (project management) skills and awareness | Project Management | Competence and Capacity |

**Source: Author**

consistently code the same data in the same way over a period of time. This also leads to questions about whether this process could be reproduced. Would another coder or group of coders classify categories in the same way? Aligned to this is the issue of the accuracy of the coding process and the extent to which the classification of a text corresponds to a standard or norm statistically. The overarching problem of concept analysis is that the researcher is the research instrument, as discussed above. Therefore, conclusions are reached according to decisions made by the researcher and the inference that the researcher puts on meanings in particular instances. This can lead to conclusions that are potentially challengeable, as they are bound to reflect the interests, values and assumptions of the researcher.[60] Therefore, despite all attempts to keep this data ‘clean’, it can only be captured and defined according to the researcher’s specific perspective. However, in an effort to overcome this problem, the content analysis was verified by a team of researchers in an organisation called Proving Services, who carry out structured assessment of projects and programmes in government to determine which will succeed and which are likely to fail.

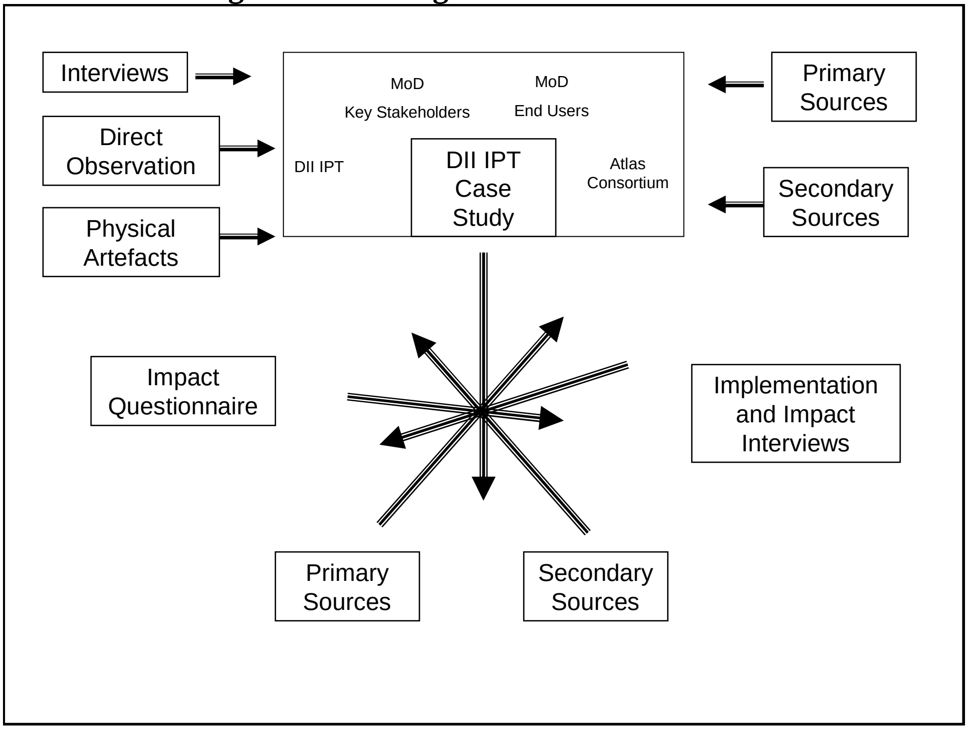
This process resulted in what was considered to be a more precise and detailed list of CSFs than those identified in the McCartney report as well as associated definitions. It is presented and discussed in Chapter Four, which also gives a detailed examination of the process of identifying the CSFs and the conclusions reached as a result. The final stage was to compare the list derived from the IT project and infrastructure reports with the list of CSFs identified in the literature to determine whether the lessons learned from previous IT mega-projects in government are correct and comprehensively considered. This reflects Fortune and Peters' examination of the Electronic Patient Records project in the NHS and their argument that considering results across a range of different projects rather than relying on individual comparisons gives a powerful approach, enabling recurrent themes to be identified.[61]

### 3.4.2. Phase Two: The IT Project

Having identified the CSFs, the next stage of this research was to undertake the case study, examining the context of the IT project and then considering whether the CSFs had been understood and applied, resulting in a positive impact and, thus, improved performance. In considering the research methods to be employed for the case study, it was important for data to be drawn from multiple sources, as shown at Figure 3.2. As already discussed, the researcher's presence within the case study is likely to result in personal observations and, therefore, bias. These converging lines of inquiry ensure reliable, valid evidence based on detailed data collection and rigorous analysis processes. Bias might also occur from evidence being obtained from a single source and this is overcome by using a wide variety of sources (data triangulation) and different methods (methodological triangulation). Case study researchers often favour qualitative methods.[62] In this instance, both qualitative and quantitative data was collected and analysed.

The selected methods are analysis of primary and secondary sources, observation, examination of physical artefacts, interview and survey. As detailed at Table 3.2,

**Figure 3.2. Triangulation of Data Sources**




**Source: Author**

interpretivist research uses "multiple methods to establish different views of phenomena" so providing the means for an intensive and detailed examination of the DII Programme. They are also designed to explore the subjective aspects of the case, examining and reflecting on perceptions in order to gain an understanding of social and human activities. The data gathered is both primary, original data collected at source, and secondary, data that already exists. The primary data was collected through observation, study of physical artefacts, interview and survey. Secondary data analysis includes the scholarly literature review as well as government reports and documentation made available by the DII Group, the ATLAS Consortium and the MoD in addition to articles about DII appearing in journals and newspapers. This secondary data provides useful background and underpins the primary data gathered for the case study in Chapters Five and Six.

Observation can be used as a research method in either positivist or interpretivist research, involving the researcher as either a participant or a non-participant. Participant observation occurs when the researcher is part of the organisation being researched, fully involved with the people and the phenomena, which was not the case in this instance.[63] More applicable to this study is non-participant observation, where people's actions and behaviour are observed and recorded without the researcher being involved.[64] The observer is separate from the activities taking place and the subjects may be unaware that they are being observed. This method provided additional data about behaviours, actions and interactions observed when the researcher was present at the site of the case study. Data was recorded in note form on every visit and was then used to inform the detailed data derived from the interviews and their analysis.

Much of the research was focused on the management processes that result in the delivery of technology. However, it has to be recognised that the main purpose of the DII Programme is the delivery of the Technical Solution, a designed physical structure that delivers functionality. Therefore, the infrastructure was accessed and explored via a terminal based at the Defence Academy. This enabled assessments to be made about its usability and accessibility, again informing and underpinning the more detailed data analysis that takes place in Chapters Five and Six.

The principal methods of data gathering were interviews and a survey. Interviews are associated with both positivist and interpretivist methodologies providing a means of collecting data by asking selected participants what they do, think or feel.[65] If a positivistic approach is being taken, then interviews are more likely to be based around structured, closed questions, which give quantifiable responses.[66] An interpretivist approach, however, is based around either unstructured questions, which have not been prepared beforehand, or semi-structured questions, which ask about broad themes, varying the order and allowing new or more probing questions to be asked as required. This type of questioning is most useful when trying to understand reasons for decisions, attitudes and opinions, as well as the meanings that respondents assign to various phenomena.[67] In addition, respondents may use words or ideas in a particular way and being able to probe these meanings can add significance and depth to the data.[68] Easterby-Smith et al suggest that an interview is the best approach when there are a large number of questions to be answered; where the questions are either complex or open-ended; or where the order and logic of questioning may need to be varied.[69] Interviews provide a richness of data, which was the main driver behind the decision to research the DII Programme in this way.

Interviews also provide a range of other advantages, such as being a useful means of data collection for causal or analytical studies, so fitting well with the purpose of this study, which is to explain the relationship between variables. They can be conducted face-to-face, by telephone or by email.[70] In this instance, the face-to-face interview was selected to enable the researcher to ask complex questions and then to follow-up the answers in a way that is not possible by email and may prove difficult by telephone. Respondents may be more reluctant to give sensitive or confidential information to someone that they have not met and may also be wary of how that information is going to be used.[71] Therefore, the more personal nature of the face-to-face interview is likely to result in a greater degree of confidence in replies, not least because account can be taken of non-verbal communication as well as the spoken word. In many ways, this is one of the strengths. In addition, writing out in-depth comment is tedious and time consuming in comparison to holding a directed conversation with someone.

Having thought about why interviews would be a useful means of data collection for this study, decisions then had to be made concerning who to interview, how and where, and the questions to be asked. In terms of who to interview, the focus of the research, as defined by the Conceptual Framework, is the Technical Solution, being developed and implemented as the DII Programme consisting of the DII Group as the MoD customer and the supplier, the ATLAS Consortium. Access to the DII Group was arranged via a sponsor or, as described by Saunders et al, a 'gatekeeper'.[72] Therefore, access to personnel and the selection of the most appropriate interviewees was controlled. The fact that individuals did not agree to participate in the research directly with the researcher and, therefore, might have been unconvinced of its value raises some questions about the reliability of the data. However, all of the participants seemed to engage willingly, evidenced by the length of time that interviews took, the extent to which people wanted their views heard and the fact that a number seemed to enjoy the process, frequently describing it as 'cathartic'. Saunders et al describe the process of 'cognitive access', which means gaining access to the precise data held by the participant.[73] It was felt that this was achieved, by and large, and that sufficient access had been gained to answer the research question and to meet the aim of this study.

ATLAS originally consisted of five companies: the lead suppliers, HP (previously EDS) and Fujitsu, with General Dynamics (which has since left the Programme), EADS (now Cassidian) and LogicaCMG. With regard to ATLAS, a key question was whether it was necessary to interview a representative sample from each of the five companies. After much consideration, it was decided that the primary concern of the research was not how a Consortium operates or to understand the different concerns of each of the companies involved but rather to seek a generic supplier perspective. Therefore, it was considered appropriate to view ATLAS as a single entity. Although the employing company of each respondent was known, it was taken to be largely irrelevant to the prime purpose of exploring the extent to which the supplier, in the form of ATLAS, had understood and applied the identified CSFs.

The next issue was to decide on a representative sample, given that it would be impossible to interview a potential population of 2,300. It was uncertain how many would be required at the outset of the research. Saunders et al note "the difficulty of trying to design a viable questionnaire schedule to cope with issues that are complex, unclear or large in number".[74] A 'sufficient' number of interviews were needed but it was difficult to decide at the outset what that number would be. Thought was also given to the order in which the participants were to be interviewed as this can affect the emphasis and balance of the emerging issues.[75] However, ultimately, the researcher had little control over this and had to accept decisions taken by the sponsoring body, the DII Group. This resulted in interviews being held with 11 members of the DII Group and six members of the ATLAS Consortium. In addition, interviews were held with six other representatives of the wider government context to give a total of 23 interviews.

Although 17 respondents from ATLAS and the DII Group might seem like a comparatively small sample, the preferred methods for interpretivist research, as shown at Table 3.2, include "small samples investigated in-depth over time". Given that this study was undertaken over a period of six years and some of the interviews lasted up to three hours, the sample fulfilled this criterion. In addition, it became evident towards the end of the interview process that the same issues were recurring, satisfying the researcher that the sample was fit for purpose.

As it turned out, the DII Group sample represented seven of the 11 sections within the organisational structure, as shown at Table 3.6, giving access to an appropriate and sufficient range of stakeholder perspectives. On the ATLAS side, the respondents included a Chief Executive and representatives of the business strategy and customer service areas. These were from both HP and Fujitsu but with a bias towards HP, which was not considered critical. It should be noted that three of the ATLAS Consortium had also worked within the DII Group. The length of time that they had spent on the project, together with their experience of both supply and demand-sides, gave a depth and breadth to their responses. The sample from the DII Group was almost double that of the ATLAS Consortium, potentially introducing a flaw in terms of the validity and reliability of the research. However, as the contractor and,

**Table 3.6. DII Group Organisation**

| **Head of DII (Interviewed)** | |
|---|---|
| Deputy Head Battlespace | Deputy Head Business Operations |
| **Deputy Head Commercial Management (Interviewed)** | **Deputy Head Engineering (Interviewed)** |
| Deputy Head Estates North | **Deputy Head Estates London (Interviewed)** |
| Deputy Head Estates West | **Deputy Head Implementation (Interviewed)** |
| **Deputy Head Requirements and Programme (Interviewed)** | **Deputy Head Service Assurance (Interviewed)** |
| **Executive Officer (Interviewed)** | |

**Source: Adapted from Great Britain, Ministry of Defence, Defence Equipment and Support, Information Systems and Services, *Defence Information Infrastructure: Joint Business Plan 2009/2010*, (London, HMSO, 2009).**

therefore, the controlling force behind the structure, organisation, funding and other key elements of the project, it was considered necessary to gain as complete an understanding as possible of how the DII Group was operating in the face of government pressure to improve performance. In other words, the command and control of the Technical Solution lies with the DII Group. Therefore, more emphasis needed to be placed on determining how this group had understood and applied the CSFs, before checking this view against the supplier perspective.

A deliberate decision was taken to focus the interviews almost wholly on the DII Programme, rather than interviewing social actors in the wider context of the MoD. This was because it was considered critical to understand and interpret the context, the

Technical Solution and the understanding, application and impact of CSFs from their viewpoint. Referring back to the discussion about research philosophy, the purpose was to understand how the personnel within the DII Programme had "pre-selected and pre-interpreted this world" and how this was motivating their behaviour and choices.[76] However, it was decided to supplement this by undertaking interviews with six key personnel, representing the Office of Government Commerce (OGC), Defence Equipment and Support (DE&S), another government department and a government agency, as well as Proving Services, the research-based organisation discussed above. This provided a view from the wider environment, adding some checks and balances to assure the reliability and validity of the data obtained from the interviews within the DII Programme.

At the start of the empirical research, two unstructured interviews were undertaken with the project sponsor, a member of the DII Group. The purpose of this was to understand the background to the Programme, to begin formulating the questions and to identify the key stakeholders in the DII Group and the ATLAS Consortium. In addition to this, a large amount of research had already been undertaken on the basis of Healey and Rawlinson's recommendation that "a well informed interviewer has a basis for assessing the accuracy of some of the information offered".[77] In addition, it was hoped that this would establish the credibility of the research.

Following on from this, semi-structured interviews were undertaken. Prior to each interview, an agenda was set out, as shown at Appendix 3. This outlined the scope and objectives of both the interview and the research, detailing the broad themes that would be covered. This was intended to promote validity and reliability by enabling the respondent to reflect on the answers before the interview took place and to assemble any relevant documentation to enable triangulation. However, preparation was kept to a minimum, as the purpose of each interview was to establish the perception of the respondent regarding key factors affecting IT project success. This document also gave reassurances regarding confidentiality and anonymity. The aim of the interview was to obtain data to enable the research question to be answered. However, each respondent was assured that they could decline to respond to any question if they so wished.

The time allowed for each interview was largely dictated by the respondent or the sponsor, as was the location, which tended to be the office of the respondent being interviewed. Despite the lack of input into this, the selected locations were obviously convenient and comfortable for the respondent, which may have created a more relaxing atmosphere for the interview, but with the potential for interruption. However, this did not occur. The sessions began with pleasantries in order to put the respondent at their ease. Then the agenda was discussed, explaining the research and enabling questions to be asked, whilst also gaining the respondent's consent and giving further reassurances regarding confidentiality. This was to make the respondents more relaxed and open about the information that they were willing to discuss. The interview themes were derived largely from the literature, the reports and from experience of the topic. The aim was to ask the questions in a logical order, to use language that was comprehensible to the respondents and to pose the questions using a neutral tone. Open questions were used in order to avoid bias.[78] Some of the questions were of a theoretical nature, requiring some prior explanation and discussion. Attempts were made to relate these to real-life experiences rather than simply presenting abstract concepts. The questions are discussed in further detail in Chapter Six.

In terms of recording the interview data, the preference was to both record and to take notes, as advised by Saunders et al.[79] Not only did this provide a back-up in case of technical failure, it also showed the respondent the importance of their responses. The respondent was asked for their permission to record and told that the recorder would be switched off at any time at their request. There was only one instance of refusal and only once did a respondent ask for the recording to be temporarily stopped due to the sensitivity of the data. At the end of the interview, the respondent was asked for final comments, then thanked and reassured of confidentiality.

As discussed in terms of the research philosophy, the researcher inevitably has an effect on the process and data can only be captured and defined according to a specific perspective. Lee raises two key areas where this needs to be recognised and efforts made to control the effect. Firstly, it is difficult to predict or measure potential bias, which may occur in terms of class, race or sex, for example.[80] The researcher needs to be aware of its existence, as it is likely to distort the data and, hence, the findings. In addition, interviewees may have certain expectations about the interview and give what they consider to be 'correct' or 'acceptable' responses.[81] Lee suggests that these problems can be overcome to some extent by increasing the depth of the interview.[82] Secondly, both unstructured and semi-structured interviews are time consuming to undertake and problematic in terms of recording, controlling the range of topics and analysing the data.[83] The questions raised and the matters explored are likely to differ between interviews as different aspects of the topic are revealed.[84] Therefore, ideally, all interviews need to be conducted in the same way, not only in terms of the same questions being asked but also in terms of the way that they are asked. Furthermore, the interviewer needs to ensure that each person understands the question in the same way. This is known as 'stimulus equivalence', demanding considerable thought and skill in question design.[85] However, this need for consistency has to be set against the need to vary the order of the questions, probe responses and ask new questions as the situation demands, in order to capture the richness of data.

Where possible, the data was transcribed as soon as possible after the interview, in accordance with good practice.[86] In addition, the following contextual data was noted following the interview: the location (i.e. place); the date and time; the environment (i.e. surrounding factors, such as noise); background information about the respondent; behaviours, actions and interactions observed before, during and after the interview; and the immediate impression of the success of the interview.[87]

Transcription was a lengthy process, taking about eight hours for each hour of interview, and resulting in a mass of data for subsequent analysis. The question of how to analyse this data was difficult. Robson points out that there is "no clear and accepted set of conventions for analysis" of qualitative data.[88] Initially, a complicated process of content analysis was undertaken. As discussed above, this involved breaking the data into separate meaning units, a string of text expressing a single coherent thought up to the point where the thought changes. These were underlined and each was allocated a number for the purposes of tracking and organisation. Recurring meaning units were then grouped and classified. However, this process was discarded as it was very time consuming and not very productive. A much more pragmatic means of analysis was then devised, which involved creating a spreadsheet for each question. This worked well as many of the questions required a structured response, although there was much unstructured discussion around them. Fundamentally, this approach involved quantifying the data, a process to which many with an interpretivist philosophy would object. However, it is justified on the grounds that it shows the representativeness or generality of the data, rather than simply presenting data without any evidence of how it has been summarised and structured.[89] Once the question responses had been collated in this way, the unstructured material was classified according to the CSFs identified in Chapter Four, providing an auditable trail of evidence for the conclusions to be drawn in Chapter Six, regarding understanding and application of these CSFs. In effect, this again involved the structuring of data but this time into categories.

The final stage of the research was to assess the impact of the CSFs on the DII Programme. To do this, a means had to be found of measuring the views and attitudes of the user population. It was evident that it would be impossible to measure the 300,000 strong user base in its entirety and, therefore, a method had to be found that enabled a sample population to be questioned in order to make inferences about the general population. The most obvious way of doing this is a survey, which usually stems from a positivistic philosophy, but can also be associated with an interpretivist approach.[90] To some extent, the scientific approach was highly applicable here, as the main object of this survey was to operationalise concepts (user satisfaction with system performance) to enable measurement. Surveys can also be used for descriptive research, fitting with the objective of describing the impact of the CSFs.[91] Having decided on survey as the most appropriate strategy, the next question was which data collection technique to use from a range of potential methods, including focus groups, structured observation, structured interviews and questionnaires.[92] The first three were considered too impractical and time consuming, whilst also militating against a large sample. A written questionnaire seemed to offer the most efficient means of targeting a relatively broad spread of personnel, allowing a range of views to be sought and thereby minimising the risk of bias.

The next decision was how to distribute this questionnaire. The options considered were a traditional postal survey or an online variant. It takes time and money to produce, disseminate, collect, collate and analyse a hard copy survey. There are also recognised limitations with using a postal questionnaire, namely 'questionnaire fatigue' and 'non return bias'.[93] The issue of fatigue was a particular problem, as the sample population under scrutiny are known to receive a wide range of questionnaires, potentially making them reluctant to respond.[94] A postal survey could also be viewed as a rather old-fashioned way of collecting data, especially when the required information concerns an IT project. Given this, an electronically distributed questionnaire was considered a better option. With cost being a constraint, it was decided to compile the questionnaire via a free online survey hosting service called SurveyMonkey (www.surveymonkey.com). An alternative electronic format, an Excel spreadsheet, was also considered, but it was felt that the time spent in becoming familiar with the required functionality would be better spent on other tasks.

In addition to being free, the SurveyMonkey online question editor is intuitive, flexible and performs the tasks of response collection and elementary data analysis. It allows for up to ten multi-part questions to be compiled according to templates, with associated rules and options for question and response types. Inevitably, this limit placed a constraint on the questioning process, although it was possible to ask a range of questions within one question, producing a slightly more complex result. Up to 100 responses can be collected at no charge, whilst individual records can be scrutinised and purged if they are thought to compromise the integrity of the data set. The resulting questionnaire had the added bonus of looking professional and it was hoped that this would encourage respondents to engage with it. It was distributed via a hyperlink in an email along with an explanation of the survey rationale, the anticipated completion time and assurances of anonymity, whilst also thanking the respondent for their support. Anonymity was an essential means of minimising bias and encouraging respondents to be honest in their responses.[95]

There were a number of issues to be taken into consideration when determining the type of questions to use. Structured questions, characteristic of self-completion questionnaires and of a positivistic approach, simplify analysis but reduce the variety of response and so the richness of the data to be collected.[96] Although the dangers of structured questions were recognised, it was considered more imperative to make the questionnaire quick and easy to complete in order to overcome the perceived questionnaire fatigue and to encourage the maximum response rate. Of the ten questions asked, three required single responses, six were based on multiple-choice answers using differential rating scales and one was an unstructured question included to provide high value, qualitative data. A great deal of time and effort went into ensuring that the questions were clear and unambiguous. They were then reviewed by two academics, a DII user, a member of the ATLAS Consortium and a statistician. This process of scrutiny resulted in a number of changes. The questionnaire was then piloted by ten respondents to further confirm the clarity, logic and progression of the questions. It received no further comments. In addition to the ten questions, a comment box was included for each question. It was anticipated that little use would be made of this, given the constraints on time experienced by most respondents. However, a large number of comments were received.

The questionnaire was categorised into three areas: a heading section to explain the purpose of the questionnaire; a categorisation section to identify the profile of the respondents; and a data section. To improve the quality of the answers, the questions in the data section were designed to become increasingly specific with a view to engaging the respondent as they worked through the questions. The categorisation section included questions about work location, how long DII had been available at that work place, length of experience using it and a self-assessment of the respondent's level of skill in using IT. The data section was in three parts. The first asked for an evaluation of use and included questions about awareness of DII prior to its implementation, access to applications and relevant hardware, training and the extent to which it had improved on the previously available IT. The second section asked for an assessment of the extent of user consultation, the implementation experience, user involvement, the perceived purpose of DII and, finally, an assessment of its success. The final section simply asked for additional comments.

The next consideration was the selection of a sample and the decision was taken to use a 'snowball' or 'chain-referral' sampling technique, which identifies initial subjects and then asks them to identify people with a similar interest.[97] This method is often used if the sample for the study is rare or limited to a very small subgroup of the population and it offers a cheap, simple method of sampling requiring a minimal amount of planning.[98] It also enabled distribution across a broad range of establishments, which should have minimised any potential bias toward a particular group. Respondents were asked to state their work location, which showed responses from a variety of locations in the UK as well as Cyprus, Germany, Afghanistan and the USA. The initial request was sent to 20 people but, because of the method, exact distribution figures are unknown and non-return tracking was impossible. However, this resulted in 84 responses. Although the free version of SurveyMonkey analyses the data, there is a charge for the downloading of the data and resulting charts and graphs. This meant that the only means of creating graphical representation of the data collected was to transfer it manually into an Excel spreadsheet, which was a rather cumbersome process. The results of this data analysis are discussed in full in Chapter Six.

### 3.5. Ethical Issues

Ethics refers to the appropriateness of the researcher's behaviour in relation to the rights of those who become the subjects of the research.[99] Ethical issues are defined as "the moral principles, norms or standards of behaviour that guide moral choices about our behaviour and our relationship with others".[100] The research in this thesis was guided by Cranfield University's Ethics Policy, which states that it is up to the research student in consultation with the supervisor to determine whether the proposed research requires consideration by the Ethics Committee. The primary ethical principle is that respondents and participants should be protected from potential physical, psychological or personal harm. Kervin suggests the following checklist for assessing this:

1. Will the research process harm participants or those about whom information is gathered (indirect participants)?
2. Are the findings of this research likely to cause harm to others not involved in the research?
3. Is accepted research practice being violated in conducting the research and data analysis, and drawing conclusions?
4. Are community standards of conduct being violated?[101]

The answer to these questions was negative. In addition, reference was made to the six key principles of ethical research, as defined by the Economic and Social Research

Council, which are shown at Table 3.7 along with an assessment of the adherence to these principles in this research.

**Table 3.7. The Six Key Principles of Ethical Research**

| Principle | Adherence to Principle |
|---|---|
| 1. Research should be designed, reviewed and undertaken to ensure integrity, quality and transparency. | Responsibility for conduct of this research taken by the researcher in association with the supervisor and guided by the Cranfield University Ethics Policy. |
| 2. Research participants must normally be informed fully about the purpose, methods and intended possible uses of the research, what their participation in the research entails and what risks, if any, are involved. | Research participants fully advised before interview and during the interview process, as well as in an email sent with the survey and within the heading section of the questionnaire. |
| 3. The confidentiality of information supplied by research participants and the anonymity of respondents must be respected. | Participants who were interviewed in the course of this research are not identified. The nature of the survey sample meant that the respondents were not identifiable unless they chose to be. |
| 4. Research participants must take part voluntarily, free from any coercion. | This was the case in terms of the survey but it was difficult to assure this in terms of participants from the DII Group as they were nominated by the sponsor. However, they all seemed to engage willingly in the research process and this was confirmed by the amount of time that they were willing to allocate to it. |
| 5. Harm to research participants must be avoided in all instances. | There was little likelihood of physical, psychological or personal harm to participants in this research. |
| 6. The independence of research must be clear, and any conflicts of interest or partiality must be explicit. | This was clarified during the introductory session of the interview and in the email containing the link to the survey. |

**Source: Economic and Social Research Council, *Framework for Research Ethics (FRE)*, http://www.esrc.ac.uk/_images/Framework_for_Research_Ethics_tcm8-4586.pdf, downloaded 19th January 2010.**

### 3.6. Summary

The purpose of this chapter was to detail the decisions made about the data collection and analysis required in order to address the research question posed in Chapter One and to meet the aim of this thesis. To this end, the research philosophy was identified as interpretivist, considering the world as socially constructed and subjective. The purpose is to understand human behaviour, rather than to explain it. In this instance, it was noted that people working on the DII Programme are likely to understand something specific in relation to the identified CSFs, that they will allocate them a specific meaning and relevance, which will motivate their behaviour. This means that different research participants may express different views and these will require some interpretation by the researcher. The recognition and acceptance of an interpretivist philosophy then influences the selections regarding the research methodology, how the research should be undertaken, and the methods or tools used to collect relevant data. The chosen methodology is case study, which will incorporate a number of methods, including interviews and surveys. It is suitable for a research question based on 'how', examining a subject within its context in order to understand the interrelationships that impact on that subject.

However, before embarking on the case study, it was necessary to identify the CSFs from a range of carefully selected reports on both IT project failure and information infrastructure projects. The method selected for this was content analysis, using a process of selective reduction and relational analysis. The second stage of the research was the case study and a range of research methods was selected to collect the relevant data: analysis of primary and secondary sources, observation, examination of physical artefacts, interview and survey. This conforms to the interpretivist research approach of using multiple methods in order to understand different views of phenomena and to explore the subjective aspects of the case study. Decisions then had to be taken about what data to collect, why, from whom, where, when and how. In discussing these issues, the type of research being undertaken was defined in terms of the purpose, process, logic and outcome. The purpose is causal or analytical in that it examines the effect of one variable (CSFs) on another (the DII Programme), in order to ascertain if there has been a specific change from existing norms. The process is based on a mixture of qualitative and quantitative methods and its logic is deductive. Finally, the outcome is applied research, designed to apply its findings to a specific existing problem. The first stage in doing this is to identify the CSFs that appear in the selected reports, discussed above. The process for this and the outcomes are presented in full in Chapter Four.

## References

[1] Easterby-Smith, M., Thorpe, R. and Lowe, A., *Management Research: an Introduction*, (London, Sage, 1991), page 33.
[2] Effective Learning Service, *An Introduction to Research and Research Methods*, (Bradford, University of Bradford, School of Management, ND), page 4, http://www.khhtqt.ueh.edu.vn/Resources/intro%20to%20research%20reports.pdf, downloaded: 5th May 2009.
[3] Bryman, A. and Bell, E., *Business Research Methods*, (Oxford, OUP, 2003), page 16.
[4] Collis, J. and Hussey, R., *Business Research: a Practical Guide for Undergraduate and Postgraduate Students*, 2nd Ed., (Basingstoke, Palgrave Macmillan, 2003), page 52.
[5] Schutz, A., *Collected Papers, I: The Problem of Social Reality*, (The Hague, Martinus Nijhof, 1962), page 59.
[6] Saunders, M., Lewis, P. and Thornhill, A., *Research Methods for Business Students*, 4th Ed., (Harlow, FT Prentice Hall, 2007), page 106-107.
[7] Pearlson, K.E. and Saunders, C.S. *Managing and Using Information Systems: A Strategic Approach.* (New York, Wiley, 2004), pages 6-7.
[8] Bryman, A. and Bell, E., *Business Research Methods*, (Oxford, OUP, 2003), page 15.
[9] Saunders, M., Lewis, P. and Thornhill, A., *Research Methods for Business Students*, 4th Ed., (Harlow, FT Prentice Hall, 2007), page 602.
[10] Collis, J. and Hussey, R., *Business Research: a Practical Guide for Undergraduate and Postgraduate Students*, 2nd Ed., (Basingstoke, Palgrave Macmillan, 2003), page 10.
[11] Effective Learning Service, *An Introduction to Research and Research Methods*,(Bradford, University of Bradford, School of Management, ND), page 7, http://www.khhtqt.ueh.edu.vn/Resources/intro%20to%20research%20reports.pdf, downloaded: 5th May 2009.
[12] Collis, J. and Hussey, R., *Business Research: a Practical Guide for Undergraduate and Postgraduate Students*, 2nd Ed., (Basingstoke, Palgrave Macmillan, 2003), page 20.
[13] Effective Learning Service, *An Introduction to Research and Research Methods*, (Bradford, University of Bradford, School of Management, ND), page 9, http://www.khhtqt.ueh.edu.vn/Resources/intro%20to%20research%20reports.pdf, downloaded: 5th May 2009.
[14] Effective Learning Service, *An Introduction to Research and Research Methods*, (Bradford, University of Bradford, School of Management, ND), page 10, http://www.khhtqt.ueh.edu.vn/Resources/intro%20to%20research%20reports.pdf, downloaded: 5th May 2009.
[15] Effective Learning Service, *An Introduction to Research and Research Methods*, (Bradford, University of Bradford, School of Management, ND), page 9, http://www.khhtqt.ueh.edu.vn/Resources/intro%20to%20research%20reports.pdf, downloaded: 5th May 2009.
[16] Effective Learning Service, *An Introduction to Research and Research Methods*, (Bradford, University of Bradford, School of Management, ND), page 9, http://www.khhtqt.ueh.edu.vn/Resources/intro%20to%20research%20reports.pdf, downloaded: 5th May 2009.
[17] Effective Learning Service, *An Introduction to Research and Research Methods*, (Bradford, University of Bradford, School of Management, ND), page 10, http://www.khhtqt.ueh.edu.vn/Resources/intro%20to%20research%20reports.pdf, downloaded: 5th May 2009.
[18] Yin, R.K., *Case Study Research, Design and Methods*, 3rd Ed., (Beverley Hills, CA, Sage, 2003), page 13.
[19] Yin, R.K., *Case Study Research, Design and Methods*, 3rd Ed., (Beverley Hills, CA, Sage, 2003), page 13.
[20] Markus, M.L. and Robey, D., 'IT and Organizational Change: Causal Structure in Theory and Research', *Management Science*, Vol. 34 No. 5, 1988, pages 583-598.
[21] Orlikowski, W.J., 'The Duality of Technology: Rethinking the Concept of Technology in Structuration', *Organization Science*, Vol. 3 No. 3, 1992, pages 398-427
[22] Eisenhardt, K.M., 'Building Theories from Case Study Research', *Academy of Management Review*, Vol. 14, No. 4, 1989, pages 532-550, this page 534.
[23] Stake, R.E., *The Art of Case Study Research*, (Thousand Oaks, CA, Sage, 1995), page xi.

24 Myers,M.D., 'Qualitative Research in Information Systems', *MISQ Discovery*, 20th May 1997, http://www.qual.auckland.ac.nz/, downloaded 7th July 2008.
25 Collis, J. and Hussey, R., *Business Research: a Practical Guide for Undergraduate and Postgraduate Students*, 2nd Ed., (Basingstoke, Palgrave Macmillan, 2003), page 19.
26 Collis, J. and Hussey, R., *Business Research: a Practical Guide for Undergraduate and Postgraduate Students*, 2nd Ed., (Basingstoke, Palgrave Macmillan, 2003), page 13.
27 Rockart, J.F., 'Chief Executives Define their own Data Needs', *Harvard Business Review*, Mar-Apr 1979, pages 81-93
28 Bryman, A. and Bell, E., *Business Research Methods*, (Oxford, OUP, 2003), pages 9-13.
29 Lee, A.S., 'A Scientific Methodology for MIS Case Studies', *MIS Quarterly*, Vol 13, No. 1, Mar 1989, pages 33-50, this page 33.
30 Bryman, A. and Bell, E., *Business Research Methods*, (Oxford, OUP, 2003), page 53.
31 Stake, R., *The Art of Case Research*, (Thousand Oaks, CA, Sage, 1995), page xi.
32 Stake, R., *The Art of Case Research*, (Thousand Oaks, CA, Sage, 1995), page 2.
33 Bryman, A. and Bell, E., *Business Research Methods*, (Oxford, OUP, 2003), page 54.
34 Yin, R.K., *Case Study Research, Design and Methods*, 3rd Ed., (Beverley Hills, CA, Sage, 2003), page 22.
35 Yin, R.K., *Case Study Research, Design and Methods*, 3rd Ed., (Beverley Hills, CA, Sage, 2003), page 23.
36 Bryman, A. and Bell, E., *Business Research Methods*, (Oxford, OUP, 2003), page 54.
37 Yin, R.K., *Case Study Research, Design and Methods*, 3rd Ed., (Beverley Hills, CA, Sage, 2003), page 10.
38 Collis, J. and Hussey, R., *Business Research: a Practical Guide for Undergraduate and Postgraduate Students*, 2nd Ed., (Basingstoke, Palgrave Macmillan, 2003), page 67.
39 Yin, R.K., *Case Study Research, Design and Methods*, 3rd Ed., (Beverley Hills, CA, Sage, 2003), page 67.
40 Yin, R.K., *Case Study Research, Design and Methods*, 3rd Ed., (Beverley Hills, CA, Sage, 2003), page 67.
41 Yin, R.K., *Case Study Research, Design and Methods*, 3rd Ed., (Beverley Hills, CA, Sage, 2003), page 68.
42 Yin, R.K., *Case Study Research, Design and Methods*, 3rd Ed., (Beverley Hills, CA, Sage, 2003), page 69.
43 Jensen, J.L. and Rodgers, R., 'Cumulating the Intellectual Gold of Case Study Research', *Public Administration Review*, 2001, Vol. 61, No.2, pages 236-246, this page 237-239.
44 Myers, M.D., 'Qualitative Research in Information Systems', *MISQ Discovery*, 20th May 1997, http://www.qual.auckland.ac.nz/, downloaded 7th July 2008.
45 Collis, J. and Hussey, R., *Business Research: a Practical Guide for Undergraduate and Postgraduate Students*, 2nd Ed., (Basingstoke, Palgrave Macmillan, 2003), page 55.
46 Colorado State University, *An Introduction to Content Analysis*, http://writing.colostate.edu/guides/research/content/pop2a.cfm, downloaded 5th May 2009.
47 Colorado State University, *An Introduction to Content Analysis*, http://writing.colostate.edu/guides/research/content/pop2a.cfm, downloaded 5th May 2009.
48 Palmquist, M., *Content Analysis*, http://www.ischool.utexas.edu/~palmquis/courses/content.html, downloaded 5th May 2009.
49 Palmquist, M., *Content Analysis*, http://www.ischool.utexas.edu/~palmquis/courses/content.html, downloaded 5th May 2009.
50 Palmquist, M., *Content Analysis*, http://www.ischool.utexas.edu/~palmquis/courses/content.html, downloaded 5th May 2009.
51 Great Britain, Cabinet Office, *Successful IT: Modernising Government in Action*, (London, HMSO, 1999).
52 Palmquist, M., *Content Analysis*, http://www.ischool.utexas.edu/~palmquis/courses/content.html, downloaded 5th May 2009.
53 Palmquist, M., *Content Analysis*, http://www.ischool.utexas.edu/~palmquis/courses/content.html, downloaded 5th May 2009.
54 Palmquist, M., *Content Analysis*, http://www.ischool.utexas.edu/~palmquis/courses/content.html, downloaded 5th May 2009.
55 Palmquist, M., *Content Analysis*, http://www.ischool.utexas.edu/~palmquis/courses/content.html, downloaded 5th May 2009.

[56] Palmquist, M., *Content Analysis*, http://www.ischool.utexas.edu/~palmquis/courses/content.html, downloaded 5th May 2009.
[57] Miles, M.B. and Huberman, A.M., *Qualitative Data Analysis: A Sourcebook of New Methods*, (Newbury Park, CA: Sage, 1984).
[58] Meyer, E.T., *Software Tools for Content Analysis*, JISC: Toolkit for the Impact of Digitised Scholarly Resources (TIDSR), 19th March 2009, http://microsites.oii.ox.ac.uk/tidsr/kb/56/software-tools-content-analysis, downloaded 29th May 2010.
[59] Meyer, E.T., *Software Tools for Content Analysis*, JISC: Toolkit for the Impact of Digitised Scholarly Resources (TIDSR), 19th March 2009, http://microsites.oii.ox.ac.uk/tidsr/kb/56/software-tools-content-analysis, downloaded 29th May 2010.
[60] Effective Learning Service, *An Introduction to Research and Research Methods*, (Bradford, University of Bradford, School of Management, ND), page 4, http://www.khhtqt.ueh.edu.vn/Resources/intro%20to%20research%20reports.pdf, downloaded: 5th May 2009.
[61] Fortune, J. and Peters, G., *Information Systems: Achieving Success by Avoiding Failure*, (Wiley, Chichester, 2005), page 175.
[62] Bryman, A. and Bell, E., *Business Research Methods*, (Oxford, OUP, 2003), page 54.
[63] Collis, J. and Hussey, R., *Business Research: a Practical Guide for Undergraduate and Postgraduate Students*, 2nd Ed., (Basingstoke, Palgrave Macmillan, 2003), page 171
[64] Collis, J. and Hussey, R., *Business Research: a Practical Guide for Undergraduate and Postgraduate Students*, 2nd Ed., (Basingstoke, Palgrave Macmillan, 2003), page 171.
[65] Collis, J. and Hussey, R., *Business Research: a Practical Guide for Undergraduate and Postgraduate Students*, 2nd Ed., (Basingstoke, Palgrave Macmillan, 2003), page 167
[66] Collis, J. and Hussey, R., *Business Research: a Practical Guide for Undergraduate and Postgraduate Students*, 2nd Ed., (Basingstoke, Palgrave Macmillan, 2003), page 168.
[67] Saunders, M., Lewis, P. and Thornhill, A., *Research Methods for Business Students*, 4th Ed., (Harlow, FT Prentice Hall, 2007), page 315.
[68] Saunders, M., Lewis, P. and Thornhill, A., *Research Methods for Business Students*, 4th Ed., (Harlow, FT Prentice Hall, 2007), page 315.
[69] Easterby-Smith, M., Thorpe, R. and Lowe, A., *Management Research: an Introduction*, (London, Sage, 1991), page 27.
[70] Saunders, M., Lewis, P. and Thornhill, A., *Research Methods for Business Students*, 4th Ed., (Harlow, Prentice Hall, 2007), page 314.
[71] Saunders, M., Lewis, P. and Thornhill, A., *Research Methods for Business Students*, 4th Ed., (Harlow, Prentice Hall, 2007), page 316.
[72] Saunders, M., Lewis, P. and Thornhill, A., *Research Methods for Business Students*, 4th Ed., (Harlow, Prentice Hall, 2007), page 182.
[73] Saunders, M., Lewis, P. and Thornhill, A., *Research Methods for Business Students*, 4th Ed., (Harlow, Prentice Hall, 2007), page 182.
[74] Saunders, M., Lewis, P. and Thornhill, A., *Research Methods for Business Students*, 4th Ed., (Harlow, Prentice Hall, 2007), page 316.
[75] Collis, J. and Hussey, R., *Business Research: a Practical Guide for Undergraduate and Postgraduate Students*, 2nd Ed., (Basingstoke, Palgrave Macmillan, 2003), page 168.
[76] Schutz, A., *Collected Papers, I: The Problem of Social Reality*, (The Hague, Martinus Nijhof, 1962), page 59.
[77] Healey, M.J. and Rawlinson, M.B., 'Interviewing Techniques in Business and Management Research', in Wass, V.J. and Wells, P.E., *Principles and Practice in Business and Management Research*, (Aldershot, Dartmouth, 1994), pages 123-145, this page 136.
[78] Easterby-Smith, M., Thorpe, R. and Lowe, A., *Management Research: an Introduction*, (London, Sage, 1991), page 27.
[79] Saunders, M., Lewis, P. and Thornhill, A., *Research Methods for Business Students*, 4th Ed., (Harlow, Prentice Hall, 2007), page 326.
[80] Lee, R.M., *Doing Research on Sensitive Topics*, (London, Sage, 1993), page 18.
[81] Lee, R.M., *Doing Research on Sensitive Topics*, (London, Sage, 1993), page 98.
[82] Lee, R.M., *Doing Research on Sensitive Topics*, (London, Sage, 1993), page 100.
[83] Lee, R.M., *Doing Research on Sensitive Topics*, (London, Sage, 1993), page 98.
[84] Lee, R.M., *Doing Research on Sensitive Topics*, (London, Sage, 1993), page 111.
[85] Collis, J. and Hussey, R., *Business Research: a Practical Guide for Undergraduate and Postgraduate Students*, 2nd Ed., (Basingstoke, Palgrave Macmillan, 2003), page 169.

[86] Robson, C., *Real World Research*, 2nd Ed., (Oxford, Blackwell, 2002), page 289.
[87] Saunders, M., Lewis, P. and Thornhill, A., *Research Methods for Business Students*, 4th Ed., (Harlow, Prentice Hall, 2007), page 327.
[88] Robson, C., *Real World Research: A Resource for Social Scientists and Practitioner Researchers*, (Oxford, Blackwell, 1993), page 370.
[89] Bryman, A., *Quantity and Quality in Social Research*, (London, Unwin Hyman, 1988), page 77.
[90] Collis, J. and Hussey, R., *Business Research: a Practical Guide for Undergraduate and Postgraduate Students*, 2nd Ed., (Basingstoke, Palgrave Macmillan, 2003), page 173.
[91] Saunders, M., Lewis, P. and Thornhill, A., *Research Methods for Business Students*, 4th Ed., (Harlow, Prentice Hall, 2007), page 138.
[92] Saunders, M., Lewis, P. and Thornhill, A., *Research Methods for Business Students*, 4th Ed., (Harlow, Prentice Hall, 2007), page 139.
[93] Collis, J. and Hussey, R., *Business Research: a Practical Guide for Undergraduate and Postgraduate Students*, 2nd Ed., (Basingstoke, Palgrave Macmillan, 2003), page 194.
[94] Collis, J. and Hussey, R., *Business Research: a Practical Guide for Undergraduate and Postgraduate Students*, 2nd Ed., (Basingstoke, Palgrave Macmillan, 2003), page 195.
[95] Collis, J. and Hussey, R., *Business Research: a Practical Guide for Undergraduate and Postgraduate Students*, 2nd Ed., (Basingstoke, Palgrave Macmillan, 2003), page 45.
[96] Collis, J. and Hussey, R., *Business Research: a Practical Guide for Undergraduate and Postgraduate Students*, 2nd Ed., (Basingstoke, Palgrave Macmillan, 2003), page 198-214.
[97] Castillo, J.J., 'Snowball Sampling', *Experiment Resources*, http://www.experiment-resources.com/snowball-sampling.html, downloaded 8th March 2011.
[98] Castillo, J.J., 'Snowball Sampling', *Experiment Resources*, http://www.experiment-resources.com/snowball-sampling.html, downloaded 8th March 2011.
[99] Saunders, M., Lewis, P. and Thornhill, A., *Research Methods for Business Students*, 4th Ed., (Harlow, Prentice Hall, 2007), page 178.
[100] Blumberg, B., Cooper, D.R. and Schindler, P.S., *Business Research Methods*, (McGraw-Hill, Maidenhead, 2005), page 92.
[101] Kervin, J.B., *Methods for Business Research*, (New York, HarperCollins, 1992), page 38.

# Chapter Four
# Lessons Learned:
# Identifying the Critical Success Factors

## 4.1. False Assumptions

In its 1999 *Modernising Government* white paper, the Labour Government declared that it would deliver fundamental and wide-ranging change to the way the public sector works through the use of Information Technology (IT).[1] This strategic intent was reinforced through successive parliaments. However, eleven years on and the newly elected Coalition Government's Digital Champion, Martha Lane Fox, was renewing the call for an online revolution in the public sector, indicating that the Labour plan did not come to fruition.[2] This demonstrates that the unerring confidence in technology is often misplaced and fails to deliver. To date, UK governments of all political persuasions have invested large sums in major IT projects. In 2005, the UK was responsible for about 23% of public sector IT spending across Europe, investing 40% more than France or Germany.[3] However, with the rising cost of the national deficit, this spending has been curtailed. IT projects and services were cut by more than £1 billion in the Coalition Government's Comprehensive Spending Review in October 2010.[4] However, the belief in IT as a means of delivering efficiency savings remains intact.[5] The society for IT professionals in the public sector, SOCITM, notes the unlimited potential of IT to reform services, but also points to the frequent failure of big government contracts to deliver value.[6] As Collins observes, "the assumption of a happy ending and a concomitant underestimation of complexity, potential problems, costs and risks is congenital to large IT projects within central government".[7]

The publicly visible and much reported catalogue of failed projects confirms Collins' cynicism, particularly those large-scale, complex and bespoke developments so frequently undertaken by government. A range of these, not comprehensive, is shown at Table 4.1, clearly demonstrating that the reasons for failure have remained largely the same for almost thirty years. This underlines the research question that drives this study: how have the lessons learned from previous complex IT projects in government been used to improve the performance of subsequent projects? The purpose of this chapter is to focus on the 'lessons learned' element of that question by identifying

## Table 4.1. A Selection of Public Sector IT Project Failures, 1980-2011

| Project Title | Date | Background | Reasons for Failure |
|---|---|---|---|
| National Health Service (NHS): Read Codes 3 Project | 1982-1998 | A local development to standardise medical reporting, then purchased by the NHS for £1.25 million in 1990 and upgraded to Read Codes 2. After a £32 million investment, version 3 was only operational at 12 NHS sites. | • No business case<br>• No cost benefit analysis<br>• No investment appraisal |
| NHS: Regional Information System Plan (RISP) | 1984-1990 | Wessex Regional Health Authority's RISP project set out to develop five core computer systems to achieve integration across the region. The system cost about £43 million and at least £20 million was wasted due to determination to complete the project. | • Network transmission capability insufficient<br>• Work processes changed<br>• NHS reorganised<br>• Lack of stakeholder involvement<br>• Lack of skilled personnel<br>• Poor project management |
| Department of Social Security (DSS):Operational Strategy System (Opstrat) | 1984-1996 | Intended to compute welfare benefits for 20 million claimants at 400 Benefit Offices. Costs rose from £700 million to £2,600 million. | • IT management separate from policy making<br>• Delivery timescales too short<br>• Project too complex; new and changing technology<br>• No alignment of business, IT or organisational strategies<br>• Lack of skills |
| Ministry of Defence: Trawlerman Project | 1988-1997 | £41 million met the initial requirements set in the early 1990s. A replacement system in 1997 cost £6 million. | • Fatally flawed design<br>• Poor project management<br>• Project too complex and over-ambitious<br>• Poor communication with supplier |
| NHS: Hospital Information Support System (HISS) | 1988-1999 | Integration of hospital information systems. By 1996, it had cost £106 million and achieved cost savings of only £3.3 million rather than the projected savings of £10.4 million. | • Lack of stakeholder involvement<br>• Poor project management<br>• Poor senior management |
| Department of Education and Employment (DEE): Field System | 1988-1999 | The £48 million project changed hands from DEE to the new Training and Enterprise Councils (TECs), resulting in an inappropriate design. | • Lack of stakeholder involvement<br>• Poor risk management<br>• Poor project management |
| London Ambulance Service: Computer Aided Despatch system | 1991-1992 | Withdrawn after a short period of service and perhaps several unnecessary fatalities. Final costs unknown. | • Poor project management<br>• Poor risk management<br>• Poor change management<br>• Delivery timescales too short<br>• Lack of stakeholder involvement |

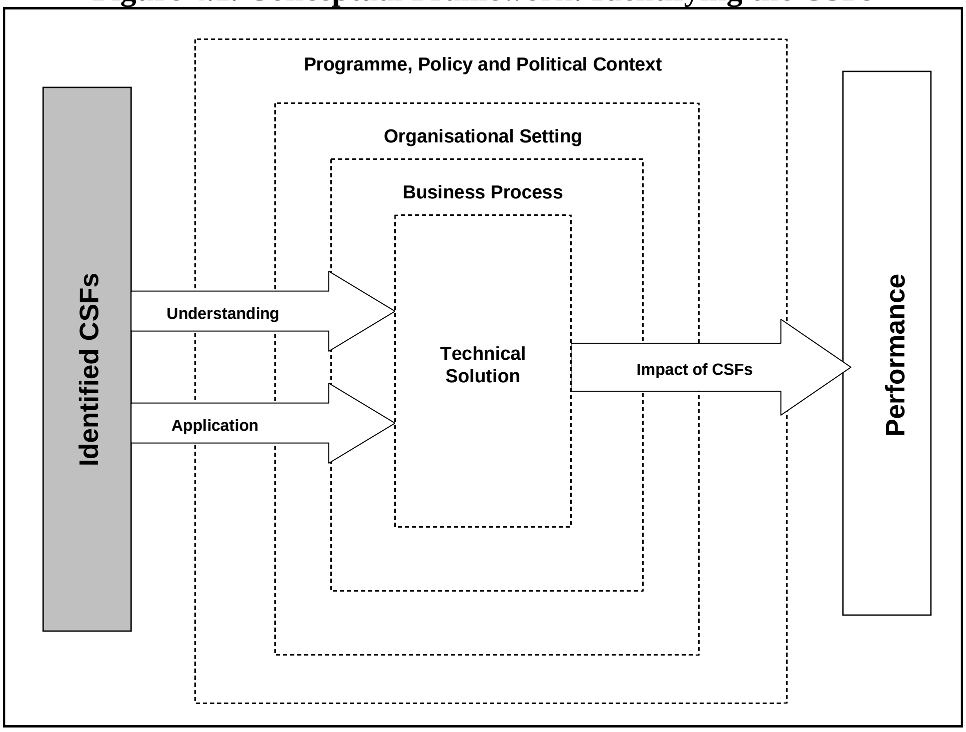
| Project Title | Date | Background | Reasons for Failure |
|---|---|---|---|
| Home Office: Case Record and Management System (CRAMS) | 1993-2001 | National database of dangerous offenders. Abandoned at a cost of £100 million. Probation Officers resorted to card index system. | • Too slow<br>• Not easily adaptable to changes in legislation<br>• Poor project management<br>• Lack of continuity in leadership<br>• Lack of governance<br>• Poor funding model<br>• Lack of stakeholder involvement |
| Inland Revenue: Infrastructure 2000 Project | 1994-2000 | £1,000 million project involving the installation of 56,000 desktop computers. By 1999, staff productivity was in decline as a result of the system. Final costs were close to £2,000 million. | • Project too big<br>• Project too complex<br>• Too much change |
| Department of Social Security (DSS):<br>National Insurance Recording System 2 (NIRS2) | 1995-1998 | System errors resulted in 130,000 pensioners losing more than £43 million in pension payments. | • System unable to cope with the volume of data<br>• Financial constraints<br>• Over ambitious project<br>• Lack of user involvement |
| Post Office: Pathway | 1996-1999 | £1 billion contract let by the Benefit Agency to use smartcards to automate the payment of benefits. Cancelled at a cost of £698 million. | • Change of payment system in favour of credit transfer<br>• Risk management<br>• Lack of clarity over requirements<br>• Two customers |
| Passport Agency: Digital Passports System | 1996-1999 | A general upgrade from an earlier system. Subject to very tight deadlines. | • Too complex<br>• Roll out timetable did not allow for the troubleshooting of problems<br>• Poor risk management<br>• Poor business case<br>• Poor stakeholder management |
| Lord Chancellor's Department: Libra | 1996-2008 | Following two failed projects in the 1990s, this was an attempt to create an IT infrastructure for magistrates' courts. The project was based on PFI. The cost of the project has more than doubled to over £400 million and the system is yet to be delivered. | • Competition badly handled<br>• No governance of individual courts<br>• Requirements poorly defined<br>• Too much risk passed to the supplier |
| Home Office: Public Safety Radio Communications Project (PSRCP) | 1999-2009 | £2.5 million contract to establish a police radio network. Project costs based on national implementation. | • Cost too high for individual local police authorities to implement<br>• No strategic oversight<br>• No power to instigate change<br>• Poor engagement with end-users |

| Project Title | Date | Background | Reasons for Failure |
|---|---|---|---|
| Home Office Immigration and Nationality Directorate: Casework Programme | 1996-2001 | System designed to speed up asylum applications. Contract let to Siemens as a PFI. Abandoned at a cost of £77 million. | • Over complex<br>• Did not match the work processes<br>• Allegedly, the system development began before the requirements had been specified<br>• Lack of project management skills<br>• Lack of risk management<br>• No accountable senior staff |
| National Air Traffic Services: New En Route Centre for Air Traffic Control | 1990-2002 | Expected to open in 1996 but did not open until 27th January 2002. Over ran its budget by £180 million to cost £623 million with a much reduced project definition. | • Scale and complexity<br>• Poor relationship with stakeholders<br>• Lack of accountability<br>• Changing project definition and scope<br>• Project management |
| National Probation Service: Information System Strategy (NPSISS) | 1993-2001 | Projected to cost £97 million over ten years and to be complete in 1999. It was still incomplete in 2001 with expected costs at the time of £118 million. The project director changed seven times during the project. | • Lacked governance and support<br>• Poor project management<br>• Lack of stakeholder involvement<br>• Poor risk assessment |
| Department of Work and Pensions (DWP): Child Support Agency | 1998-2003 | Reforms at the Child Support Agency included new rules for child support and a simplified calculation for maintenance, supported by a new IT system and a substantial business restructuring. Called CS2, the IT system was delayed and £456 million over budget. In 2007, the Government announced it would spend a further £300m in an attempt to improve CS2. It still did not work. | • Unclear specifications<br>• Poor project management<br>• Poor design<br>• Poor risk management<br>• Too complex<br>• Designed to match an over-ambitious processes |
| Department for Environment, Food and Rural Affairs (DEFRA): Rural Payment Agency's Single Payment Scheme | 2005 to date | Implementation of an IT system to administer the European Union's Single Payment scheme to farmers in England. The cost of the IT system rose four fold, from £75.8m to £350m, and it may never work reliably. | • Too complex<br>• Poor risk assessment<br>• Poor accountability<br>• Lack of skills<br>• Poor project management |
| Home Office: National Offender Management Information System (C-NOMIS) | 2004 to date | The C-NOMIS project has been handled badly, resulting in a three-year delay in programme roll-out, reductions in scope and benefit, and a doubling of programme costs | • Poor project management<br>• Over complex<br>• Lack of resources<br>• Lack of accountability and governance<br>• Over-ambitious<br>• Lack of skills |

**Source: Author**

the CSFs that are highlighted in government reports on IT projects and, more specifically, on information infrastructure projects. The conceptual framework for this study, shown again at Figure 4.1, describes the thinking on which this thesis is based and maps the route of this research. The IT project sits at the core of the model with CSFs as the input. The purpose of this chapter is to identify the CSFs, as indicated on the diagram. Once identified, this study will examine the extent to which these are understood and applied, along with an assessment of the resulting

**Figure 4.1. Conceptual Framework: Identifying the CSFs**




**Source: Author**

performance of the product. The ‘Technical Solution’ sits within the government context. As in private sector organisations, that context consists of ‘Business Process’ and ‘Organisational Setting’. Its difference lies in the outer layer, the ‘Programme, Policy and Political Context’. In theory, the CSFs should be understood by the organisation and, more specifically, by the project team and applied to the planning, development and implementation of the Technical Solution. The impact of these CSFs should be improved performance. The aim of this study is to examine whether this works in practice.

The process for identifying these CSFs starts with the so-called McCartney Report of 2000, *Successful IT: Modernising Government in Action*, and then incorporates nine subsequent reports, shown at Table 4.2, reproduced from Chapters One and Three.

**Table 4.2. Reports of Public Sector IT Project Failure, 2000-2006**

| Reporting Body | Title | Date |
|---|---|---|
| Cabinet Office | Successful IT: Modernising Government in Action (the McCartney Report) | 2000 |
| Organisation for Economic Co-Operation and Development (OECD) | The Hidden Threat to E-Government: Avoiding Large Government IT Failures | 2001 |
| Intellect | Getting IT Right for Government | 2002 |
| Office of Government Commerce (OGC) | Common Causes of Project Failure | 2002 |
| Intellect | IT Supplier Code of Practice | 2003 |
| Parliamentary Office of Science and Technology (POST) | Government IT Projects | 2003 |
| House of Commons, Work and Pensions Committee | Department of Work and Pensions Management of Information Technology Projects: Making IT Deliver for DWP Customers | 2004 |
| National Audit Office (NAO) | Improving IT Procurement | 2004 |
| Royal Academy of Engineering (RAEng) and the British Computer Society (BCS) | The Challenges of Complex IT Projects | 2004 |
| National Audit Office (NAO) | Delivering Successful IT-Enabled Business Change | 2006 |

**Source: Author**

Other reports appeared during this timescale, broadly concerned with the same subject matter, but did not meet the following selection criteria: aiming to identify CSFs for IT projects in the public sector; published by influential and respected bodies; and much referenced and quoted in the literature.

Based on evidence derived from extensive research of public and private sector case studies in both the UK and overseas, the McCartney Report recognised that there is no single, simple solution to IT project failure; its headline statement noted the need to stop thinking in terms of IT projects and to start thinking about change management projects enabled by IT.[8] It identified 10 areas where improvement would deliver more successful results:

- Change management;
- Leadership and responsibility;
- Project management;
- Risk management;
- Modular and incremental development;

- Benefit realisation;
- Procurement and supplier relationships;
- Cross-cutting initiatives;
- People and skills;
- Learning lessons.[9]

The eleventh area, the implementation strategy, detailed the action plan for the 30 recommendations identified in the other 10 areas. These section headings highlight the areas of activity considered most critical to delivering a successful outcome. Arguably, they conform to Rockart's definition of CSFs, discussed in Chapters One and Two:

> …the few key areas where 'things must go right' for the business to flourish…
>
> …areas of activity that should receive constant and careful attention from management…
>
> …the areas in which good performance is necessary to ensure attainment of [organisational] goals.[10]

The problem is that these section headings are very general. The heading 'project management', for example, does not provide sufficient clarity about what needs to be done for project management to 'go right' or what should receive 'constant and careful attention'. This detail can only be gained by reading the discussion in the report. Conversely, the recommendations are very specific i.e. "Recommendation 4: professional development events for Ministers and senior civil servants being organised by the Centre for Management and Policy Studies (CMPS) will include informing them of their role in, and responsibility for, major IT projects and programmes".[11] In order to identify more meaningful and, therefore, potentially more useful CSFs, they need to be sufficiently precise and detailed. Using the McCartney Report and these broad headings as a basis, a thorough content analysis of the text was undertaken in order to achieve more specific and pertinent CSFs, as detailed in Chapter Three.

The literature identified that not all projects are the same and they should, therefore, be managed in different ways using different CSFs. Given that the case study under examination for this thesis is an infrastructure project, the Defence Information Infrastructure (DII) Programme, this raises questions about whether information infrastructure projects are different to other IT projects and, if so, whether they have different CSFs. Although the literature identifies different types of project and the resulting analysis suggested that IT projects are different, there was no evidence directly relating to infrastructure projects. Therefore, five accounts of infrastructure projects were selected, as shown at Table 4.3. The selection criteria are discussed in Chapter Three, Section 3.4.1 and the same process of content analysis was applied. They were then compared with those of the general reports to determine a final list of 'Identified CSFs', which is presented at Section 4.5.

**Table 4.3. Reports on Public Sector Infrastructure Projects**

| Reporting Body | Title | Publication Date |
|---|---|---|
| National Audit Office | **The Implementation of the National Probation Service Information Systems Strategy (Home Office)** | 2001 |
| National Audit Office | **New IT Systems for Magistrates' Courts: the Libra Project** | 2003 |
| National Audit Office | **Delivering Digital Tactical Communications through the Bowman CIP Programme (Ministry of Defence)** | 2006 |
| National Audit Office | **The National Programme for IT in the NHS (Department of Health)** | 2006 |
| US General Audit Office | **Information Technology: DoD Needs to Ensure that Navy Marine Corps Intranet Program is Meeting Goals and Satisfying Customers** | 2006 |

**Source: Author**

This chapter begins by discussing the commissioning of the McCartney Report, then tracking its progress over time before considering its recommendations and key outcomes. The purpose, key findings and CSFs for each of the nine other reports are then presented followed by the five infrastructure reports. The outcome of this process is the synthesis of the CSFs from the fifteen reports. This is then compared to the list of academic CSFs identified in Chapter Two, so answering the first of the three subsidiary questions that stem from the research question, highlighted in Chapter One: are the lessons learned from previous complex IT projects in government correct and comprehensively considered? This requires a point of comparison, which in this case is the academic literature.

## 4.2. Starter for Ten: the McCartney Report

As discussed in Chapter One, the Public Accounts Committee (PAC) first reported on IT failure in government in 1984.[12] However, it was another sixteen years before any concerted action was taken, prompted by the failure of the Passport Agency's IT project in 1999. At the same time as the *Modernising Government* initiative was heralding IT as the means to improve efficiency and effectiveness in the public sector, the media was carrying headlines crying "passport misery for thousands".[13] Ironically, this project was ultimately a success but the Government deemed the performance level of its IT projects unacceptable and commissioned Ian McCartney, then e-Government Minister based in the Cabinet Office, to conduct a review.[14] Although popularly called after McCartney, the process was led by Ann Steward, an Australian on secondment to the Cabinet Office and later Chief Information Officer (CIO) for the Australian Government.[15] The task of the review team was to look for lessons that would improve performance and help future IT projects to avoid past mistakes, in other words to identify the relevant CSFs. Indicating the importance of this report and the urgency to implement it, five of the 30 recommendations were released four months before the publication of the full Report and immediately put into practice.[16] They were later subsumed into Recommendations 4, 21, 23, 28 and 30.

Drawing on Cobb's Paradox, discussed in Chapter Two, McCartney acknowledged that the reasons for failure are well known but are not translated into positive action.[17] In an attempt to overcome this perceived inertia and to ensure 'active ownership', he allocated a delivery deadline and a Senior Responsible Owner (SRO) for each recommendation.[18] He also designated an SRO to take overall responsibility for the report, namely Andrew Pinder, the e-Envoy in the Cabinet Office, who made an interim progress report in December 2000, at which point, 19 of the 30 recommendations had been fulfilled, as shown at Table 4.4.[19]

## Table 4.4. McCartney Recommendations: Achieved (December 2000)

| Areas of Concern | Recommendations | Outcome |
|---|---|---|
| **Change Management** | **1** Business development to be a key feature in the skills framework being developed by the Central IT Unit (CITU). **Completed June 2000 – See Recommendation 25** | Half of the skills framework used in the e-Business Skills assessment toolkit now related to business development. |
| | **2** CITU/OGC to strengthen the application of business development skills across government. **Completed December 2000 – See Recommendation 25** | Workshop held and actions identified in December 2000. |
| | **3** Business cases must reflect all of the business change to be delivered. **Completed August 2000 – See Recommendation 19** | Practical guidance on the contents of a business case provided by the OGC using the draft business case model provided by the McCartney Review study team. |
| **Leadership and Responsibility** | **6** An interim checklist of roles and responsibilities of the SRO made available by June 2000. | Interim checklist published in June and full version published in December. |
| **Project Management** | **9** Key staff on major projects must undertake formal project management training. | OGC examining competencies and facilitating a programme of mentoring. |
| | **10** The Project Profile Model (PPM) to be used to assess the difficulty of projects and check project management skills. | PPM and guidance published end of September 2000. |
| **Risk Management** | **11** The OGC to investigate methods of problem reporting and upward referral. These will be based on the PPM. | Interim risk map published in August 2000.<br>OGC developed a flexible method of upward referral of risk. |
| **Modular and Incremental Development** | **13** OGC must refine and expand on the preliminary guidance issued by the major IT projects review team. | Briefing in December 2000 and Central Computer and Telecommunications Agency (CCTA) Information System (IS) Management Handbook. |
| **Benefit Realisation** | **16** Treasury should review the systems that departments and agencies have in place for monitoring benefits realisation. | Departmental Investment Strategies published 22/11/00. |
| | **17** The OGC should review the results of Post-Implementation Reviews (PIRs) and ensure that valuable common information is widely available. | OGC published a questionnaire to enable IT projects to feed back the results of PIRs, which are then analysed and disseminated. |
| | **18** OGC/CITU to examine additional measures and guidance to ensure government maximises benefits from IT investment. | OGC examining results of reviews on IT projects to identify guidance, training and relevant procedures. |
| **Procurement and Supplier Relationships** | **19** OGC should audit existing policy and guidance on procurement to produce a set of materials for IT. | Procurement brief published, identifying principle sources of guidance during the procurement cycle. |
| | **22** OGC to gather information about government's top 10 IT suppliers. | Information collated by OGC. Contractual performance data was available from December 2000. |
| **People and Skills** | **24** CITU/OGC to develop a technical skills framework.<br>**25** CITU to develop an extension to the Skills for the Information Age (SFIA) framework. | Skills toolkit published by e-Envoy in July 2000. Included in the e-business strategies published by Information Age Government Champions (IAGC). Departments reported back on skills gaps.<br>In November 2000, Office of the e-Envoy (OeE)/OGC workshop held to review findings and decide on necessary action. |
| | **27** The Government must support the co-ordinated and ongoing assessment of its IS skills base and ensure improvements. | OeE updated e-Business skills Assessment Toolkit and Departments advised to re-use toolkit each time they review their e-business strategy. |
| **Learning Lessons** | **28** The draft peer review process developed by this study to be implemented by OGC by September 2000. | Interim set of guidance and support material published. PPM and Workbooks on Peer Review and Gateway Process available. |
| | **29** Government must establish effective permanent mechanisms for obtaining and disseminating information about managing programmes and projects. | Centre for Management and Policy Studies will use the OGC database as a learning resource in training events. |
| | **30** The Government must construct a system for gathering, maintaining and sharing information about the progress of projects. | Handover to OGC of review team database and specification in May 2000.<br>Questionnaire sent to departments via IAGC in September.<br>OGC developed database in December 2000. |

**Source: Great Britain, Cabinet Office, *Progress Report on 'Successful IT: Modernising Government in Action'*. (London, Cabinet Office, 29/12/2000). http://www.e-envoy.gov.uk/reports-top/$file/successfulit_menu.htm, downloaded 12th January 2004.**

Pinder also reported on the remaining 11 recommendations, which required action by Government Departments and Agencies, as shown at Table 4.5. A 'Schedule of Outcomes' was set up to monitor progress, identifying action points and milestones for each of the recommendations, while the SPRITE (Successful Projects in an IT Environment) programme was developed to oversee the implementation.[20] SPRITE consisted of three work streams: business focus and direction; people and resources; and tools and techniques. Between them, they supported ten projects, which were considered critical to embedding McCartney's recommendations into working practices and culture.[21]

**Table 4.5. McCartney Recommendations: Outstanding Actions (December 2000)**

| Areas of Concern | Recommendations |
|---|---|
| **Leadership and Responsibility** | **4** Professional development events for ministers and senior civil servants will include informing them of their role in, and responsibility for, major IT projects and programmes. |
| | **5** All IT-supported change projects or programmes must have a single, named, Senior Responsible Owner (SRO). |
| **Project Management** | **7** The SRO for a project should remain in place throughout or change only when a distinct phase of benefit delivery has been completed. |
| | **8** The SRO of each project must ensure that a formal approach to project management, such as Prince 2, is applied |
| **Modular and Incremental Development** | **12** Departments and agencies must adopt a modular and/or incremental approach to projects, unless there are very strong reasons for not doing so. The approach to be taken must be clearly documented. |
| **Benefit Realisation** | **14** All major projects or programmes must undertake periodic reviews of proposed benefits throughout development and implementation. |
| | **15** A post-implementation review must be undertaken and benefits realised assessed against projected benefits outlined in the original business case. |
| **Procurement and Supplier Relationships** | **20** Departments and agencies must ensure that they put in place processes that will actively encourage co-operation and open a dialogue between supplier and client. |
| | **21 Part 1**: Before contracts are signed, suppliers must have produced a realistic plan, including timescales, resources and technology.<br>**21 Part 2:** Guidance for departments on how to evaluate such plans should be developed, initially by the Treasury Task Force and then by OGC. |
| **Cross-Cutting Initiatives** | **23** Cross-cutting projects and programmes must have a unified, regularly updated business case. |
| **People and Skills** | **26** The work on Civil Service Reform should explicitly take into account the McCartney study. |

**Source: Great Britain, Cabinet Office, *Progress Report on 'Successful IT: Modernising Government in Action'*. (London, Cabinet Office, 29/12/2000). http://www.e-envoy.gov.uk/reports-top/$file/successfulit_menu.htm, downloaded 12th January 2004.**

By the time Pinder reported, just five months after the Report had been published, the majority of departments and agencies had appointed SROs for their high profile projects, several departments had appointed programme managers to implement the recommendations, Ministers were being kept informed and centres of expertise for project and programme management were being set up.[22] Government was evidently eager for action and determined to demonstrate its faith in McCartney. At the end of his initial progress report, Pinder wrote, "the process of implementing the recommendations cannot be allowed to stagnate".[23] He promised diligence in following the progress of the McCartney Report via the annual *UK On-Line Report*.[24] Ironically, this document appeared only twice, in 2001 and 2002.

The demise of the reporting process muddies the McCartney trail, compounded by responsibility moving from the Cabinet Office to the Office of Government Commerce (OGC) in 2001.[25] An independent office of the Treasury, the OGC was established in April 2000 to improve central government procurement processes, make e-government a reality and manage individual IT projects. Responsibility for McCartney was thought to align more comfortably with this remit than with the e-Envoy's more strategic role of overseeing the UK's place in the online economy. However, this change of ownership did not improve overall governance for its implementation. Neither the Treasury nor the Cabinet Office has the over-arching authority or power to direct the actions of other departments.[26] This means that they cannot intervene with IT projects in individual departments; they can only issue guidance, provide advice or attempt to promulgate best practice.[27] Therefore, McCartney's recommendations continued to be suggestions rather than demands.

As part of the new remit, the OGC took responsibility for the SPRITE programme, which was formally closed in March 2003 with any remaining work incorporated into ongoing OGC programmes. Responsibility for the McCartney Report was further convoluted by the departure of the e-Envoy in 2004, resulting in the reconfiguring and re-labelling of his Office as the 'E-Government Unit'. Pinder's replacement was Ian Watmore, previously UK Managing Director of the consultancy firm, Accenture, an appointment reflecting the Government's decision to recruit private sector specialists to its ranks.[28] He later assumed the title of CIO concerned with delivering central government IT, narrower than Pinder's e-Envoy role. Critical to the progress of the McCartney Report, Watmore assumed responsibility for IT finance, working in partnership with the OGC to monitor major IT projects in government, to advise on major investment decisions and to manage the top-level relationship with strategic suppliers to government.[29]

Just over a year later, Watmore was appointed Head of the Prime Minister's Delivery Unit (PMDU), established in 2001 to strengthen the Government's ability to deliver key public service priorities.[30] In terms of the continued implementation of

McCartney's recommendations, he retained overall management responsibility for the incoming CIO, John Suffolk, former Director General of Criminal Justice IT.[31] The progress of McCartney's recommendations was diverted and eventually overtaken by subsequent initiatives. However, it had highlighted a number of CSFs for IT project management in government and initiated action to address them. Its legacy is the strengthening of top top-level leadership and accountability for IT projects as a result of two specific recommendations: that every project should have an SRO and that every project should be independently reviewed at critical stages. These initiatives are discussed in greater detail in Sections 4.2.2 and 4.2.3 below following a broad discussion of the content of the McCartney Report.

### 4.2.1. McCartney: Sections and Recommendations

The McCartney Report is divided into ten sections, each meriting around five pages of text and outlining between three and four recommendations, giving a balanced presentation with no section appearing more important than the next. The first section discusses Business Change, making three recommendations to increase the certainty of business benefit: two concern improving business development skills and one achieving the business objectives of an IT project. Lack of business competence results in uninformed business decisions with business cases being used simply to gain investment rather than as living documents monitoring progress towards the business goals. McCartney's declaration that "overall responsibility for delivering the business objectives and benefits…must be invested in a single, responsible and visible individual, the Senior Responsible Owner (SRO)" led to the second section, Leadership and Responsibility, with three recommendations concerning the lack of active ownership for IT projects.[32] These include the SRO initiative, which is discussed in Section 4.2.2 below, and the need to improve competence and capacity in this area.

McCartney claimed that "ineffective project management has frequently been a major contributing factor in the failure of projects".[33] As discussed in Chapter Two, the Civil Service favours skills in policy or operations, which do not readily translate to managing complex IT projects. Recommendations 8 to10, therefore, were concerned with ensuring a formal approach to project management: adopting PRINCE 2

(PRojects IN Controlled Environments 2) (Recommendation 8); undertaking formal project management training (Recommendation 9); and assessing in-house project management skills and experience against the perceived difficulty of the project (Recommendation 10).

The fourth section, Risk Management, links to both Project Management and Business Change: project management should be focused on business change and any perceived risks to achieving that change must be managed. In the face of a plethora of guidelines, the quality of Risk Management across government was considered highly variable, suggesting that the guidance might not be fit for purpose. Recommendation 11 requires improved methods of problem reporting and upward referral, so giving greater clarity, along with the need to enhance skills in this area.

In terms of managing risk, McCartney notes that projects consisting of a series of smaller steps are more likely to succeed. Despite the focus on failure in this study, it is recognised that there are numerous successful public sector IT projects but these tend to be smaller, more tightly controlled and with specific targets.[34] For example, the Driver and Vehicle Licensing Agency (DVLA) has had several IT-related successes, as have many local authorities and some NHS Trusts.[35] It is widely recognised that IT mega-projects are far more likely to fail and that a high proportion of government projects are, by necessity, very large.[36] As discussed in Chapter Two, this is partly due to the tendency to centralise government services in the UK and partly due to political 'hyperactivism'. A change in taxes or benefits, for example, is likely to involve thousands of new procedures, interacting in unpredictable ways and resulting in highly complex, bespoke software.[37] In Recommendations 12 and 13, McCartney urges the adoption of Modular and Incremental Development, dividing complex projects into stages, which can be delivered separately using modular or incremental approaches, so introducing greater scalability and flexibility.

The section on Benefit Realisation links back to Business Change, highlighting poor systems to track benefits delivery and the lack of central reporting, making it impossible for project managers to learn from past projects. In Recommendations 14-18, McCartney requires improvements in the measurement and realisation of benefits, better processes and the facilitation of knowledge transfer in this area. He proposes a process termed the Post-Implementation Review (PIR) to check the delivered benefits against the benefits outlined in the business case. However, benefits can only be realised with the assistance of the suppliers, discussed in the seventh section, Procurement and Supplier Relations. Recommendations 19 to 22 are aimed at improving interactions with IT suppliers: providing clear policy and guidance on IT procurement for government agencies and departments; improving communications with suppliers; ensuring that suppliers have realistic project plans and that government has the capability to assess their viability; and, finally, providing intelligence on the top ten suppliers of IT to government by volume and value of business.

Complex IT projects in the public sector often cut across many different agencies, making leadership difficult. The failed Benefits Card Project, for example, was led by two organisations, the Department of Social Security (DSS) and the Post Office, each with their own distinct aims.[38] Even when a single organisation is involved, public sector projects have inherently more complex criteria for success than those in the commercial sector, which tend to be judged by return on investment. Obligations to provide a universal service and political desires to maintain employment can conflict with a project's original business case. McCartney recognises these issues in Section Eight, Cross Cutting Initiatives. Recommendation 23 states the need for a unified, regularly updated business case monitored by an SRO and with clear allocation of responsibility.

The Report then highlights skills shortages in section nine, People and Skills. As discussed in Chapter Two, there was an identifiable community of IT professionals in the public sector in the 1980s with a recognised career path, training opportunities and promotion possibilities.[39] With the outsourcing agenda of the 1990s, this community was lost, making it difficult for government to compete with private sector salaries in order to attract IT professionals back into the public sector.[40] The skills listed in the McCartney report are taken from a study conducted by Feeny and Willcocks, which identifies nine core clusters that an organisation must retain internally:

1. Leadership;
2. Business systems thinking;
3. Relationship building;

4. Architecture planning;
5. Making technology work;
6. Informed buying;
7. Contract facilitation;
8. Contract monitoring; and
9. Vendor development.[41]

Recommendations 24 to 27 are about providing the competence and capacity to deliver major IT-enabled projects. The final section, Learning Lessons, is again about improving performance through enhanced development and skills. Recommendations 29 and 30 concern “the need for mechanisms to ensure that best practice and good advice are readily available and easy to use”.[42] Recommendation 28 suggests the draft peer review process, which later became the Gateway Review Process, discussed below, along with the other key initiative, the establishment of the SRO role.

### 4.2.2. Senior Responsible Owners

McCartney highlighted that civil servants are inexperienced at running IT projects and, related to this, that there is no senior figure capable of taking control when a project goes awry. To this end, Recommendations 4 to 7 consider the lack of active ownership by senior management.[43] To overcome this problem, McCartney identified the need for an SRO as the business sponsor of the project, a critical role used in the project management methodology, PRINCE 2. In order to ensure that objectives are met and benefits delivered, the SRO needs to stay in post throughout the project or to move only at a sensible point in its lifecycle. The role of the SRO is identified as oversight of the project brief and business case; ensuring that there is a coherent project organisation structure and logical plan; controlling the progress of the project at the strategic level; closing the project, ensuring that the lessons are documented and that there is a post-implementation review.[44] Finally, the SRO should refer serious problems to top management and/or ministers.[45]

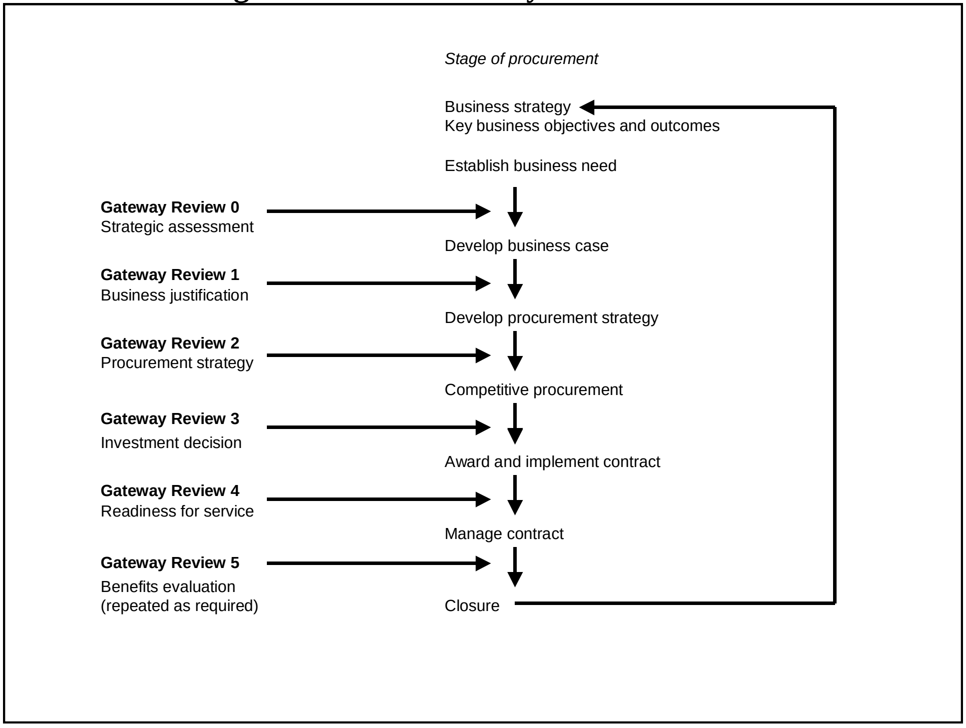
All projects now have senior level ownership. However, in 2005, John Higgins, Director General of the IT trade association, Intellect, noted that: “the Senior Responsible Owner has to be someone who has responsibility for operational objectives, it can't just be the IT director."[46] The SRO should have the right skill set and personality to represent the service benefits of the project.[47] In 2007, Tony Collins, then *Computer Weekly's* commentator on public sector IT projects, reviewed the creation of this role as "a corrective to flawed custom".[48] However, like Higgins, he questioned some of the appointments, noting the tendency to appoint civil servants who were due to leave or retire before project completion; to appoint multiple responsible owners; or to give responsibility for a mission critical or high risk project to someone in their first SRO role.[49] His comments suggest a continued lack of understanding of the importance of this role. However, in May 2010, the newly elected Coalition Government reinforced the role and, in particular, the need to keep the SRO in post for the life of the project.[50]

### 4.2.3. Gateway Reviews

Recommendation 28 made the OGC responsible for implementing a peer review process, considered by some to be the most effective of McCartney's initiatives. Based on an idea borrowed from the oil industry, the Gateway Review process was introduced in February 2001 to ensure the continued viability of projects by scrutinising them at six key Gateways, as shown at Fig. 4.2. Participation in this process is based on the perceived risk of the project, rather than the cost, which is tested against the OGC's Project Profile Model (PPM).[51] The quality of the subsequent review depends on the independent review team, three to five people with a minimum of five years experience of managing £100 million projects.[52] The Review takes three to five days, awarding projects either a red, amber or green colour code: red requires remedial action; amber allows a project to go forward with actions required; and green indicates that it is on target, although it may still receive recommendations.

There is much anecdotal evidence of the benefits that this process brings but it is difficult to find supporting figures. The NAO reported in *Improving IT Procurement* that 440 Gateway Reviews had been conducted on 254 projects between February 2001 and March 2004 with three quarters of the Departments rating them as either useful or very useful.[53] Of the projects reviewed at this time, 28% were in the red category, 50% were amber and only 22% were green.[54] However, 30% had bypassed

**Figure 4.2. The Gateway Review Process**




**Source: Great Britain, Parliamentary Office of Science and Technology, *Government IT Projects*, Report 200, (London, HMSO, 2003), page 19.**

the first two Gateway Reviews and entered the process after the business case had been prepared.[55]

The SRO and the project team are responsible for enacting the recommendations of a Review, although they are not compulsory. In 2006, it was reported that eight projects had received two successive red gates since April 2003.[56] In this instance, the only action available to the OGC is to inform the Prime Minister. In 2005, the PAC published *The Impact of OGC Initiatives on the Delivery of Major IT-Enabled Projects*, recommending that the Treasury should withhold funds from IT projects where departments consistently ignore the Gateway process and increase their risk of failure.[57] This action has not been taken and it is likely that a project in difficulty requires a very different kind of intervention.

Gateway Reviews are conducted on a confidential basis to encourage an open and honest process; very often, even the suppliers are excluded from the results.[58] There is also no requirement for Parliament to be given timely or accurate information on IT projects.[59] The OGC collates the results of the Gateway Reviews, identifying trends and lessons but these analyses are not published. In 2004, the NAO reported that the common issues raised in Gateway Reviews have remained broadly similar since their inception: the need for involvement of key stakeholders; the clearer identification of the roles and responsibilities of departments and suppliers in the governance of IT-enabled projects; improved development of business cases, particularly scope and content; better risk management; and improved skills and resources, including resource planning, succession planning, and the quantity and quality of suitably skilled staff.[60]

There has been a great deal of pressure from MPs, the Press and the public to release the findings of the Gateway Reviews. Following a Freedom of Information (FoI) request in 2005, the OGC was forced to publish details of its ten most at risk IT projects, although they were not named.[61] In addition to the eight revealed by the NAO in 2004, they had all received consecutive red lights.[62] Then, in 2009 after a four-year appeal under FoI, the OGC was forced to publish two early Gateway Reviews on the Identity Card Project.[63] Later that year, the Information Commissioner's Office ordered the publication of Gateway Reviews for several multi-billion pound government IT projects, believing that the 'public interest disclosure' outweighs the benefit of keeping the information out of the public domain.[64]

### 4.2.4. McCartney: A Report with No Teeth?

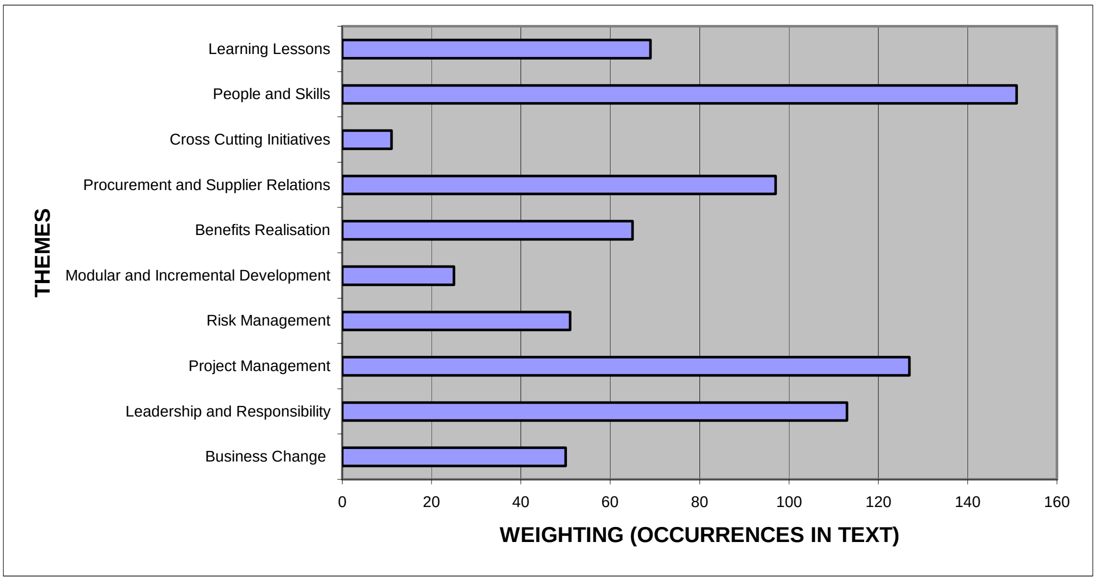
There is no doubt that the McCartney Report was authoritative. Based on sound work by experienced IT professionals, it contained many important elements of best practice but has not prevented flawed IT projects. Audit reports show that projects such as the Criminal Records Bureau, the Child Support Agency, Tax Credits, the National Programme for IT in the NHS and the National Air Traffic Services have repeated mistakes from past project failures.[65] The problem is that no penalties are imposed on departments and agencies that ignore or disregard McCartney or that are seen to repeat the very problems that McCartney highlighted. Similarly, although the OGC has had an important influence on best practice, too many of its recommendations are also optional. There appears to be a lack of governance in government.

In the US, the IT Management Reform Act (ITMRA, the so-called Clinger-Cohen Act) was introduced in 1996 under the Clinton administration. This legislation was designed to reduce the number of IT disasters by forcing adherence to best practice, recognising the lack of accountability along with the culture of secrecy and cover-up.[66] All government agencies in the US are required to have a CIO, who reports to Congress if their IT Project suffers major deviations from contract or price. Many issues similar to those raised by McCartney are covered by this legislation, such as incremental acquisition, purchasing Commercial-Off-the-Shelf (COTS) IT rather than developing bespoke, and designing and implementing IT management processes that maximise value but also take account of risk.

The Clinger-Cohen Act went through the US Senate four years before McCartney declared that the UK Government “will not tolerate failure”.[67] However, this intolerance did not prompt similar legislative action in the UK. In retrospect, this may have been fortuitous. In many quarters, the Clinger-Cohen Act is considered a failure with most criticism surrounding the CIO role.[68] In 2010, it was reported that CIOs often lack relevant experience and leave too quickly to make a difference; the average tenure is two years.[69] They do not report to the head of their agency nor do they have budgetary authority.[70] Relevant and appropriate skills remain an issue. In 2010, fourteen years after its inception, it was reported that government IT managers "routinely do not follow even some of the more basic project management practices”.[71]

This question of skills dominates the McCartney Report. The initial content analysis, described in Chapter Three, Section 3.4.1, involved selecting the relevant meaning units and then sorting them against the ten themes. Despite the balanced presentation of the themes, this process reveals the emphasis on People and Skills, as shown at Figure 4.3, which permeates the discussion of the other nine themes. For example, the discussion of Business Change highlights the lack of business development skills; Leadership and Responsibility talks about professional development; Project

**Figure 4.3. McCartney Report: Content Analysis**




**Source: Author**

Management and Risk Management focus on the lack of skills in these areas. In his foreword, McCartney notes, "we still need to improve performance and avoid the mistakes of the past".[72] Although the report is usually acclaimed for putting the focus on to business change, it is evident that the substance of the Report is the need for much higher levels of competence in government and the capacity, in terms of the right people in the right numbers, to deliver this competence. However, Fig 4.3 also highlights an emphasis on Procurement and Supplier Relations with government needing the skills to manage suppliers but also the need for improved performance from the suppliers themselves. Overall, it is evident that IT projects require significant skills and experience on the part of both government and their suppliers if they are to be delivered successfully. How then do the nine subsequent reports compare with McCartney and does this theme persist throughout the six years under examination?

## 4.3. Reporting on Failure: Successful IT to Delivering IT-Enabled Change

The McCartney Report opened the floodgates for a number of other reports, published by reputable bodies and appearing at the rate of one or two a year. Like McCartney, their purpose was to discover why projects fail and to identify actions to improve the chances of success. Understanding what has worked previously and what has not, as well as identifying residual problems is key to evolving a more effective approach. Therefore, in this section, each of the nine selected reports is overviewed in terms of provenance, purpose, evidence and content, whilst an analysis is carried out of how it compares or contrasts with McCartney in terms of the themes that are tackled.

### 4.3.1. Organisation for Economic Co-Operation and Development (OECD): *The Hidden Threat to E-Government: Avoiding Large Government IT Failures*, 2001

The OECD provides a focus for those countries committed to democracy and the market economy as a means of supporting sustainable growth. This report takes an international and cross-cultural view, providing an interesting contrast to McCartney's national focus. It resulted from concerns about the ability of governments around the world to manage IT projects, posing a serious threat to the implementation of e-Government with its potential efficiency savings. Its overarching message is that:

> The general lesson is not that governments should not take any risks; rather, governments must identify risk, determine which risks they are willing to take, and manage the relevant risk within appropriate governance structures.[73]

The report is divided into eight themes with one key recommendation for each. These are shown at Table 4.6, along with the highlights of the report, annotated with McCartney's section headings in order to compare and contrast the content. The underpinning evidence was derived from analysis of selected reports together with a workshop involving representatives from 17 countries.

The focus on risk in this report sends a very different message to McCartney's insistence on IT-enabled change projects. It also places far more emphasis on the public sector context, seen as making project management more complex, challenging and, therefore, more risky. This issue of context is considered to some extent in McCartney (Sections 5, 8 and 9) but is not seen as a major contributory factor to IT project failure. In the first section of the OECD report, three key areas relating to the public sector context are discussed, along with a concern that civil servants and politicians are held accountable for projects over which they may have had very little influence. The second section, 'Dolphins, Not Whales', relates to McCartney's

**Table 4.6. OECD: The Hidden Threat to e-Government**

| Theme and Recommendation | Content |
|---|---|
| Face Governance Facts<br>*(Leadership and Responsibility)*<br>**Establish appropriate governance structures** | • Policy change can result in major changes in IT.<br>• Rapid initiation of legislation makes it difficult to develop and implement supporting IT.<br>• Public sector standards of accountability and transparency mean that failure is likely to be widely publicised. |
| Dolphins not Whales<br>(*Modular and Incremental Development*)<br>**Think small** | • Public sector budgeting methods encourage large projects; smaller projects are less likely to command the required attention during budget negotiations.<br>• Large projects are seen as more politically advantageous, providing indisputable evidence of political action.<br>• Government is very big business due to its customer base and the extent of its services, so has to embark on large IT projects. |
| Avoid Emerging Technologies<br>**Use known technologies** | • May enable IT to be implemented without making radical changes to business processes.<br>• Leading edge technology is more prone to failure: the promise of increased benefits brings its own risk.<br>• Use well-proven approaches and standard software: COTS rather than bespoke.<br>• If new technology is unavoidable, then test it before contract award in order to identify, assess and manage the associated risks. |
| Identify and Manage Risks<br>(*Risk Management*)<br>**Identify and manage risk**<br>**Ensure compliance with best practices for project management** | • Many governments have well-developed guidelines and practices on managing risk but poor compliance.<br>• Use independent reviews at key stages of a project. |
| Strengthen Leadership and Accountability, and Focus on Business Change<br>(*Leadership and Responsibility; Business Change*)<br>**Hold business managers accountable** | • The IT project as business project.<br>• The need for a single senior official with overarching and final responsibility.<br>• If IT is critical to the public sector, then this must be reflected in how it is managed. |
| Manage Knowledge and Human Resources<br>(*People and Skills*)<br>**Recruit and retain talent**<br>**Prudently manage knowledge** | • The lack of IT skills in the public sector.<br>• The difficulty in recruiting well qualified talent due to lower wages, loss of prestige and the mundane duties associated with public sector service. |
| Manage External Providers<br>(*Procurement and Supplier Relations*)<br>**Establish environments of trust with private vendors** | • Outsourcing IT provision may not be the solution to the skills deficit as public servants are likely to also lack the skills to manage the processes of procurement, development and implementation.<br>• The different cultures between government and supplier and their mutual scepticism about capabilities and honesty. |
| Involve End-Users<br>(*People and Skills*)<br>**Involve end users** | • The impact on people and their jobs requires a comprehensive strategy for managing change, communication, consultation and participation in order to build ownership and commitment. |

**Source: OECD, *The Hidden Threat to E-Government: Avoiding Large Government IT Failures,* OECD Public Management Policy Brief, PUMA Policy Brief No 8, March 2001, http://www.oecd.org/dataoecd/19/12/1901677.pdf, downloaded 24th November 2010**

Modular and Incremental Development theme. The third section urges the avoidance of emerging technologies, which the public sector has a tendency to prefer as they promise better solutions and, potentially, more innovative possibilities for business change, as discussed in Chapter Two. This leads to the fourth section, which concerns the identification and management of that risk. The OECD notes that many governments have well-developed guidelines and practices but poor compliance, a problem also highlighted in the McCartney Report. Following the McCartney lead, it highlights the utility of independent reviews at key stages of a project but only "if project management deals promptly and thoroughly with the issues raised".[74]

The section entitled 'Strengthen Leadership and Accountability, and Focus on Business Change' confirms McCartney's view of the IT project as business project and, therefore, the need for a single senior official with overarching and final responsibility, McCartney's SRO. If IT is critical to the public sector, then this must be reflected in how it is managed and failure to do so may be due to the lack of IT skills in the public sector, reinforcing McCartney's view. This is discussed in 'Manage Knowledge and Human Resources', while the seventh section, 'Manage External Providers', notes that outsourcing IT provision may not be the solution to the skills deficit as public servants also lack the skills to manage the processes of procurement, development and implementation. This creates a so-called 'asymmetric relationship' between government and the supplier, exacerbated by the different cultures and their mutual scepticism about capabilities and honesty.

Another key difference with the McCartney report is the emphasis on the end-user and the need for stakeholder management, which is covered in Section Eight, Involve End-Users. By and large, McCartney is focused on the project team and its capabilities, while the OECD highlights the wider impact on people and their jobs. It notes the need for a comprehensive strategy for managing change, communication, consultation and participation in order to build ownership and commitment.

Overall, the OECD highlights and reinforces many of the themes identified in the McCartney Report, demonstrating that these apply internationally and not just in the UK. Its main focus is risk and it urges governments to learn how to manage that risk, rather than avoiding it, reinforcing the need for the right competence and capacity within the public sector and underlining McCartney's concern with People and Skills. However, in addition to this, the concern that permeates the OECD Report is the public sector context and how that brings an additional layer of complexity, as discussed in Chapter One, and how increased complexity brings risk.

### 4.3.2. Intellect: *Getting IT Right for Government*, 2002

Intellect represents 1000 companies in the UK IT, Telecommunications and Electronics industries. It published two reports in relation to IT project failure in 2002 and 2003. This first is closely linked to the McCartney Report with the purpose of presenting the supplier view. It is the work of a group of key public sector suppliers, based on data gathered via a survey and 30 relevant publications. It covers three key areas: managing business change programmes, the government context and making government projects successful.

The discussion concerning the management of business change reinforces McCartney's headline message and argues for a shift in focus from technology to the wider government organisation and its need for better services, improved efficiency and the implementation of policy. Projects need to be embedded in their organisations, receiving support from all levels and involving everyone affected by them. In terms of the government context, the report calls for mandatory adoption of best practice, pointing to the plethora of excellent guidelines and procedures covering every aspect of IT procurement. This is supported by a list of lessons learned provided by the suppliers, derived from a wide range of projects. They highlight the need for project planning, identification of risks, managing the contract, an improved supplier attitude, controlling change, improving supplier relationships, managing the project team, testing and acceptance, improved project design and strategies for user involvement.

This report pays particular attention to the contract, including the need for an accurately specified contract requirement capable of anticipating change and managing change. In large projects, this is linked to the need for a partnering relationship with the contractor, which means working closely together, good communications and the ability to share both risks and reward. The report also notes the link between stakeholder involvement and an empowered champion at senior level showing leadership and commitment. Change needs to be controlled with the business focused on realistic user expectations. If users are involved throughout the project with clear communication between users, customer and supplier, then system acceptance is more likely.

The lack of project management skills in government impacts negatively on business change programmes. The project team must be competent, professional and stable with relevant experience of appropriate tools and methodologies. The report highlights the need to acquire these skills and to create a career path for experienced specialists. In addition, the team needs a sound motivation to succeed and needs to be led by a strong, experienced project manager who appreciates the business drivers and has the right level of authority. In line with McCartney, the report suggests the need for gateway reviews but only if they have the right level of governance. Major projects should be split into stages with each delivering value. Ideally, a core capability should be delivered first, providing the foundation for other business functionality. This modular approach should be matched by an incremental payment scheme agreed by both parties. However, the report acknowledges that it is sometimes cheaper to go for COTS and to redesign business processes to suit.

As discussed in Chapter Two of this study and picking up on the work of the OECD, the third chapter of this report discusses the uniqueness of the public sector business environment, producing the list shown at Table 4.7, reproduced from Chapter Two. It notes that responsibility, accountability and authority for government projects is often split between individuals and groups, making strong leadership difficult and creating a culture where the emphasis is on avoiding blame if things go wrong, rather than getting things right. IT suppliers need to recognise the constraints and drivers of the civil service. In turn, government should adapt its culture and processes if they are creating barriers. The report points to a culture of risk aversion, leading to rigid management of suppliers which restricts their ability to bring their full capabilities to bear and creates unnecessary tensions, preventing openness. In turn, IT suppliers can be over-optimistic in planning major programmes and may have false expectations. The report calls for the negative perceptions between government and industry to be broken down.

**Table 4.7. Private and Public Sector Projects Compared**

| Successful Private Sector Projects | Successful Public Sector Projects |
|---|---|
| Focused on measurable financial and service outcomes | Multiple aims so hard to measure |
| Business driven by competition | Generally not in competition with other projects |
| Often not visible to the public or shareholders | Highly visible to the public and the media |
| Less constrained by legislation and regulations | Constrained by UK and EU legislation |
| Open to risk taking | Managed in a risk averse culture |
| Designed to limit damage when they are in difficulty | Difficult to adapt to change because of scale and complexity |
| | Likely to interact with other departments |

**Source: Intellect, *Getting IT Right for Government*, (London, HMSO, 2000).**

In comparison with McCartney and the OECD, there are different emphases here but also some similarities. Intellect puts more emphasis on the supplier relationship and the different cultures between private and public sector. Again, the view is much wider than McCartney's, looking at the organisational factors and beyond, not just at the project. However, it reinforces all of McCartney's section headings and expands on many of his ideas.

### 4.3.3. Office of Government Commerce (OGC): *Common Causes of Project Failure*, 2002

Rather than being specifically about IT project management, this is a general report on project management in government. As such, it technically breaks the rules for inclusion in this study. However, it was published by the OGC, which had taken over responsibility for McCartney's recommendations in 2001. It identifies the common causes of project failure, which had ostensibly been done by McCartney two years previously, and then links them to key questions for project managers and SROs, designed to test the viability of their projects. It is, therefore, an important document. There is no explanation of the derivation of the eight common causes identified but given that they were agreed with the NAO, it is likely that they are based on the findings of the many NAO reports on project failure. They are shown at Table 4.8 with the associated questions, both linked to McCartney's themes in order to aid analysis. The report highlights the importance of not only delivering business benefits but also aligning those benefits across other related projects (Cross Cutting Initiatives) to create greater consistency and coherence.

**Table 4.8. OGC: Common Causes of Project Failure**

| | |
|---|---|
| **1. Lack of clear links between the project and the organisation's key strategic priorities, including agreed measures of success**<br><br>**(*Benefits Realisation*)** | Do we know how the priority of this project compares and aligns with our other delivery and operational activities? (*Cross-Cutting Initiatives*)<br>Have we defined the CSFs for the project? (*Benefits Realisation*)<br>Have the CSFs been agreed with suppliers and key stakeholders? (*Benefits Realisation/Procurement and Supplier Relations/Leadership and Responsibility*)<br>Do we have a clear project plan that covers the full period of the planned delivery and all business change required, and indicates the means of benefits realisation? (*Project Management/Business Change/Benefits Realisation*)<br>Is the project founded upon realistic timescales, taking account of statutory lead times, and showing critical dependencies such that any delays can be handled? (*Project Management*)<br>Are the lessons learned from relevant projects being applied? (*Learning Lessons*)<br>Has an analysis been undertaken of the effects of any slippage in time, cost, scope or quality? (*Project Management; Risk Management)* |
| **2. Lack of clear senior management and Ministerial ownership and leadership**<br><br>***(Leadership and Responsibility)*** | Does the project management team have a clear view of the interdependencies between projects, the benefits and the criteria against which success will be judged? (*Cross-Cutting Initiatives/Benefits Realisation*)<br>If the project traverses organisational boundaries, are there clear governance arrangements to ensure sustainable alignment with the business objectives of all organisations involved? (*Cross-Cutting Initiatives/Leadership and Responsibility/Benefits Realisation*)<br>Are all proposed commitments and announcements first checked for delivery implications? (*Leadership and Responsibility*)<br>Are decisions taken early, decisively and adhered to, in order to facilitate successful delivery? (*Leadership and Responsibility*)<br>Does the project have the necessary approval to proceed from its nominated Minister either directly or through delegated authority to a designated Senior Responsible Owner (SRO)? (*Leadership and Responsibility*)<br>Does the SRO have the ability, responsibility and authority to ensure that the business change and business benefits are delivered? ) (*Leadership and Responsibility/Business Change/ Benefits Realisation*)<br>Does the SRO have a suitable track record of delivery? Where necessary, is this being optimised through training? (*Leadership and Responsibility/People and Skills*) |
| **3. Lack of effective engagement with stakeholders**<br><br>***(People and Skills)*** | Have we identified the right stakeholders? (*People and Skills*)<br>Have we, as intelligent customers, identified the rationale for doing so (e.g. the why, the what, the who, the where, the when and the how)? (*People and Skills*)<br>Have we secured a common understanding and agreement of stakeholder requirements? (*Project Management*)<br>Does the business case take account of the views of all stakeholders including users? (*People and Skills/Benefits Realisation*) |

| | |
|---|---|
| | Do we understand how we will manage stakeholders (e.g. ensure buy-in, overcome resistance to change, allocate risk to the party best able to manage it)? (*People and Skills; Risk Management)*<br>Has sufficient account been taken of the subsisting organisational culture? (*People and Skills/Business Change*)<br>Whilst ensuring that there is clear accountability, how can we resolve any conflicting priorities? (*Leadership and Responsibility/Project Management*) |
| **4. Lack of skills and proven approach to project management and risk management**<br><br>***(Project Management/Risk Management)*** | Is there a skilled and experienced project team with clearly defined roles and responsibilities? If not, is there access to expertise, which can benefit those fulfilling the requisite roles? (*Project Management/People and Skills*)<br>Are the major risks identified, weighted and treated by the SRO, the Director and Project Manager and/or project team? (*Leadership and Responsibility/Risk Management)*<br>Has sufficient resourcing, financial and otherwise, been allocated to the project, including an allowance for risk? (*Project Management/Risk Management*)<br>Do we have adequate approaches for estimating, monitoring and controlling the total expenditure on projects? (*Project Management)*<br>Do we have effective systems for measuring and tracking the realisation of benefits in the business case? (*Project Management/Benefits Realisation*)<br>Are the governance arrangements robust enough to ensure that "bad news" is not filtered out of progress reports to senior managers? (*Leadership and Responsibility/Risk Management)*<br>If external consultants are used, are they accountable and committed to help ensure successful and timely delivery? (*Procurement and Supplier Relations*) |
| **5. Too little attention to breaking development and implementation into manageable steps**<br><br>***(Modular and Incremental Development)*** | Has the approach been tested to ensure it is not 'big-bang' (e.g. in IT-enabled projects)? (*Modular and Incremental Development*)<br>Has sufficient time been built-in to allow for planning applications in Property & Construction projects for example?<br>Have we done our best to keep delivery timescales short so that change during development is avoided? (*Project Management/Risk Management*)<br>Have enough review points been built-in so that the project can be stopped, if changing circumstances mean that the business benefits are no longer achievable or no longer represent Value for Money (VfM)? (*Project Management*)<br>Is there a business continuity plan in the event of the project delivering late or failing to deliver at all? (*Risk Management*) |

| | |
|---|---|
| ***5.*** **Evaluation of proposals driven by initial price rather than long-term VfM (especially securing delivery of business benefits)**<br><br>***(Procurement and Supplier Relations)*** | Is the evaluation based on whole-life VfM, taking account of capital, maintenance and service costs? (*Project Management*)<br>Do we have a proposed evaluation approach that allows us to balance financial factors against quality and security of delivery? (*Benefits Realisation/Risk Management*)<br>Does the evaluation approach take account of business criticality and affordability? (*Benefits Realisation/Risk Management*)<br>Is the evaluation approach business driven? *(Benefits Realisation)* |
| ***6.*** **Lack of understanding of, and contact with the supply industry at senior levels in the organisation**<br><br>***(Procurement and Supplier Relations/Leadership and Responsibility)*** | Have we tested that the supply industry understands our approach and agrees that it is achievable? (*Procurement and Supplier Relations*)<br>Have we asked suppliers to state any assumptions they are making against their proposals? (*Procurement and Supplier Relations*)<br>Have we checked that the project will attract sufficient competitive interest? Are senior management sufficiently engaged with the industry to be able to assess supply-side risks? (*Procurement and Supplier Relations/Leadership and Responsibility/Risk Management*)<br>Do we have a clear strategy for engaging with the industry or are we making sourcing decisions on a piecemeal basis? (*Procurement and Supplier Relations*)<br>Are the processes in place to ensure that all parties have a clear understanding of their roles and responsibilities, and a shared understanding of desired outcomes, key terms and deadlines? (*Procurement and Supplier Relations*)<br>Do we understand the dynamics of industry to determine whether our acquisition requirements can be met, given potentially competing pressures in other sectors of the economy? (*Procurement and Supplier Relations; People and Skills)* |
| ***7.*** **Lack of effective project team integration between clients, the supplier team and the supply chain**<br><br>***(Procurement and Supplier Relations)*** | Has a market evaluation been undertaken to test market responsiveness to the requirements being sought? (*Procurement and Supplier Relations*)<br>Are the procurement routes that allow integration of the project team being used? (*Procurement and Supplier Relations*)<br>Is there early supplier involvement to help determine and validate what outputs and outcomes are sought for the project? (*Procurement and Supplier Relations/Benefits Realisation*)<br>Has a shared risk register been established? (*Procurement and Supplier Relations/Risk Management*)<br>Have arrangements for sharing efficiency gains throughout the supply team been established? (*Procurement and Supplier Relations*) |

**Source: Author**

The resulting questions focus on the process for doing this along with the competence and capacity of the project team, asking about some of the basic skills of project management, such as setting and agreeing the CSFs, having a clear and realistic plan that delivers the desired benefits and being aware of how to counteract any constraints in terms of time, cost or scope. The second cause of failure looks at Leadership and Responsibility, again picking up on Cross Cutting Initiatives and Benefits Realisation. The questions consider the interdependencies between projects and benefits, but also the clarity and perception of the CSFs, governance arrangements for cross-cutting initiatives, decision making, approval for projects from senior personnel and the inevitable requirement for skills. The basic steps of stakeholder management are detailed: identifying, engaging and managing the stakeholders, having a clear rationale for the project, capturing requirements and taking organisational culture into account. This was discussed explicitly in the OECD report but only implicitly in McCartney.

However, there is clear reflection of McCartney's sections on Project Management and Risk Management. The questions concern the competence and capacity of the commissioning organisation but also of any external consultants, highlighting the need for risk and project management processes, including governance arrangements, and the requirement for sufficient resources, budget control and benefits certainty. McCartney's comments on the scalability and flexibility of projects are also picked up, identifying the need to work in manageable steps, reinforced with questions about keeping delivery timescales short, having sufficient review points and a business continuity plan.

The sixth cause of failure is Procurement and Supplier Relations although the focus of this section is Value for Money (VfM), which is not a high profile area in the McCartney report. The project should offer the optimum economy, effectiveness and efficiency in using the required resources to ensure delivery. The questions concern Project Management, Risk Management and Benefits Realisation, the consideration of the whole-life VfM of the project, the requirement for a means to balance financial factors against quality and security of delivery, and the need for a business driven evaluation. Suppliers need to understand the project approach being adopted in order to critique it. There also has to be sufficient competitive interest. Senior management on both the supply and demand side need to be engaged and there should be a clear strategy for engaging with industry.  Both client and supplier need to understand their roles and responsibilities as well as sharing understanding of the desired outcomes. Finally, the contractor should consider whether the acquisition requirements are realistic.  The focus in this final section remains the relationship between supplier and contractor, again clearly picking up on one of McCartney's sections.  The questions are about market evaluations, early supplier involvement, shared risk registers and shared efficiency gains.

Following the list of causes and questions in the Report is a note that projects should not be allowed to proceed if the answers to any of these questions are unsatisfactory, endorsing McCartney's Leadership and Responsibility theme.  The emphasis in this report is shared between Procurement and Supplier Relations, Benefits Realisation, Leadership and Responsibility, Risk Management and Project Management.  Overall, it a useful *aide memoire* for some of the McCartney themes for those involved in a public sector IT project but also picks up more clearly on other key issues, such as stakeholder management and VfM.

### 4.3.4. Intellect: *IT Supplier Code of Best Practice,* 2003

Intellect's 2003 report encourages a more mature acquisition and delivery environment to give the customer a greater certainty of success and better value, and the supplier a more successful and sustainable business for a fair rate of return.  It sets out best practice to improve the professionalism of suppliers as defined by the Senior IT Forum, a joint initiative between OGC and Intellect.  This Forum was set up following the publication of the McCartney Report in order to bring together managers from both government and industry.[75]  The basis for this description of best practice is vague, apparently based on discussions with key customers and a review of suppliers.  However, it reinforces much of the OGC's guidance and is complementary to the *Government Procurement Code of Good Practice for Customers and Suppliers*, produced by OGC, which also sets out core values and behaviour within central government's supply chain.[76]  The report makes ten commitments, as shown at Table 4.9, again interpreted using McCartney's themes, which are emboldened.

**Table 4.9. Intellect: Supplier Code of Best Practice**

| Commitment Theme | Commitment Promise |
|---|---|
| 1. Customer-Supplier relationship<br>**(Procurement and Supplier Relations)** | We will strive to build and maintain an effective relationship with the Customer, founded on mutual trust and openness, with a clear understanding of each other's goals and interests.<br>**(Procurement and Supplier Relations)** |
| 2. Understanding the requirement<br>**(Benefits Realisation)** | We will make every reasonable effort to ensure we develop and agree with the Customer a full and robust understanding of the requirement and its broader business context as a firm foundation for our proposals.<br>**(Procurement and Supplier Relations)**<br>**(Benefits Realisation)** |
| 3. Constructive challenge<br>**(Procurement and Supplier Relations)** | We will be ready to offer constructive challenge whenever we believe improvements could usefully be made to the shaping or delivery of a programme, with the aim of ensuring an improved solution.<br>**(Project Management)**<br>**(Benefits Realisation)** |
| 4. Confidence in delivery<br>**(Benefits Realisation)** | We will only bid what we believe we can deliver with a high degree of confidence and on business models that can be sustained for the planned life of the programme.<br>**(Benefits Realisation)**<br>**(People and Skills)** |
| 5. Assumptions and implications<br>**(Project Management)** | We will declare all relevant assumptions that we make during the course of a programme (and make clear their implications) in particular those that relate to information or services provided by the Customer.<br>**(Project Management)**<br>**(Procurement and Supplier Relations)** |
| 6. Programme management<br>**(Project Management)** | We will ensure that all aspects of the programme are managed to a high degree of professionalism, using an agreed methodology and, wherever appropriate, with a clear focus on the delivery of business benefits.<br>**(Project Management)**<br>**(Benefits Realisation)**<br>**(People and Skills)** |
| 7. Risk management<br>**(Risk Management)** | We will rigorously identify, analyse and manage risks and we will seek to agree solutions with the Customer that offer the best ownership and risk mitigation strategy.<br>**(Risk Management)**<br>**(Procurement and Supplier Relations)** |
| 8. Supply chain management<br>**(Procurement and Supplier Relations)** | We will provide sufficient transparency throughout the supply chain that subcontractors can shape their offerings and manage their work appropriately and the Customer has suitable visibility at all levels.<br>**(Procurement and Supplier Relations)** |
| 9. Management and deployment of skilled resource<br>**(People and Skills)** | We will only nominate individuals for specific roles or as team members whom we judge to have the necessary authority, skills and experience and are expected to be available. Their contribution to Customer satisfaction and successful programme delivery will be encouraged and recognised.<br>**(People and Skills)** |
| 10. Individual skills and professionalism<br>**(People and Skills)** | We will encourage our staff to acquire and maintain appropriate professional standards and individual competencies. We will work towards a common and agreed framework for specific roles and associated competencies.<br>**(People and Skills)** |

**Source: Intellect, *IT Supplier Code of Best Practice,* (London, Intellect, 2003), page 5.**

During the acquisition phase, suppliers are expected to show customers how they would put these ten commitments into practice, although they have no contractual or legal status. Suppliers are simply ‘invited’ to adopt the Code. It is also noted that the Code will be updated as procurement trends evolve, but there is no evidence of this having happened to date. The report emphasises the need for a shared understanding between supplier and contractor, again reinforcing McCartney’s view. It encourages openness and communication in order to achieve this understanding, along with the need for strong leadership on both the supplier and the contractor side. The role of SRIE (Senior Responsible Industry Executive) is established to work alongside the SRO, delivering the requisite authority and top-level support. Skills, authority and experience are also important here in terms of project and programme management, risk management and in understanding the benefits that are deliverable.

#### 4.3.5. Parliamentary Office of Science and Technology (POST): *Government IT Projects,* 2003

Working on behalf of both Houses of Parliament, POST carries out independent and apolitical examinations of public policy issues related to science and technology. This particular report analyses why some government IT projects fail, the measures put into place to tackle the identified problems and the effectiveness of those measures. It divides its findings into three areas: government issues, technology issues and project issues. Therefore, unlike McCartney but aligned with the OECD, it places a great deal of emphasis on the public sector context and its effect on projects. Government issues are identified as accountability, publicity and the political environment, not dissimilar to the OECD report. The public sector is contrasted with the private sector, particularly in terms of public scrutiny by bodies such as the NAO and the PAC, which, it suggests, can lead to a risk-averse culture. Government projects are often announced early, without full consideration of the delivery implications. Policy can alter rapidly leading to IT changes, while relevant legislation may not be passed by Parliament until just before implementation, creating the potential for last minute changes to requirements.

In terms of technology issues, rapidly changing technology, user requirements, complexity, oversight, interoperability and limited skills are identified. The lack of skills, a recurring theme throughout these reports, results in an inability to scrutinise the supplier's offerings. The rate of technology change may result in projects being obsolete before they start, despite the tendency to prefer leading edge technology, which is, by necessity, bespoke and so carries greater risk than COTS. User requirements are often not clear at the start and the simplest of changes may have fundamental effects on time, cost and the system. The complexity of a project may not be obvious until after it has started. Skill is required to manage that complexity and the associated risk, while it is difficult for non-technical management to judge the quality or completeness of software between award of contract and delivery. IT projects are likely to interface with other systems, which may also be changing. Therefore, interaction is often a major issue. Finally, the section on project issues concerns the need for: a business case to ensure projects deliver benefits; leadership and senior management commitment; the involvement of users at all stages of the project; good relationships between government and suppliers; and effective project management and risk management.

Overall, this report reiterates McCartney's call for IT-enabled change with the business case a critical tool in changing this focus. Following McCartney's lead, it highlights the need for senior management and Ministers to show leadership and commitment. However, unlike McCartney, it goes on to emphasise the users in terms of determining their initial requirements, building their ownership to reduce resistance to change and ensuring that they receive adequate training in the use of the finished product. As in the McCartney Report, competence and capacity are key features. To be an intelligent client, government requires the skills to manage suppliers. Project management also requires skills. The POST report confirms McCartney's modular and incremental view but notes that departments often have very large systems, which may need to be redeveloped at short notice due to policy changes. It also reinforces the OECD view that funding might be more readily available for large, high profile projects. Finally, it identifies a range of initiatives that stem from the McCartney report, although this is not made explicit: the Gateway Reviews, the SRO, the Senior IT Forum, the Programme and Project Management specialism and Centres of Excellence. At the time of publication, it was noted that it was still too soon to measure the effect of these initiatives; the test would be the outcome of the large-scale IT projects initiated around that time, which included DII.

### 4.3.6. House of Commons Select Committee on Work and Pensions: *Department for Work and Pensions Management of Information Technology Projects: Making IT Deliver for DWP Customers*, 2004

In 2004, the Select Committee on Work and Pensions published its substantial report on IT failure based on an examination of the Department for Work and Pensions (DWP), which was undertaking a massive modernisation programme dependent on IT. The aim of this report was, therefore, to examine the DWP's management of previous IT projects. At the time, it had some of the largest IT systems in the world: 35 major systems for 26 million customers.[77] The two part inquiry was launched in November 2003 to examine the principles of best practice in the areas of procurement and administration of IT projects in the public sector and, secondly, to undertake a case study of the Child Support Agency (CSA). While the focus was on issues internal to DWP, this report is recognised as being one of the most detailed and penetrating to emerge during this period with 36 recommendations, many of a general nature and many picking up on the issues identified by McCartney four years previously.[78] The key findings are that the vast amount of information on best practice results in only patchy compliance and that, while the OGC has had an influence on best practice, its recommendations are optional and it needs greater powers of enforcement. Overall, there was an identified need to improve the accountability and transparency of government. With the necessary standards and methodologies already in the public domain, the issue is compliance. According to the Select Committee, greater openness will improve the success rate and it joined the calls for publication of the Gateway Reviews along with business cases and independent audits.

The first part of the report introduces the issues surrounding IT project failure then, in Section 2, it goes on to consider best practice, highlighting the need to simplify policy to enable easier implementation; avoid unrealistic deadlines and engage in early discussions to avoid unworkable projects; to staff and manage the cultural changes needed to introduce new ways of working; to use COTS; to break large IT changes into a number of smaller projects; and to have strong contingency planning for when things go wrong, including abandoning failing projects. It echoes the OECD and POST reports in the first two areas by identifying factors specific to the public sector but goes on to reinforce McCartney's emphasis on better relations with suppliers to encourage more constructive discussion, staffing and change management issues, COTS, modular and incremental change, and improved risk management. There is more emphasis on managing change than in the McCartney Report: simply imposing a system on end users greatly increases the risk of failure.

In Section 3, the report considers DWP and Suppliers, reinforcing McCartney's focus on Procurement and Supplier Relations. Much of this discussion is focused on the Private Finance Initiative (PFI), which was quietly dropped as a procurement solution for IT in July 2003 because it was deemed difficult to express long term IT requirements in a contract as technology changes rapidly and as IT is closely linked to operational needs. It is also difficult to substitute suppliers if a contractor fails to meet obligations, particularly given the limited IT marketplace for government. Finally, the life of a PFI IT contract is relatively short (around 10 years) but even during this period the contractor has to replace assets.[79] However, the report goes on to discuss the need for greater competition in the market place for government IT projects as there are very few suppliers and, in the case of DWP, one is dominant, EDS (now HP).[80] The second largest IT supplier in the world, EDS held 54% of the central government IT market at that time.[81] The report notes that government procurement processes discourage smaller suppliers from bidding.

Section 4 highlights Possible Ways of Improving Success. It begins by noting the lack of adherence to known best practice and the fact that so little of the guidance is obligatory, although it does highlight the six mandatory actions agreed by the Cabinet Office in 2003. This refers to DAO(GEN)01/03, which was a letter from the Treasury Officer of Accounts to departmental Accounting Officers.[82] OGC procedures were expanded beyond IT projects to all acquisition-based projects and required Accounting Officers: to provide assurance that projects do not suffer from the OGC's common causes of failure; to mandate no big bang implementations; to make no announcements about IT projects until risk analysis has been undertaken; to prioritise all projects as mission critical, highly desirable and desirable; and to appoint a responsible Minister, SRO and Project Manager with good, relevant track records for each project. Following on from this notion of mandating, the DWP Report discusses the idea of bringing in legislation to force compliance, along the lines of the Clinger-

Cohen Act, advising the OGC to undertake a review into the likely effect of implementing a similar statutory framework here.[83] From there, the report moves into a detailed examination of the CSA.

### 4.3.7. National Audit Office (NAO): *Improving IT Procurement*, 2004

This report by the NAO was based on its usual rigorous methodology, including a literature review, desk research and interviews. The results of this data collection were then tested against five case studies of major IT projects. The purpose of the report was to assess the impact of the OGC's work in helping departments improve their IT procurement. It makes eight recommendations on how the OGC might make further improvements, which are paraphrased at Table 4.10 and assigned McCartney themes. The overarching conclusion, reinforcing the findings of the literature review, is that many of the problems of IT projects are not about the technology but about understanding the business processes and determining the requirements along with the selection and skills of the staff who operate the new arrangements. Therefore, as evidenced by the recommendations, the key themes here, in McCartney terms, are People and Skills and Learning Lessons.

The report identifies three essential requirements that need to be in place for projects to be successful. The first is the rigorous challenge and scrutiny of projects at each stage in their lifecycle. The evidence indicates that the Gateway Review process is improving the procurement of IT but that projects enter the process too late and exit too early. The second requirement is for highly skilled and capable project managers. Awareness and application of best practice needs to be strengthened as lack of skills and experience presents a major risk to IT projects. The final requirement is effective engagement with suppliers. There needs to be a clear understanding of the respective positions and sharing of responsibilities, risks and benefits. The report suggests that different procurement routes would diversify the supplier base. However, the overarching view of the report is that some of the common causes of failure have been successfully tackled but, while the resulting processes are increasing the likelihood of success, more remains to be done.

**Table 4.10. NAO: Improving IT Procurement**

| Recommendation | McCartney Theme |
|---|---|
| 1. Regular and sustained engagement of departmental and agency boards with the Gateway Review process and the performance of their projects and programmes should be routine agenda items | **Learning Lessons** |
| 2. Create a strategy to change the behaviour of departments and agencies, based on a clear understanding of clients' needs, experience and capabilities | **People and Skills** |
| 3. Evaluate, monitor and assess the impact of other activities, such as Centres of Excellence and the Successful Delivery Skills Programme | **People and Skills** |
| 4. Centres of Excellence should provide advice to SROs on best practice guidance relevant to their Gateway Review recommendations | **Learning Lessons** |
| 5. Departments should ensure that their Centres of Excellence should align their tools and guidance with those of the OGC and disseminate these to project teams | **People and Skills** |
| 6. Departments need to set in place arrangements to develop a cadre of experienced programme and project managers | **People and Skills** |
| 7. The OGC, departments and agencies need to work together to ensure that initiatives result in a step change in the management of major IT-enabled projects | **Learning Lessons** |
| 8. Department and Agency Boards need to exercise clear leadership and commitment to make certain guidance is followed, skills are developed and maintained, risks properly identified and managed and the rigour of the Gateway process becomes part of departmental thinking | **Leadership and Responsibility** |

**Source: National Audit Office, *Improving IT Procurement*, (London, HMSO, 2004)**

### 4.3.8. Royal Academy of Engineering (RAEng) and the British Computer Society (BCS): *The Challenges of Complex IT Projects*, 2004

In support of the distinction between general projects and IT projects in the literature review, this study by the Royal Academy of Engineering and the British Computer Society seeks to improve understanding about how complex IT projects differ from other engineering projects, with a view to identifying ways to achieve successful delivery. The findings and recommendations are derived from an extensive body of evidence, collected in both written and oral form from more than 70 individuals, including senior directors, managers, project managers and software engineers from the public and private sectors, as well as academic experts. The report is divided into three main sections. The first addresses possible reasons for failure by comparing the principles and practice of software engineering and IT projects with those of other branches of engineering. The second part provides guidance on best practice for people involved in commissioning, designing and managing IT projects. The third part summarises the findings and makes seven recommendations, as shown at Table 4.11.

**Table 4.11. RAEng/BCS: The Challenges of Complex IT Projects**

| Findings | Recommendations |
|---|---|
| **Professionalism**<br>It is time for the IT industry to recognise collectively the engineering content of their work and to embrace the discipline and professionalism associated with traditional branches of engineering<br>***(People and Skills)*** | (a) Customers ensure that all senior IT practitioners involved in the design and delivery of high consequence systems have attained Chartered status and maintain their technical currency through Continuing Professional Development (CPD);<br>(b) The OGC, together with the Professional Institutions, assess means of enforcing the registration, and maintenance of professional competence through CPD, of senior practitioners working on high consequence systems;<br>(c) The Professional Institutions work together with the Confederation of British Industry (CBI) and the Institute of Directors (IoD) to promote awareness of the benefits of employing IT practitioners with Chartered status and suppliers who have adopted the Intellect Code of Best Practice. |
| **Education**<br>***(People and Skills)*** | (a) Intellect take a lead in forming links between companies, government departments and universities to promote a greater applications focus in undergraduate courses;<br>(b) The BCS and Institute of Electrical Engineers (IEE) produce a model syllabus or other criteria to apply in assessing and accrediting undergraduate courses to encourage a move towards courses with a stronger engineering emphasis;<br>(c) Management schools ensure that IT is a core module of future Masters in Business Administration (MBA) courses. |
| **Project Management**<br>***(People and Skills)*** | (a) Management schools collaborate with computer science and engineering departments, as well as the project management Professional Bodies, to develop courses which specifically address IT project management;<br>(b) Management schools ensure that project management is a core module of future MBA courses. |
| **Risk Management**<br>***(Risk Management)*** | The RAEng produce guidance to address risks of projects in such a form that it can be used for corporate governance in the framework provided by the Turnbull Report. |
| **Systems Architects**<br>***(People and Skills)*** | The Professional Bodies work together with the Engineering and Physical Sciences Research Council (EPSRC) and the Department for Education and Skills (DfES) to explore ways to identify and develop the skills of people with the potential to become systems architects. |
| **UK Software Engineering Institute**<br>***(People and Skills)*** | Government, with the Department of Trade and Industry (DTI) taking the lead, jointly with Industry to establish a UK Software Engineering Institute for research, advice and training to promote best practice in software engineering and IT project management. |
| **UK Complex IT Systems Research Programme**<br>***(People and Skills)*** | The DTI and EPSRC establish a UK research programme on complex IT systems to address the design, development, evolution and assessment of complex, distributed IT systems. |

**Source: Royal Academy of Engineering (RAEng) and the British Computer Society (BCS): *The Challenges of Complex IT Projects*, (London, BCS, 2004).**

The reason for the failure to implement best practice is the lack of collective professionalism in the IT industry, along with a lack of education and training of both customer and supplier staff at all levels, with poor project management, risk management and understanding of systems architecture. The first three recommendations concern the need to improve competence and capacity. In addition, there are recommendations about the need for basic research into the design, development, evolution and assessment of complex, distributed IT systems. As would be expected from institutions such as these, the emphasis in this report is on People and Skills, echoing concerns that appeared in McCartney in 2000 and that have appeared consistently in reports ever since.

### 4.3.9. National Audit Office (NAO): *Delivering Successful IT-Enabled Business Change,* 2006

The purpose of the NAO's 2006 report is essentially to identify CSFs. Based on an analysis of 24 case studies from the public and private sectors in the UK and overseas, it seeks the factors underlying their success with a view to learning lessons that can be transferred to future projects.[84] It highlights three key CSFs: the level of engagement by senior decision makers of the organisation undertaking the IT project (Leadership and Responsibility); the organisation's understanding of what they need to do to be an 'intelligent client' (People and Skills) and the organisation's understanding of the importance of identifying the benefits of the project at the outset and knowing how to manage the project in order to deliver those benefits (Benefits Realisation).[85]

From these three factors stem nine key questions, shown at Table 4.12, which the NAO recommends departments should answer satisfactorily before embarking on an IT project. The NAO states its hope that "this report will assist government departments and other public bodies to improve their capacity to bring about successful IT-enabled change".[86] This reiterates the emphasis in the other general reports on the need for improved competence and capacity, providing the right people with the right skills.

**Table 4.12. Nine Key Questions for Departments Embarking on IT-enabled Business Change**

| **Ensuring Senior Level Engagement** | |
|---|---|
| **Question** | **Key success Factor** |
| Q1: Is the Board able to make informed judgements about the department's capacity to manage change?<br>**(Business Change)** | Mechanisms to prioritise the programme and project portfolio in line with business objectives<br>**(Business Change)** |
| Q2: Does the department have in place a decision-making structure that will ensure strong and effective leadership of the IT-enabled business change?<br>**(Leadership and Responsibility)** | A clear decision making structure with agreed lines of accountability so that the right decisions are made swiftly and in line with business strategy<br>**(Leadership and Responsibility)** |
| Q3: What incentives exist to drive performance?<br>**(Business Change)** | Senior management who demonstrate commitment to the change<br>**(Business Change/Leadership and Responsibility)** |
| **Acting as an Intelligent Client** | |
| **Question** | **Key success Factor** |
| Q4: Does the department have the necessary programme management skills?<br>**(Project Management/People and Skills)** | Building capacity and capability<br>**(People and Skills)** |
| Q5: What is the natural division of duties between the Programme and Project Management Centre of Excellence and the Chief Information Officer?<br>**(Leadership and Responsibility)** | Building capacity and capability<br>**(People and Skills)** |
| Q6: How will the department establish and promote an open and constructive relationship with suppliers?<br>**(Procurement and Supplier Relations)** | Creating constructive relationships with suppliers<br>**(Procurement and Supplier Relations)** |
| Q7: How clear is the department about the business process that it is seeking to change or develop?<br>**(Business Change)** | Designing and managing the business change<br>**(Business Change)** |
| Q8: Does the technology exist to deliver the change?<br>**(Risk Management)** | Managing the risks of the IT solution<br>**(Risk Management)** |
| **Realising the Benefits of Change** | |
| Q9: Beyond immediate technical success, how will wider benefits be secured?<br>**(Benefits Realisation)** | Selling the benefits to users and winning the support of wider stakeholders<br>Optimising the benefits<br>**(Benefits Realisation/People and Skills)** |

**Source: National Audit Office, *Delivering Successful IT Enabled Business Change*, HC 33-1, Session 2006-2007, (London, HMSO, 2006), pages 15-19.**

It is evident from this examination of the ten key reports on government IT project failure that appeared between 2000 and 2006 that McCartney's ten themes have been reiterated and confirmed. However, it also shows the need for greater clarity in terms of the expression of these CSFs by trying to succinctly capture the essence of the issues identified in these reports. Before doing this, the discussion turns to the reports on infrastructure projects to examine whether these same factors recur or whether there are any additional CSFs that are specific to this particular type of project.

## 4.4. Information Infrastructure Projects: the Same Difference?

As discussed in Chapter Two, there are questions about whether all projects are the same or whether there are different types. According to McFarlan, the size and structure of the project can impact on the level of risk confronted.[87] By their nature, information infrastructure projects are mega-projects, providing the hardware and software that underpins the entire workings of the organisation. There was no mention of CSFs in relation to information infrastructure projects in the literature. However, analysis of this area was considered critical to determining whether such projects differ from other IT projects and, therefore, whether they have different CSFs. A third level of analysis was undertaken, which was based on secondary data derived from reports on infrastructure projects.

As discussed in Chapter Three, the information infrastructure reports were selected on the basis of four criteria. The projects had to be public sector infrastructure projects, rather than private sector. They had to be complex mega-projects comparable to DII and to have been carried out by a government auditing body. Finally, they had to give sufficient detail to allow a full analysis. The five selected reports fell within the same timescales as the general IT project reports, although this was not considered essential. The reports are partial and most often undertaken after the event. However, each reflects a particular viewpoint and reveals the essence of the problem as perceived by the investigating body (the relevant Audit Office). These factors were considered to be comparable across all the reports. Therefore, it was not considered necessary or practicable to supplement this information with additional research. The main aim was to identify if anything is different about infrastructure projects and their CSFs. The full findings are presented in chronological order at Appendix 4 with a short background to each, followed by the aim of the project, a brief chronology and, finally, an analysis of the CSFs in each using McCartney's ten sections as a framework. A shortened version is presented here at Table 4.13.

## Table 4.13. Information Infrastructure Projects

| | The Implementation of the National Probation Service Information Systems Strategy (Home Office), NAO 2001 | New IT Systems for Magistrates' Courts: the Libra Project, NAO 2003 | Delivering Digital Tactical Communications through the Bowman Combat Infrastructure Programme (CIP) (Ministry of Defence), NAO 2006 | The National Programme for IT in the NHS (Department of Health), NAO 2006 | Information Technology: DoD Needs to Ensure that Navy Marine Corps Intranet Program is Meeting Goals and Satisfying Customers, GAO 2006 |
|---|---|---|---|---|---|
| **Project Aim** | To provide a national information infrastructure and a Case Recording and Management System (CRAMS) across all of the probation services in England and Wales. | To provide a national IT infrastructure with links to other criminal justice agencies and a standard national application to support court work. | To improve military communications; to enable faster planning; and to allow communication across the armed forces. | To reform information use; to improve services and the quality of care; and to provide direction for IT development and the use of advanced IT. | To provide information superiority and to foster innovative ways of operating through an interoperable and shared network. |
| **CSFs** | | | | | |
| **Business Change** | | | | | |
| **Leadership and Responsibility** | | | | | |
| **Project Management** | | | | | |
| **Risk Management** | | | | | |
| **Modular and Incremental Development** | | | | | |
| **Benefit Realisation** | | | | | |
| **Procurement and Supplier Relations** | | | | | |
| **Cross-Cutting Initiatives** | | | | | |
| **People and Skills** | | | | | |
| **Learning Lessons** | | | | | |

**Source: Author**

These reports give a single perspective on these projects and scrutiny of the literature reveals that different views exist about the extent of success. For example, the PAC queried the “almost universally positive tone” of the NAO report on the NHS’s National Programme for IT.[88] There were suggestions that criticism appearing in an early draft was deleted from the final report.[89] A more recent report by the PAC on Bowman has been overwhelmingly critical of the entire programme and its procurement.[90] However, the main aim in scrutinising these reports was to identify whether there is anything different about infrastructure projects and it appears from the evidence above that there is not. The issues that were identified clearly fit into McCartney’s ten themes, as demonstrated above, and there was nothing that appeared to be particular to this type of project.

The themes used to scrutinise all of these reports, both general and infrastructure, were derived from the section headings used in McCartney’s original report and the issues highlighted fitted these ten themes. There is evidence of poor project management across all five reports. NPSISS did not embed project management methods and they fell into disuse while Libra saw the project requirements changed. The Bowman project managers had to cope with complexity and change as well as the iron triangle of cost, time and scope, while there were problems with project planning in both the National Programme for IT and the NMCI Program. All five projects struggled with Procurement and Supplier Relations and People and Skills. For example, Libra had only one bidder and, therefore, no competitive tension, a point highlighted by the OGC in its *Common Causes of Project Failure.* Across all projects, there were issues with frequent changes in the project team, relevant skills and stakeholder engagement. Business change appears as less of an issue and there is little reference to the need to learn lessons. Overall, however, it is evident that the same themes emerge and, more importantly, no different themes are identified.

As discussed in Section 4.1, McCartney’s themes are very general i.e. Project Management and Risk Management, but lead to highly specific recommendations. As can be seen from the above discussion of IT projects, there are a number of detailed issues that emerge from the above reports. Therefore, they require further refinement in order to capture the essence of the ‘few key areas where things must go right’, so providing a more meaningful and more useful list of CSFs with which to scrutinise the DII Programme.

### 4.5. Capturing the Essence: CSFs Synthesised

As described above, the themes identified in the fourteen reports were refined through an iterative process of relational analysis. Each of the meaning units for each report was categorised according to McCartney's original themes. The themes were then comparing to the meaning units in order to determine a more exact definition, as shown at Table 4.14, repeated from Chapter 3. For example, one meaning unit

**Table 4.14. Content Analysis Process: McCartney Report**

| Meaning Unit | Theme | CSF |
|---|---|---|
| IT has to fit closely with the new working practices | Benefits Realisation | Benefits Certainty |
| A clear vision of the context in which IT is being implemented | Business Change | Benefits Certainty |
| Think in terms of change management projects rather than IT projects | Business Change | Clarity and Perception |
| Improve the delivery of the projects themselves | Business Change | Complexity Management |
| Deliver improvements to the way they do business | Project Management | Constraints Certainty |
| Take an overall view of the whole change process | Benefits Realisation | Benefits Certainty |
| Integration (whole change process) is a vital, and ongoing, management task | Business Change | Complexity Management |
| Achieving integration of all the aspects of change requires effective leadership | Leadership and Responsibility | Consistency and Coherence |
| Responsibility for the delivery of a project or programme falls to an individual | Leadership and Responsibility | Consistency and Coherence |
| Good leadership | Leadership and Responsibility | Competence and Capacity |
| Clear responsibility for IT-based change programmes and projects | Leadership and Responsibility | Clarity and Perception |
| A Senior Responsible Owner (SRO) and a description of the SRO Role | Leadership and Responsibility | Clarity and Perception |
| People in place who have the ability to deliver | Leadership and Responsibility | Clarity and Perception |
| Highly skilled and experienced managers are vital to success | People and Skills | Competence and Capacity |
| Improve project management across Government | People and Skills | Competence and Capacity |
| Matching project managers to projects | Project Management | Constraints Certainty |
| Increasing (project management) skills and awareness | Project Management | Competence and Capacity |

**Source: Author**

extracted from the McCartney Report was “Single identified individuals should ensure that the project or programme maintains its business focus”. This was categorised under McCartney’s theme of Leadership and Responsibility. However, more precisely, it was seen to concern the clarity of the rationale, scope and scale of the project and shared understanding by key stakeholders across the broad communities involved. Therefore, it was categorised as Clarity and Perception. This was then tested against other meaning units in other reports. For example, in the RAEng/BCS Report, the following meaning unit was also seen to fit into this category rather than the broader Leadership and Responsibility: “senior management needs to attempt to create a receptive context for the project”. The focus is on general understanding about the project and promulgating understanding, rather than specific leadership issues. In the NAO 2006 report, the following was also considered to be about Clarity and Perception rather than Leadership and Responsibility: “The level of engagement by senior decision makers of the organisations concerned”. The issue was not how much time and effort these senior decision makers put into the project but rather the extent to which they understood the project’s purpose and were willing to broadcast that understanding across the organisation or context.

Therefore, the aim of this exercise was to build CSFs that encapsulate the activity, rather than simply offer a broad theme. This means that, rather than specifying Procurement and Supplier Relations, the aim was to capture the required behaviour and skills, as well as the underlying issues. For example, under this heading, McCartney highlights that “Government’s policy is to ensure VfM in procurement through competition”, which is concerned with delivering value, rather than relations between customer and supplier. The fact that there are such relations within a project context is seen as self-evident, the issue is to identify what needs to be done in terms of good performance and to determine how to make things go right. This process led to the identification of twelve CSFs, which are shown below at Table 4.15, along with a clear definition.

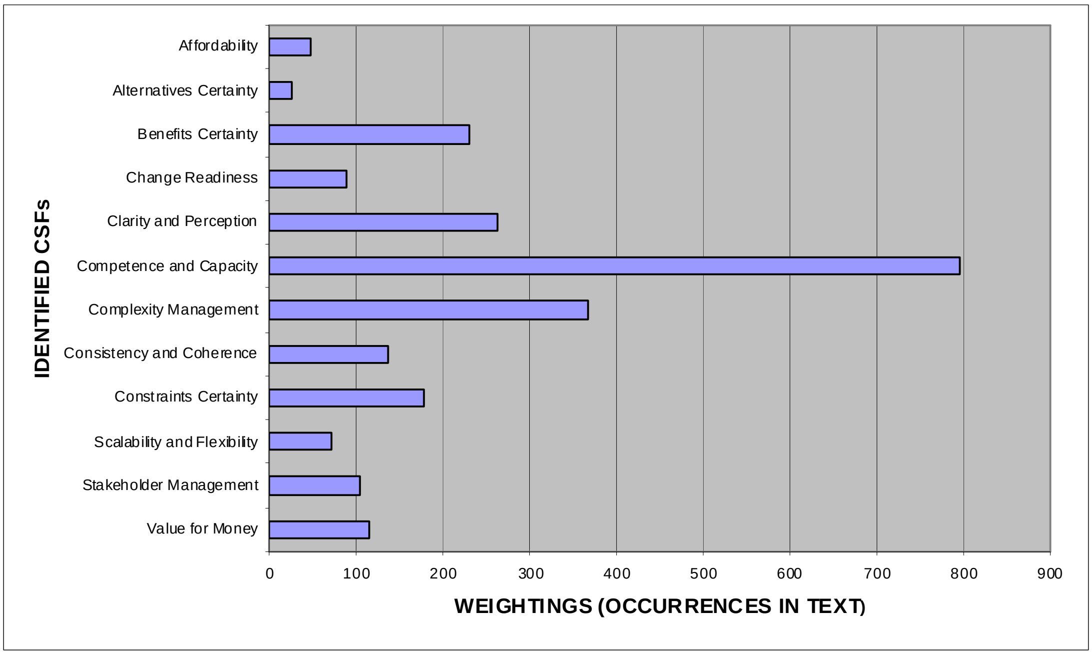
**Table 4.15. Identified CSFs**

| |
|---|
| **Affordability** |
| *An assessment of whether proposals can be paid for in terms of resources, cash-flows and funding* |
| **Alternatives Certainty** |
| *Consideration of alternative approaches capable of fulfilling the objectives creates project confidence and commitment with the key stakeholders i.e. Do Nothing, Do minimum, Defer, Outsource, Consolidate* |
| **Benefits Certainty** |
| *Clear identification and definition of the business need for the project and the required performance improvement outcomes along with how these will be managed in terms of measures, owners, targets and strategic alignment* |
| **Change Readiness** |
| *The current state of the organisations involved in the project and their perceived ability to absorb, adapt to, and assimilate change* |
| **Clarity and Perception** |
| *Clarity of the rationale, scope and scale of the project and shared understanding by key stakeholders across broad communities involved* |
| **Competence and Capacity** |
| *The requirement for individuals associated with the project to be able to properly perform specific jobs through a combination of knowledge, skills and behaviour, along with the capacity, in terms of the availability of the right people with the right skills, to execute and effectively deliver the option* |
| **Complexity Management** |
| *The level of likely risk and the scale, novelty, diversity, interdependency and volatility of a project* |
| **Consistency and Coherence** |
| *Integration of the selected option with established systems, processes and policies* |
| **Constraints Certainty** |
| *An estimate of costs, resource requirements and timescales along with project planning, design and implementation* |
| **Scalability and Flexibility** |
| *Consideration of the versatility of a future option and its anticipated survivability in a future and unpredictable environment, requiring an understanding of the scalability (both up and down) and of the degree of flexibility* |
| **Stakeholder Management** |
| *The systematic identification, analysis and planning of actions to communicate with, negotiate with and influence all those who have an interest or role in the project or those who are impacted by the project.* |
| **Value for Money** |
| *The project offers the optimum economy, effectiveness and efficiency in delivering the product along with a qualitative and quantitative judgement over the manner in which resources are utilised and managed and any reputational risk that has ensued to both public sector and supplier* |

**Source: Author**

These twelve CSFs were derived from McCartney and then examined across all ten general project reports to determine the number of times that they appeared and, therefore, their weighting or emphasis, as shown at Figure 4.4. This demonstrates an overwhelming emphasis on Competence and Capacity, the need for people who can properly perform specific jobs through a combination of knowledge, skills and behaviour as well as the need for the right people with the right skills to be available in the right numbers. Second to this is the need to be able to manage complexity, assessing the level of likely risk and dealing with the scale, novelty, diversity, interdependency and volatility of a project. Next in importance is Clarity and

**Figure 4.4: All General IT Reports: CSFs: Weightings**

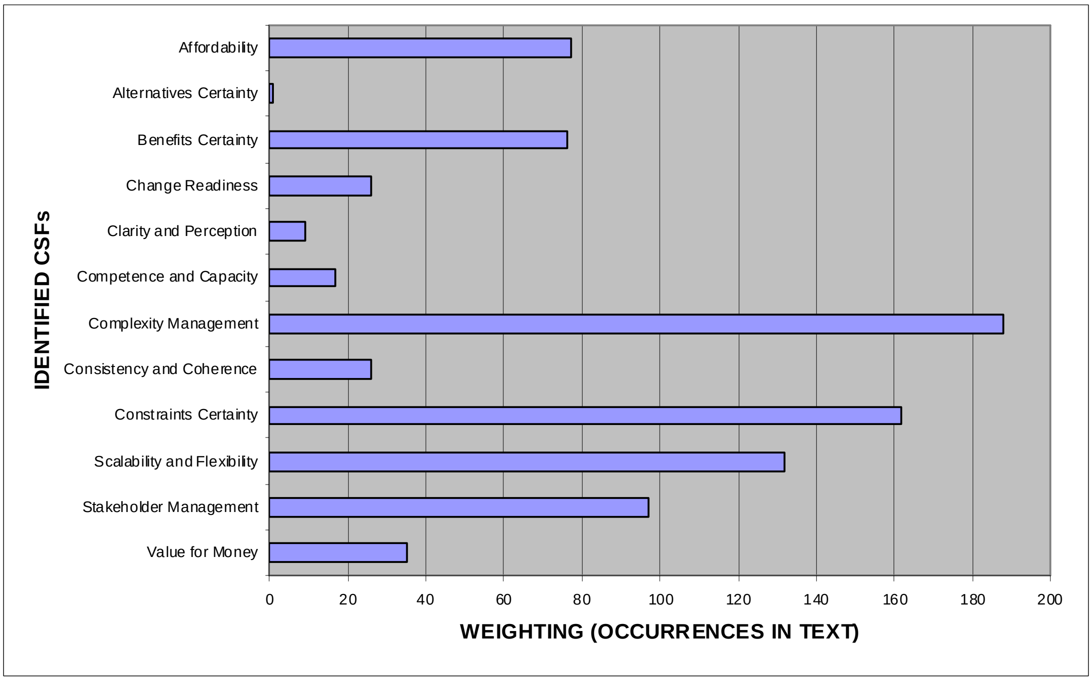



**Source: Author**

Perception, which describes the shared understanding of the rationale, scope and scale of the project by key stakeholders across the broad communities involved. Finally, Benefits Certainty also stands out: clear identification and definition of the business need for the project and the required performance improvement outcomes along with how those will be measured.

How then does this compare with the infrastructure reports? The same weighting process was carried out and is shown at Figure 4.5. This shows a much greater emphasis on Complexity Management but also highlights the need for Constraints Certainty, the ability to manage the project in terms of estimating costs, resource requirements and timescales using project planning, design and implementation. Scalability and Flexibility is also important, whether the project will scale up or down and whether it is sufficiently flexible and versatile. These things are likely to impact on its survivability in a future unpredictable environment. Stakeholder Management features highly here too. This is the need to identify, analyse and plan actions to communicate with, negotiate with and influence all those with an interest or role in the project or those who are impacted by it. Further down the weighting scale are Affordability, whether the resources, cash flows and funding are available, and

**Figure 4.5: All Infrastructure Reports: CSFs: Weightings**




**Source: Author**

Benefits Certainty. Therefore, while both sets of reports confirm the identified CSFs, this analysis shows that they are weighted differently in terms of importance. This suggests that there may be different lessons for different types of project, going some way to answering the second of the three subsidiary research questions, which asks whether lessons learned have been differentiated by type of project. This was not directly proved in the literature review.

The first subsidiary research question asks whether the lessons learned from previous complex IT projects in government are correct and comprehensively considered. This requires a point of comparison, which in this case is the academic literature. In Chapter Two, Fortune and White's list of CSFs, identified from the generic management literature in 2006 was used as a point of comparison for the IT project management CSFs. The two combined is used as a point of comparison for the CSFs identified as a result of the content analysis of the ten reports selected for scrutiny. This is shown at Table 4.16.

Although there is no read across, there is sufficient evidence of a match between the CSFs identified in the selected reports and those identified in the literature. This

## Table 4.16. Verifying the Identified CSFs

| Literature Review: CSFs | Reports: CSFs |
|---|---|
| Support from senior management<br><br>(Fortune and White: 39 citations)<br>(IT Project Management Literature: 26 citations) | Clarity and Perception |
| Clear realistic objectives<br><br>(Fortune and White: 31 citations)<br>(IT Project Management Literature: 31 citations) | Alternatives Certainty<br>Benefits Certainty<br>Clarity and Perception |
| Strong detailed plan kept up-to-date<br><br>(Fortune and White: 29 citations)<br>(IT Project Management Literature: 11 citations) | Alternatives Certainty<br>Benefits Certainty<br>Constraints Certainty |
| Good communication/feedback<br><br>(Fortune and White: 27 citations)<br>(IT Project Management Literature: 10 citations) | Clarity and Perception<br>Stakeholder Management |
| User/client involvement<br>(Fortune and White: 24 citations)<br>(IT Project Management Literature: 32 citations) | Clarity and Perception<br>Stakeholder Management |
| Skilled/suitably qualified/sufficient staff/team<br><br>(Fortune and White: 20 citations)<br>(IT Project Management Literature: 25 citations) | Competence and Capacity |
| Effective change management<br>(Fortune and White: 19 citations)<br>(IT Project Management Literature: 5 citations) | Change Readiness |
| Competent project manager<br>(Fortune and White: 19 citations)<br>(IT Project Management Literature: 9 citations) | Competence and Capacity |
| Strong business case/sound basis for project<br>(Fortune and White: 16 citations)<br>(IT Project Management Literature: 6 citations) | Benefits Certainty<br>Clarity and Perception |
| Sufficient/well allocated resources<br>(Fortune and White: 16 citations)<br>(IT Project Management Literature: 13 citations) | Affordability<br>Value for Money |
| Good leadership<br>(Fortune and White:15 citations)<br>(IT Project Management Literature: 6 citations) | Clarity and Perception |
| Proven/familiar technology<br>(Fortune and White: 14 citations)<br>(IT Project Management Literature: 15 citations) | Competence and Capacity |
| Realistic schedule<br>(Fortune and White: 14 citations)<br>(IT Project Management Literature: 6 citations) | Constraints Certainty |
| Risks addressed/assessed/managed<br>(Fortune and White: 13 citations)<br>(IT Project Management Literature: 1 citation) | Complexity Management |
| Project sponsor/champion<br>(Fortune and White: 12 citations) | Clarity and Perception |
| Effective monitoring/control<br>(Fortune and White:12 citations)<br>(IT Project Management Literature: 9 citations) | Benefits Certainty<br>Constraints Certainty |

| Literature Review: CSFs | Reports: CSFs |
| --- | --- |
| Adequate budget<br>(Fortune and White: 10 citations)<br>(IT Project Management Literature: 8 citations) | Affordability |
| Organisational adaptation/culture/structure<br>(Fortune and White: 10 citations)<br>(IT Project Management Literature: 19 citations) | Change Readiness<br>Consistency and Coherence<br>Scalability and Flexibility |
| Good performance by suppliers/contractors/consultants<br>(Fortune and White: 10 citations)<br>(IT Project Management Literature: 12 citations) | Competence and Capacity |
| Planned close down/review/acceptance of possible failure<br>(Fortune and White: 9 citations) | Alternatives Certainty |
| Training provision<br>(Fortune and White: 7 citations)<br>(IT Project Management Literature: 9 citations) | Competence and Capacity |
| Political stability<br>(Fortune and White: 6 citations)<br>(IT Project Management Literature: 4 citations) | Consistency and Coherence |
| Correct choice/past experience of project management methodology/tools<br>(Fortune and White: 6 citations)<br>(IT Project Management Literature: 10 citations) | Competence and Capacity |
| Environmental influences<br>(Fortune and White: 6 citations)<br>(IT Project Management Literature: 9 citations) | Complexity Management |
| Past experience (learning from)<br>(Fortune and White: 5 citations)<br>(IT Project Management Literature: 2 citations) | Competence and Capacity |
| Project size (large)/level of complexity (high)/number of people involved (too many)/duration (over three years)<br>(Fortune and White: 4 citations)<br>(IT Project Management Literature: 14 citations) | Change Readiness<br>Complexity Management<br>Scalability and Flexibility |
| Different viewpoints (appreciating)<br>(Fortune and White: 3 citations)<br>(IT Project Management Literature: 10 citations) | Consistency and Coherence<br>Stakeholder Management |
| Technology<br>(IT Project Management Literature: 6 citations) | Complexity Management |

**Source: Author**

confirms that the lessons learned from previous complex IT projects in government are correct and comprehensively considered and so answers the first subsidiary research question.

## 4.6. Summary

This chapter, along with the literature review presented in Chapter Two, demonstrates that there is a wealth of solid advice and theory on the subject of project success and failure. In 2000, McCartney produced his authoritative report detailing why government IT projects fail, which was followed by a number of reports that have both confirmed and redefined his themes. The attempt to follow the trail of McCartney's Recommendations demonstrated that, while some of his policies were rapidly enacted, enthusiasm appeared to wane over time as they changed hands, became increasingly diluted and were then overtaken by subsequent initiatives. This makes it difficult to identify whether all of his recommendations were ultimately put into practice, but is illuminating in terms of the implementation of policy in the public sector. It demonstrates that policy recommendations are simply that: suggested courses of action, rather than mandated regulations. This is a theme that recurs in the subsequent reports, raising questions about the fact that government departments and agencies cannot be made to comply with these CSFs, that there is no government body that has that level of authority or governance. This makes the idea of legislation to force compliance unlikely, with the outcomes of the Clinger-Cohen Act in the US suggesting that it may not be the answer.

McCartney's principal legacies are the SRO appointment and Gateway Reviews but the report also raised issues of skills and knowledge in government, initiating a number of mechanisms to improve this situation. In addition, it highlighted the importance of delivering benefits, initiating smaller more manageable projects and improving relations with suppliers. Whilst the other reports that were analysed for this study were shown to have generally followed McCartney's lead in terms of the CSFs that they identify, they each have a slightly different flavour and emphasis. The OECD report focuses on risk but sees that arising from the government context, which is considered to make projects more complex, along with policy change, new legislation and levels of scrutiny. It also focuses on the end user. Intellect takes the supplier view and in its first report considers contract management in the public sector context. The OGC, the second NAO report and the second Intellect report attempt to provide mechanisms to make the lessons from McCartney more practical and applicable. POST raises the issue of technology, while the DWP is concerned with governance. The NAO assesses the work of the OGC, whilst the RAEng and BCS are concerned with skills and complex projects. Three key themes emerge from this analysis:

1. Knowledge, understanding and skills are a major issue in the government context and underpin a range of the other identified CSFs.
2. Governance is critical. These reports demonstrate the arguments made in the introduction to this chapter: the means to success are known; the issue is compliance with those means.
3. The contract needs to be managed, again raising questions about skills, and the relationship with the supplier, given a clash of cultures.

It is evident that the lessons are there for the learning and that the CSFs have been identified in the government reports and confirmed through comparison with the academic literature as being correct and comprehensively considered. The next stage of this study is to assess whether they have been used and, if so, whether they have improved the performance of subsequent complex IT projects in government. These issues will be examined through a detailed case study of the MoD's DII Programme. The contextual setting for this project and the surrounding business processes are examined in Chapter Five, while the extent to which the CSFs have been understood and applied, and to what effect, is analysed in Chapter Six.

## References

[1] Great Britain, Cabinet Office, *Modernising Government*, Cm.4310, (London, HMSO, 1999).
[2] BBC, *Martha Lane Fox Urging Government Online 'Revolution*', 23 November 2010, http://www.bbc.co.uk/news/uk-11815731, downloaded 23rd November 2010.
[3] Europa, IDABC, *UK Government Continues to Lead ICT Spending in Europe,* June 2005, http://europa.eu.int/idabc/en/document/4336/5860, downloaded 19th September 2005.
[4] Heath, N., 'Spending Review: £1 Billion Plus Cuts to Government IT Bill', *Silicon.com*, 20 October 2010, http://www.silicon.com/management/public-sector/2010/10/20/spending-review-1bn-plus-cuts-to-government-it-bill-39746519/, downloaded 23rd November 2010.
[5] SOCITM, 'SOCITM's Response to the Spending Review', *SOCITM's Webpage*, 21 October 2010, http://www.socitm.net/press/article/152/socitms_response_to_the_spending_review, downloaded 2nd December 2010.
[6] SOCITM, 'SOCITM's Response to the Spending Review, *SOCITM's Webpage*, 21 October 2010, http://www.socitm.net/press/article/152/socitms_response_to_the_spending_review, downloaded 2nd December 2010.
[7] Collins, T., 'What MPs Said About the State of IT Projects in 1984', *ComputerWeekly.com*, 12 November 2009, http://www.computerweekly.com/blogs/public-sector/2009/11/public-accounts-mps-attack-it.html, downloaded 18th November 2010.
[8] Great Britain, Cabinet Office, *Successful IT: Modernising Government in Action*, (London, HMSO, 1999), page 5.
[9] Great Britain, Cabinet Office, *Successful IT: Modernising Government in Action*, (London, HMSO, 1999).
[10] Rockart, J.F., 'Chief Executives Define their own Data Needs', *Harvard Business Review*, Mar-Apr 1979, pages 81-93.
[11] Great Britain, Cabinet Office, *Successful IT: Modernising Government in Action*, (London, HMSO, 1999), page 14.
[12] Collins, T., 'Twenty Five Years of Government IT Project Failure', *ComputerWeekly.com*, 6 November 2009, http://www.computerweekly.com/Articles/2009/11/06/238452/Twenty-five-years-of-government-IT-project-failure.htm, downloaded 29th September 2010.
[13] BBC Online Network, *Passport Misery for Thousands*, 29th June 1999, http://news.bbc.co.uk/1/hi/uk/380911.stm, downloaded 15th January 2005.
[14] Great Britain, Cabinet Office, *Successful IT: Modernising Government in Action*, (London, HMSO, 1999), page 4.
[15] Cross, M., 'Message off target', *The Guardian*, 7th July 2005, http://society.guardian.co.uk/internet/story/0,8150,1522583,00.html, downloaded 25th January 2006
[16] Great Britain, Cabinet Office, *Successful IT: Modernising Government in Action*, (London, HMSO, 1999), page 5.
[17] Great Britain, Cabinet Office, *Successful IT: Modernising Government in Action*, (London, HMSO, 1999), page 7.
[18] Great Britain, Cabinet Office, *Successful IT: Modernising Government in Action*, (London, HMSO, 1999), page 14.
[19] Great Britain, Cabinet Office, *Successful IT: Modernising Government in Action*, (London, HMSO, 1999), page 61.
[20] Great Britain, Cabinet Office, Office of the e-Envoy, *Progress Report on 'Successful IT: Modernising Government in Action'*, (London, Cabinet Office, 2000), page 4.
[21] Great Britain, Cabinet Office, Office of the e-Envoy, *Progress Report on 'Successful IT: Modernising Government in Action'*, (London, Cabinet Office, 2000), page 2.
[22] Great Britain, Cabinet Office, Office of the e-Envoy, *Progress Report on 'Successful IT: Modernising Government in Action'*, (London, Cabinet Office, 2000), page 2.
[23] Great Britain, Cabinet Office, Office of the e-Envoy, *Progress Report on 'Successful IT: Modernising Government in Action'*, (London, Cabinet Office, 2000), page 7.
[24] Great Britain, Cabinet Office, Office of the e-Envoy, *Progress Report on 'Successful IT: Modernising Government in Action'*, (London, Cabinet Office, 2000), page 7.
[25] Mugan, C., 'Cabinet Office Loses Key IT Responsibility', *ComputerWeekly.com*, http://www.computerweekly.com/SiteMapArticle/Articles/2001/04/27/c5791/179830/CabinetOfficeloseskeyITresponsibility.htm., downloaded 30th March 2005.

[26] Mugan, C., 'Cabinet Office Loses Key IT Responsibility', *ComputerWeekly.com*, http://www.computerweekly.com/SiteMapArticle/Articles/2001/04/27/c5791/179830/CabinetOfficeloseskeyITresponsibility.htm., downloaded 30th March 2005.

[27] Mugan, C., 'Cabinet Office Loses Key IT Responsibility', *ComputerWeekly.com*, http://www.computerweekly.com/SiteMapArticle/Articles/2001/04/27/c5791/179830/CabinetOfficeloseskeyITresponsibility.htm., downloaded 30th March 2005.

[28] Anon., 'The Bulletin Interview: Ian Watmore', *ITNow*, March 2005, http://archive.bcs.org/bulletin/mar05/intervie.htm, downloaded 16th January 2006.

[29] Anon., 'The Bulletin Interview: Ian Watmore', *ITNow*, March 2005, http://archive.bcs.org/bulletin/mar05/intervie.htm, downloaded 16th January 2006.

[30] Arnott, S., 'Watmore gets PM Delivery Unit Role', *Computing*, 15 December 2005, http://www.computing.co.uk/ctg/news/1817527/watmore-pm-delivery-unit-role, downloaded 16th January 2006.

[31] Arnott, S., 'Watmore gets PM Delivery Unit Role', *Computing*, 15 December 2005, http://www.computing.co.uk/ctg/news/1817527/watmore-pm-delivery-unit-role, downloaded 16th January 2006.

[32] Great Britain, Cabinet Office, *Successful IT: Modernising Government in Action*, (London, HMSO, 1999), page 14.

[33] Great Britain, Cabinet Office, *Successful IT: Modernising Government in Action*, (London, HMSO, 1999), page 21.

[34] Collins, T., 'Whitehall Must Embrace Honesty and Openness to Succeed With IT', *Computer Weekly*, 1st November, 2005, p.8-9.

[35] Collins, T., 'Whitehall Must Embrace Honesty and Openness to Succeed With IT', *Computer Weekly*, 1st November, 2005, p.8-9.

[36] Collins, T., 'Whitehall Must Embrace Honesty and Openness to Succeed With IT', *Computer Weekly*, 1st November, 2005, p.8-9.

[37] Collins, T., 'Whitehall Must Embrace Honesty and Openness to Succeed With IT', *Computer Weekly*, 1st November, 2005, p.8-9.

[38] Wheeler-Carmichael, G, 'Government IT projects: the McCartney Report 'Successful IT: Modernising Government in Action' and the CSSA Report 'Getting IT Right for Government', *Computer Law and Security Report*, 2000, Vol, 16, No. 5, pages 325-328.

[39] McCue, A., 'The McCue Interview: UK Government CIO Ian Watmore', *Silicon.com*, 16th February 2005, comment.silicom.com/andymccue/0,3800002581,39127908,00.htm. Downloaded: 28th September 2005.

[40] McCue, A., 'The McCue Interview: UK Government CIO Ian Watmore', *Silicon.com*, 16th February 2005, comment.silicom.com/andymccue/0,3800002581,39127908,00.htm. Downloaded: 28th September 2005.

[41] Feeny, D. and Willcocks, L., 'Core IS Capabilities for Exploiting Information Technology', *Sloan Management Review*, 1988, Vol. 39, No. 3, pages 9-21.

[42] Great Britain, Cabinet Office, *Successful IT: Modernising Government in Action*, (London, HMSO, 1999), page 58.

[43] Great Britain, Cabinet Office, *Successful IT: Modernising Government in Action*, (London, HMSO, 1999), page 15.

[44] Great Britain, Cabinet Office, *Successful IT: Modernising Government in Action*, (London, HMSO, 1999), page 16.

[45] Great Britain, Cabinet Office, *Successful IT: Modernising Government in Action*, (London, HMSO, 1999), page 16.

[46] Cross, M., 'Message Off Target', *The Guardian*, 7th July 2005, http://society.guardian.co.uk/internet/story/0,8150,1522583,00.html, downloaded 25th January 2006.

[47] Cross, M., 'Message Off Target', *The Guardian*, 7th July 2005, http://society.guardian.co.uk/internet/story/0,8150,1522583,00.html, downloaded 25th January 2006.

[48] Collins, T., 'Senior Responsible Owner: a Good Idea Subverted', *ComputerWeekly.com*, 24th August 2007, http://www.computerweekly.com/blogs/public-sector/2007/08/senior-esponsible-owner-a-good-1.html, downloaded 18th November 2010.

[49] Collins, T., 'Senior Responsible Owner: a Good Idea Subverted', *ComputerWeekly.com*, 24th August 2007, http://www.computerweekly.com/blogs/public-sector/2007/08/senior-esponsible-owner-a-good-1.html, downloaded 18th November 2010.

[50] Collins, T., 'Government IT: Time Now for Real Change?', *ComputerWeekly.com*, 18 May 2010, http://www.computerweekly.com/blogs/public-sector/2010/05/government-it---time-now-time.html, downloaded 18th November, 2010.
[51] Great Britain, Parliamentary Office of Science and Technology, *Government IT Projects*, Report 200, (London, HMSO, 2003), page 19.
[52] Great Britain, National Audit Office, *Improving IT Procurement: The Impact of The OGC's Initiatives on Departments and Suppliers in the Delivery of Major IT-Enabled Projects*, November 2004, (London, HMSO, 2004).
[53] [53] Great Britain, National Audit Office, *Improving IT Procurement: The Impact of The OGC's Initiatives on Departments and Suppliers in the Delivery of Major IT-Enabled Projects*, November 2004, (London, HMSO, 2004).
[54] Cross, M., 'Special Report: Public Sector IT Failures', *Prospect*, October 2005, pg 48-52, p.51.
[55] Collins, T., 'MPs Back Publication of Gateway Reports', *Computer Weekly*, 5th July 2005, p.1.
[56] Cross, M., 'Message Off Target'. *The Guardian*, 7th July 2005, http://society.guardian.co.uk/internet/story/0,8150,1522583,00.html, downloaded 25th January 2006.
[57] Collins, T., 'MPs Back Publication of Gateway Reports', *Computer Weekly*, 5th July 2005, p.1.
[58] Great Britain, House of Commons, Work and Pensions Committee, *Management of Information Technology Projects: Making IT Deliver for DWP Customers*, HC 311, Third Report, Session 2003-04, (London, HMSO, 2004).
[59] Collins, T., 'Decision Not to Publish Gateway Reviews Does Not Bear Scrutiny – and Here's Why', *Computer Weekly*, 13th July 2004, p.14.
[60] Great Britain, National Audit Office, *Improving IT Procurement: The Impact of The OGC's Initiatives on Departments and Suppliers in the Delivery of Major IT-Enabled Projects*, November 2004, (London, HMSO, 2004).
[61] Anon., 'OGC Sees Red', *Kablenet.com*, 1st March 2005, www.kablenet.com/kd.nsf/printview/D556DD34D70285D580256FB7003EE9A
[62] Anon., 'OGC Sees Red', *Kablenet.com*, 1st March 2005, www.kablenet.com/kd.nsf/printview/D556DD34D70285D580256FB7003EE9A
[63] Collins, T., 'Watmore Tells Mps Why So Many Government IT Projects Fail', *ComputerWeekly.com*, 10 June 2009, http://www.computerweekly.com/Articles/2009/06/10/236365/Watmore-tells-MPs-why-so-many-government-IT-projects.htm, downloaded 23rd November 2010.
[64] King, L., 'Information Commissioner Orders IT Gateway Review Publication', *CIO*, 24 June 2009, http://www.cio.co.uk/news/118084/information-commissioner-orders-it-gateway-review-publication/, downloaded 23 November 2010.
[65] Collins, T., 'Whitehall Must Embrace Honesty and Openness to Succeed With IT', *Computer Weekly*, 1st November, 2005, p.8-9.
[66] Collins, T., 'Minister to Consider Computer Weekly's Plan to Stop IT Disasters', *Computer Weekly*, 6th July 2004, p.14.
[67] Great Britain, Cabinet Office, *Successful IT: Modernising Government in Action*, (London, HMSO, 1999).
[68] Holmes, A., 'Five Reasons Why Clinger-Cohen Failed', *NextGov: Technology and the Business of Government*, 8 November 2010, http://techinsider.nextgov.com/2010/08/five_reasons_why_clinger-cohen_failed.php, downloaded 26th November 2010.
[69] Holmes, A., 'Five Reasons Why Clinger-Cohen Failed', *NextGov: Technology and the Business of Government*, 8 November 2010, http://techinsider.nextgov.com/2010/08/five_reasons_why_clinger-cohen_failed.php, downloaded 26th November 2010.
[70] Holmes, A., 'Five Reasons Why Clinger-Cohen Failed', *NextGov: Technology and the Business of Government*, 8 November 2010, http://techinsider.nextgov.com/2010/08/five_reasons_why_clinger-cohen_failed.php, downloaded 26th November 2010.
[71] Holmes, A., 'Five Reasons Why Clinger-Cohen Failed', *NextGov: Technology and the Business of Government*, 8 November 2010, http://techinsider.nextgov.com/2010/08/five_reasons_why_clinger-cohen_failed.php, downloaded 26th November 2010.
[72] Great Britain, Cabinet Office, *Successful IT: Modernising Government in Action*, (London, HMSO, 1999), page 3.
[73] OECD, *The Hidden Threat to E-Government: Avoiding Large Government IT Failures*, OECD Public Management Policy Brief, PUMA Policy Brief No 8, March 2001, http://www.oecd.org/dataoecd/19/12/1901677.pdf, downloaded 24th November 2010.

[74] OECD, *The Hidden Threat to E-Government: Avoiding Large Government IT Failures*, OECD Public Management Policy Brief, PUMA Policy Brief No 8, March 2001, http://www.oecd.org/dataoecd/19/12/1901677.pdf, downloaded 24th November 2010, page 3.
[75] Great Britain, Cabinet Office, Office of Government Commerce, *Senior IT Forum*, http://www.ogc.gov.uk/procurement_initiatives_senior_it.asp, downloaded 26th November 2010.
[76] Great Britain, Cabinet Office, Office of Government Commerce, *Government Procurement Code of Good Practice for Customers and Suppliers*, No Date, http://www.ogc.gov.uk/documents/cp0080_Gov_Procurement_Code_Good_Practice.pdf, downloaded 8th December, 2010, page 2.
[77] Great Britain, House of Commons, Work and Pensions Committee, *Management of Information Technology Projects: Making IT Deliver for DWP Customers*, HC 311, Third Report, Session 2003-04, (London, HMSO, 2004), page 5.
[78] Collins, T., 'Commons Support Grows for Gateway Publication', *Computer Weekly*, 13th July 2004, p.1.
[79] Great Britain, House of Commons, Work and Pensions Committee, *Management of Information Technology Projects: Making IT Deliver for DWP Customers*, HC 311, Third Report, Session 2003-04, (London, HMSO, 2004), pg.27.
[80] Great Britain, House of Commons, Work and Pensions Committee, *Management of Information Technology Projects: Making IT Deliver for DWP Customers*, HC 311, Third Report, Session 2003-04, (London, HMSO, 2004), page 28.
[81] Great Britain, House of Commons, Work and Pensions Committee, *Management of Information Technology Projects: Making IT Deliver for DWP Customers*, HC 311, Third Report, Session 2003-04, (London, HMSO, 2004), page 28.
[82] Great Britain, National Audit Office, *Improving IT Procurement: The Impact of The OGC's Initiatives on Departments and Suppliers in the Delivery of Major IT-Enabled Projects*, November 2004, (London, HMSO, 2004), page 64.
[83] Collins, T., 'Minister to Consider Computer Weekly's Plan to Stop IT Disasters', *Computer Weekly*, 6th July 2004, p.14.
[84] Great Britain, National Audit Office, *Delivering Successful IT Enabled Business Change*, HC 33-1, Session 2006-2007, (London, HMSO, 2006), page 10.
[85] Great Britain, National Audit Office, *Delivering Successful IT Enabled Business Change*, HC 33-1, Session 2006-2007, (London, HMSO, 2006), page 10.
[86] Great Britain, National Audit Office, *Delivering Successful IT Enabled Business Change*, HC 33-1, Session 2006-2007, (London, HMSO, 2006), page 10.
[87] McFarlan, F.W., 'Portfolio Approach to Information Systems', *Harvard Business Review*, 1981, Sept-Oct, pages 142-150.
[88] Perry, G., 'Officials Blame Suppliers for Delays to NHS IT Scheme', *Project Central*, 2006, http://www.project-central.co.uk/blog/?p=7, downloaded 9th December, 2010.
[89] Anon., 'Criticisms of NHS IT Programme Were Cut from NAO Report', *e-Health-Insider*, August 2006, http://www.e-health-insider.com/news/2079/criticisms_of_nhs_it_programme_were_cut_from_nao_report, downloaded 9th December, 2010.
[90] Great Britain, House of Commons, Public Accounts Committee, *Ministry of Defence: Delivering Digital Tactical Communications through the Bowman CIP Programme*, Fourteenth Report of Session 2006-2007, HC 358, (London, HMSO, 2007).

# Chapter Five
# Defence Information Infrastructure Programme: Context, Setting and Process

## 5.1. The Case Study Context

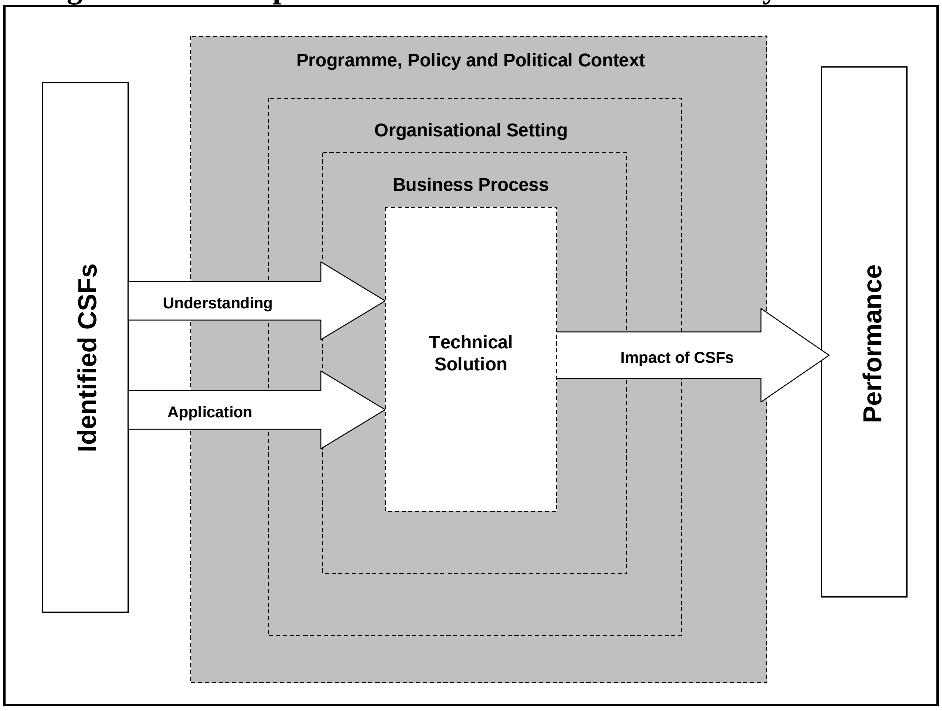
Having identified the Critical Success Factors (CSFs), the next stage of this study is to determine whether they have been understood and applied in practice and, if so, to what effect. As discussed in Chapter Three, case study was selected as the most relevant and viable research methodology, defined by Yin as:

> …an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident.[1]

Yin's emphasis on the unclear boundaries between phenomenon and context fits well with the research question and with the causal analysis, which asks whether the phenomenon under investigation, the identified CSFs, has resulted in improved performance with regard to the Information Technology (IT) project under scrutiny. This chapter begins the analysis of this case study, the Defence Information Infrastructure (DII) Programme, an IT mega-project initiated by the Ministry of Defence (MoD) in 2000 and continuing to date. The examination is based on primary data collected via the interview process discussed in Chapter Three and secondary data, particularly reports. This case study begins with an examination of the context in which the DII Programme is being developed and implemented, closely following the logic described by the Conceptual Framework, shown again at Figure 5.1.

IT projects within both public and private sectors operate within the constraints of the 'Business Process' and 'Organisational Setting', both of which impact on the 'Technical Solution'. However, a government IT project faces additional complexity as a result of

**Figure 5.1. Conceptual Framework: the DII Case Study: Context**




**Source: Author**

the 'Programme, Policy and Political Context'. A series of factors within this context restrict action, such as the law, civil service rules, and public and parliamentary scrutiny. In addition, these projects are subject to the short-term political framework that directs policy-making.[2] Policy is designed to translate "political priorities and principles into courses of action to deliver designed changes".[3] Therefore, this layer controls the Organisational Setting, Business Process and, ultimately, any proposed Technical Solution. As quoted in Chapter Two, Mitev argues that the "larger social and political processes through which the interests of different social groups interact with one another and with the technology" need to be investigated in any examination of an IT project.[4] She also highlights Belassi and Tukel's view of the importance of interrelationships between factors. Therefore, it is the outer three layers that will be considered in this chapter, unpeeling the complexity surrounding a government IT project in order to understand the impact of those layers as they interact across their boundaries. The chapter structure follows the route highlighted in the Conceptual Framework diagram, beginning with a discussion of the 'Programme, Policy and Political Context' before moving to the 'Organisational Setting' and the 'Business Process'.

## 5.2. Programme, Policy and Political Context

This section begins by considering the policy that translates politics into programmes or courses of action, examining how the political climate has broadly changed in the past decades before assessing recent policy to improve procurement and project management in government. Since the end of the Second World War, successive governments have worked at reforming the public sector by increasing or decreasing the civil service, centralising or decentralising control, or creating new kinds of relationships between the public and private sectors.[5] The term 'New Public Management' (NPM) was coined in the 1980s to describe this philosophy of modernising government by applying business tools and techniques to achieve improved efficiency and control.[6] NPM is strongly associated with the rising public sector interest in project management due to the need to cut costs and improve operations.[7] Whilst the political emphasis of these reforms has shifted over time, there has been a general move from monopoly state provision to a public service economy that collaborates with the private and voluntary sectors.[8] This has been driven by the adoption of private sector management methods, the privatisation of services and functions, and the introduction of complex partnerships.[9] A range of initiatives has resulted, such as Compulsory Competitive Tendering in the 1980s;[10] the New Management Strategy of the late 1980s;[11] Market Testing in the 1990s;[12] the Private Finance Initiative (PFI) introduced by the Conservatives in 1992 and the creation of Public-Private Partnership (PPP) by the subsequent Labour administration;[13] and the rise of the public services industry, using external providers to deliver public services, a policy that has accelerated rapidly since the 1980s.[14]

It is the policies and reforms of the Labour Government, in power between 1997 and 2010, which have affected the DII Programme to date, resulting in a shift to modern practice, but essentially based on incremental developments from previous reforms.[15] The modernisation agenda is set to continue under the Coalition Government.[16] For Labour, IT was seen as a critical means of modernising public services, expressed in two guiding white papers: *Modernising Government* published in 1999 and *Transformational Government Enabled by Technology* in 2005. *Modernising Government* made a key commitment to information age government, implying the need for improved skills, whilst *Transformational Government* emphasised the importance of IT to the delivery of services and shared services, explicitly highlighting the need for increased professionalism in the planning, delivery, management and governance of IT-enabled change.[17] These policies resulted in massive investment in IT, coinciding with recognition of the parlous state of major government IT projects, as discussed in Chapter Four.[18]

The substance of the McCartney Report was the recognition of the need for much higher levels of competence and capacity in government. This stance was reinforced in subsequent reports on IT failure but also dominates a series of related reports on improving the management of government procurement, particularly in relation to the purchase of goods and services, ranging from commodities to major IT and construction projects. A selection of these initiatives is considered here, viewed largely through the lens of the National Audit Office (NAO), the independent, statutory authority that examines the economy, efficiency and effectiveness of government. Reference is also made to documents from other sources where relevant. The NAO reports track government action over time, using a consistent methodology and providing a coherent commentary on the effect of government policy. They are discussed chronologically but threads are followed through where necessary for the sake of a more logical discussion.

Just prior to McCartney, Gershon's 1999 *Review of Civil Procurement in Central Government* found a lack of skills and common processes for managing large, complex procurements and suppliers.[19] His recommendation that government procurement should be centralised resulted in the creation of the Office of Government Commerce (OGC) in 2000 and he became its first Chief Executive (CE). The Efficiency Reforms of 2004 extended the OGC's remit to the MoD, initially excluded, and to the wider public sector.[20] However, with no direct authority, it could only promulgate best practice through guidance and advice.[21] As discussed in Chapter Four, its key initiatives came from the McCartney Report: Gateway Reviews; Centres of Excellence; the Successful Delivery Toolkit; and the Programme and Project Management Specialism and

Successful Delivery Skills Programme to improve skills in government.[22] In 2007, it was reduced in size by about half and its brief again curtailed to just central government, while its power to intervene was increased.[23] It can now set procurement standards for departments; monitor their performance through procurement capability reviews; and demand collaboration in buying common goods and services.[24]

In 2002, the NAO released its *Better Public Services through e-Government* report, highlighting government's inability to deliver IT projects to intended cost, time and quality standards. It noted the need for strong leadership and high quality staff. In 2003, this was reiterated in *Managing Resources to Deliver Better Public Services*, which urged departments to make use of the OGC's resources while praising the Government's introduction of three-year budgets, greater flexibility to carry funds forward and commercial style budgeting and accounting.[25] The NAO re-examined resource management in 2008 with *Managing Financial Resources to Deliver Better Public Services*. Its focus remained on skills, governance and compliance as, despite the Treasury's requirement for all departments to have a professionally qualified Finance Director on their Board by December 2006, six had failed to do so. This included the MoD, although it was in the process of recruiting.[26] None of the Permanent Secretaries held a professional finance qualification.[27] This lack of financial skills, particularly amongst budget holders, was seen as one of the most significant barriers to improving financial resource management across government.

Back in 2003, the OGC's *Making a Difference: Reducing Bureaucracy in Central Civil Government Procurement* repeated the call for greater use of OGC resources, along with the need to improve leadership, decision-making, commercial skills and project management.[28] It also criticised the bureaucratic procurement process, seen as a deterrent to many potential suppliers, and urged departments to share more information with suppliers earlier in the process. In 2004, the NAO considered the impact of the OGC in *Improving Procurement*, arguing again for wider acceptance and application of its advice; regular consideration of procurement performance at board level; and finding ways to allow smaller businesses to compete.[29] It also highlighted the need to improve procurement capability by raising commercial awareness; more proactive management of suppliers; managing the risk of too few suppliers for key commodities; developing procurement expertise; and better targeting of Value for Money (VfM). In 2004, the NAO returned to its scrutiny of the OGC with *Improving IT procurement: the Impact of the Office of Government Commerce's Initiatives on Departments and Suppliers in the Delivery of Major IT-Enabled Projects*.[30] It concluded positively: structures were in place to minimise the risk of IT failure and the behaviour of both government and suppliers was changing. This examination of the OGC was repeated in 2005 by the House of Commons Public Accounts Committee (PAC).[31] It praised the Gateway Reviews for increasing scrutiny and highlighting potential risks but noted that they were not being taken seriously by all departments, as discussed in Chapter Four. The key theme of the report was the variable use of OGC resources and, as a result, it called for more stringent means of enforcing good practice.

In December 2006, central government spent around £1.8 billion on consultancy services, largely to support IT and project management. With its report on *Central Government's Use of Consultants*, the NAO highlighted the need to improve VfM.[32] Departments should collect adequate information to improve decisions on the use of consultants then actively engage with the major consulting firms to understand how they work. It suggested using internal staff where possible; using different methods of payment, such as fixed price or incentivised contracts; and building greater commitment from consultants to making projects a success. It reiterated the OGC's 2002 *Making a Difference* report, encouraging departments to engage with the market earlier, enabling consultants to gain a better understanding of the requirement. The NAO returned to the subject of consultancy in 2010 with its *Central Government's Use of Consultants and Interims* report.[33] It found that only limited progress had been made since 2006 and, although spending on consultancy and interims had dropped to £1 billion, there was still no evidence of VfM.[34] This, it believed, was due to the inability to manage consultants effectively. In addition, departments were not always following best practice nor were they assessing the performance of consultants.

As a result of the Treasury's *Transforming Government Procurement* in 2007, the CE of the OGC became the professional head of Government Procurement Services (GPS) and departmental reviews were initiated to ensure standards were being met and VfM delivered.[35] The aim of the Capability Review Programme was to ensure that the civil service leadership has the knowledge and skills to develop and deliver departmental strategies, and to provide assurance of future delivery.[36] The NAO reviewed the Programme in 2009 and concluded that there had been no improvement in the delivery of public services, despite the fact that capability weakness featured prominently as part of board business.[37] The other initiative established by *Transforming Government Procurement* was the Major Projects Review, the scrutiny of major central government projects by a panel of government commercial experts, designed to assess the certainty of benefits delivery, affordability and VfM, defined as the "optimum combination of whole-life cost and quality (or fitness for purpose) to meet the users' requirement".[38] Unlike the Gateway Reviews, this Group has the power to stop a procurement project, although there is no evidence of it having done so.[39]

The NAO reported in 2008 on *Central Government's Management of Service Contracts*, including IT, security, catering and cleaning.[40] It found examples of good senior level engagement with suppliers, benchmarking and joint working between government organisations and suppliers, but a failure to prioritise contract management or to allocate appropriate skills and resources to it. Risk management processes were poor, there were weaknesses in key performance indicators and limited use of financial incentives to improve supplier performance. It estimated that improved contract management could save up to £290 million a year, as well as improving the quality of service provision.[41] As a result, the NAO, in association with the OGC, produced a framework for good practice in contract management.[42]

In April 2009, the Treasury's *Operational Efficiency Programme* highlighted the need for greater governance of IT-enabled change projects; the strengthening of the Gateway process by introducing a 'starting gate'; the implementation of portfolio management processes, greater standardisation and simplification of IT across the public sector; and the development of internal IT capability.[43] At the same time, the OGC issued a *Joint*

*Statement of Intent for IT Programmes and Projects* (JSI) as part of its Programme and Project Delivery initiative.[44] It noted that a range of factors might cause an IT project to stray from its original objectives, including global or national events, new policies or deliberate changes to requirements. These changes often result in the charge of failure, even if they have been formally approved. In addition, poor practice and unhelpful behaviour by both contractor and supplier were seen as a source of problems. The JSI develops a shared contractor and supplier view of the intended benefits of an IT project by adopting seven key principles:

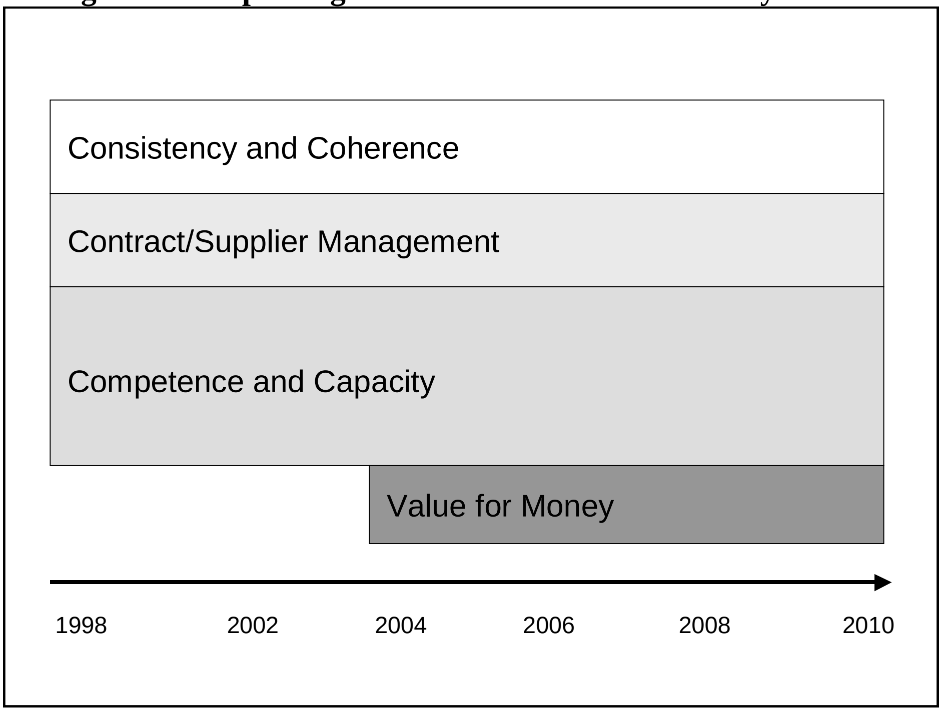
1. Appropriate governance;
2. Open dialogue and positive behaviours;
3. Using best practice;
4. Focus on business outcomes;
5. Appropriate change management;
6. Objective measurement of success; and
7. Appropriate interventions.

The result of this process should be an unambiguous definition of success or failure and a mechanism for monitoring how successfully client and supplier have adopted and delivered good practice. It provides a cross-government mechanism for measuring project outcomes to promote success and to avoid allegations of project failure.

In November 2009, the NAO released *Commercial Skills for Complex Government Projects*. Significant weaknesses in commercial skills and expertise meant that the VfM of 43 major government projects worth around £200 billion was at risk.[45] As the private sector takes on more responsibility for the delivery of public services, government staff need the necessary skills and experience to interact with their suppliers. However, a 2009 review by the OGC found that 44% of Senior Responsible Owners (SROs) of major projects had no substantial commercial experience.[46] The biggest skills gaps were in contract management, commissioning and managing advisers; risk identification and management; and business acumen, all of which were generally being provided by interim staff, consultants or specialist advisers. The NAO argued that over-reliance on temporary staff could lead to higher project costs and loss of knowledge. Reportedly, a majority of departmental commercial directors believed that the establishment of the OGC had done little to address these skills gaps.

Overall, these reports show a political intent to improve government procurement in a period that has seen a concerted move to e-government and greater reliance on IT; private provision rather than government provision of skills, resources and services; and a greater requirement for the capability and competence to manage these policies at a time of decreasing funding. With the same issues highlighted in report after report, it seems that government departments and agencies have failed in these endeavours to date. The issues that have been identified can be broadly categorised into four themes, as shown at Figure 5.2. Whilst not to scale, the block size of each theme indicates its emphasis throughout

**Figure 5.2. Improving Government Procurement: Key Themes**




**Source: Author**

these reports with its length indicating its recurrence over time. Three of these themes align directly with three of the CSFs identified in Chapter Four. 'Consistency and

Coherence' describes the need for common practices and processes along with compliance with best practice. 'Competence and Capacity' identifies the need for a range of skills, including commercial management, financial management, project management, risk management and IT capability. An emphasis on providing 'VfM' through procurement begins to emerge in 2004. Whilst it is the smallest of the blocks, it is one that has undoubtedly increased in importance since the financial crisis began in 2007. Whilst related to the need for improved skills, there is a clear emergence of the need for improved 'Contract/Supplier Management' in terms of improved oversight, relationships, incentives and assessment in managing the contractual relationship with the supplier.

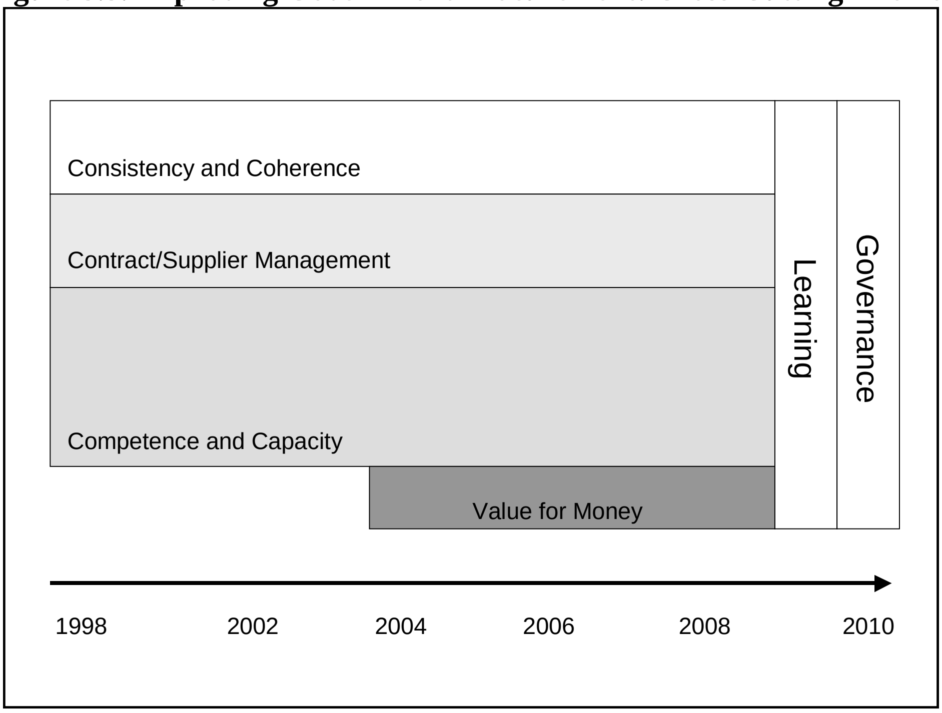
The view that there has been limited improvement in practice is reinforced by the repeated calls for central government departments to make better use of the support provided by the OGC. This suggests not only a lack of compliance but also a lack of governance and authority to ensure compliance. These points have been picked up recently by the NAO in two reports, *Helping Government to Learn* and *Assurance for High Risk Projects.* The first highlights the lack of priority given to learning in government departments and across government with no effective tools for capturing and sharing it, whilst high staff turnover leads to a loss of knowledge.[47] In addition, no time is allocated to the capture of lessons within projects. The Head of the NAO noted that:

> …projects and programmes are more likely to succeed and keep to time and budget where lessons have been learned and experience shared…Getting better at learning from the past will help government secure better VfM in the future.

In June 2010, the second report was published in the wake of the newly elected Government. It recommends a central, mandatory system of assurance in government and argues that high-risk public sector projects, which are frequently large scale, innovative and rely on complex relationships between diverse stakeholders, present a level of risk that no commercial organisation would consider. Whilst recognising the positive impacts of the OGC Gateway Reviews and the Major Project Review Group, the lack of an integrated system is limiting further improvements. A new assurance system should trigger further interventions where necessary; provide the ability to plan and resource assurance activity; systematically propagate lessons learned; and minimise the burden placed on projects.

These two reports capture the essence of the problem with two cross-cutting themes, as shown at Figure 5.3, 'Learning' and 'Governance'. The latter term is used in preference to 'Assurance' as it more clearly demonstrates the need for much stronger authority in terms of directed, required compliance with policy rather than simply guarantees of adherence. This emphasis on compliance reinforces the discussion in Chapter Four, Section 4.2.4, about the lack of governance in government and the need to

**Figure 5.3. Improving Government Procurement: Cross-Cutting Themes**




**Source: Author**

ensure that the political priorities and principles that emerge from the 'Programme, Policy and Political Context' are translated into "courses of action to deliver designed changes" within the 'Organisational Setting', which then filter through to the 'Business Process'.[48] However, the evidence here, relating to what government does and what it needs to do, suggests a chasm between policy and process, which may well be having an impact on performance. In order to examine this further, the lens narrows to consider the next layer surrounding DII, the 'Organisational Setting', the MoD.

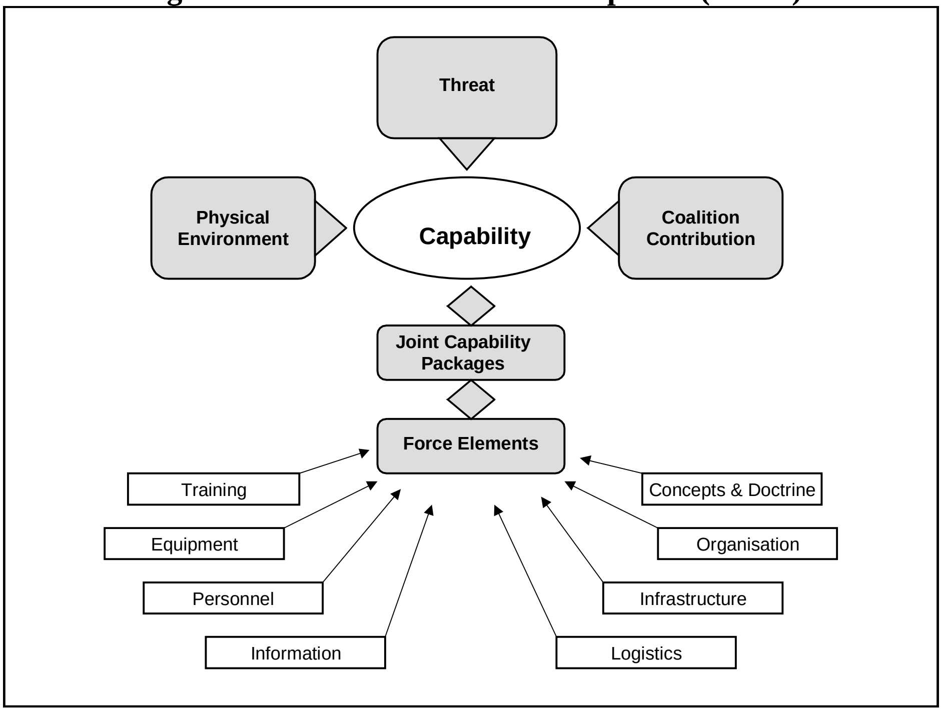
## 5.3. Organisational Setting

This section examines how the 'Programme, Policy and Political Context' has been translated within the 'Organisational Setting' of the MoD, which is one of the largest and most diverse of the Departments of State, described by the NAO as "a complex Department".[49] Like any large organisation, it has multiple organisational layers, a great variety of stakeholders and a wide range of activities, making any planned organisational change and, therefore, any IT development and implementation, potentially problematic.[50] In order to understand this setting, this discussion begins by describing the MoD's structure and organisation before examining its recognised problems with procurement, which are then related back to the issues identified in the 'Programme, Policy and Political Context'.

### 5.3.1. Ministry of Defence: Structure and Organisation

Uniquely, the MoD is both a State Department and a military headquarters, led by both a military officer and a civil servant.[51] The Chief of the Defence Staff (CDS), the professional head of the Armed Forces, is responsible for military capability and operations, whilst the Accounting Officer, the Permanent Secretary (PS), manages the Department and oversees the use of public funds.[52] The Department provides military capability through 'force elements' (ships, aircraft etc.).[53] These are provided with a range of facilities that accord to a framework called the Defence Lines of Development (DLoD), shown at Figure 5.4, covering eight critical aspects to be addressed as the force elements move from planning to operations: training, equipment, personnel, logistics, information, infrastructure, concepts and doctrine, and organisation. This capability is identified and procured within the resources allocated by the Treasury and in accordance with Defence policy. Defence strategy filters through a number of stages to the *Defence*

**Figure 5.4. Defence Lines of Development (DLoD)**




**Source: Great Britain, Ministry of Defence, 'What is Through Life Capability Management?'** ***Acquisition Operating Framework,*** **December 2010, http://www.aof.mod.uk/aofcontent/operational/business/capabilitymanagement/capabilitymanagement_whatis.htm, downloaded 14th January 2011.**

*Plan*, which allocates objectives to sub-strategy owners, the Top Level Budget holders (TLBs), Process Owners and SROs.[54] The TLBs control operating costs and have delegated authority in a range of areas, including finance, personnel and commercial. They operate to Short-Term Plans (STPs), spanning a four-year period and covering the operating costs of Defence.

In 2010, the MoD had an allocated budget of £36.9 billion in Total Departmental Expenditure Limit (Total DEL).[55] It has personnel deployed across the globe, responsibility for a range of different bodies, including agencies, trading funds, museums and a large and varied estate. Its assets include £82.4 billion of land, equipment and buildings and £6.2 billion of stocks.[56] As a Government department spending large amounts of taxpayers' money, it operates within the public expenditure planning, control and accountability framework.[57] However, despite these checks and balances and despite its remit to procure within allocated resources, the MoD has a poor record of delivering complex technology projects to time and cost.

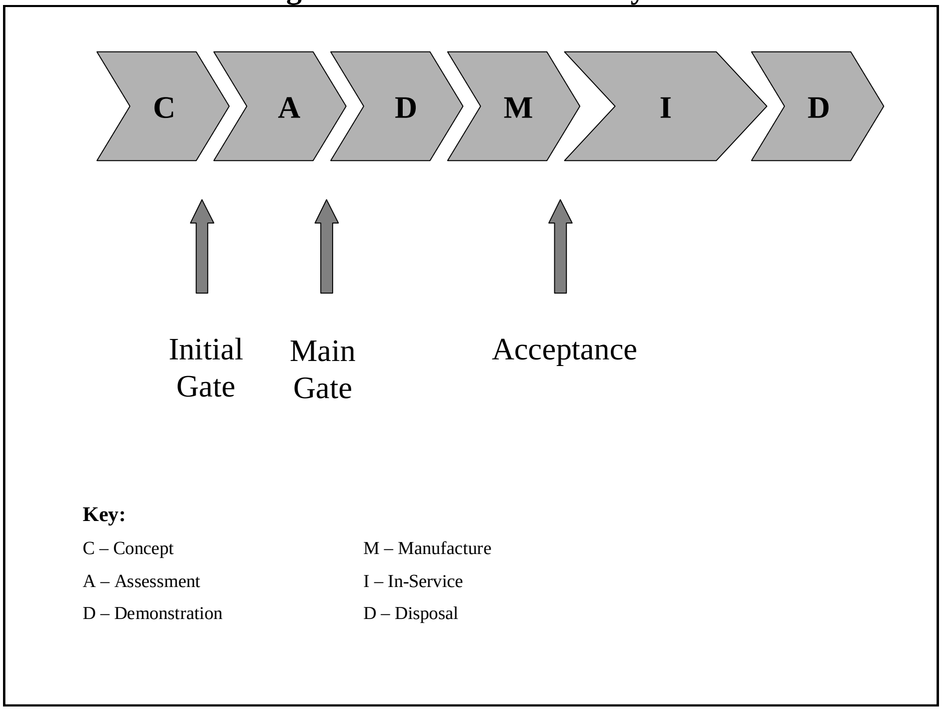
### 5.3.2. Defence Procurement: a 'Conspiracy of Optimism'?

The rising costs of Defence equipment set against a diminishing budget were discussed in Chapter One. In 2003, Hartley estimated that, between 1990 and 2000, real Defence spending in the UK had fallen by some 23%,[58] while equipment costs rose by some 10% per annum in real terms, a doubling of costs every 7.25 years.[59] More recently, there has been a debate over the realities of this equipment inflation with Kirkpatrick arguing for its existence,[60] whilst Chalmers argues against.[61] It is not within the scope of this study to enter this debate but there is evidence that Defence procurement is not operating effectively within the public expenditure planning, control and accountability framework.

Kirkpatrick notes the likelihood of variation in the cost of military equipment as it moves through the stages of the procurement process, the so-called CADMID cycle.[62] CADMID describes the acquisition lifecycle from the initial identification of a gap in capability to the delivery, use and, ultimately, disposal of that capability, as shown at Figure 5.5. Similar to the Gateway Review Process identified in the McCartney Report and discussed in Chapter Four, there are two main approval points (Gates) required at key stages in this cycle. Kirkpatrick observes the tendency for whole-life costs to increase as the project moves through this cycle. Set alongside the overly optimistic initial forecasts, the result is spiraling, potentially uncontrollable, costs.[63]

Sir Peter Spencer, Chief of Defence Procurement (CDP) between 2003 and 2007, described Defence procurement as a 'conspiracy of optimism' with its tendency to ignore potential risks, such as cost increases.[64] His view is confirmed by the NAO's annual review of the MoD, the *Major Projects Report*, which assesses the 20 highest value equipment procurement projects in the Demonstration and Manufacturing phases of the CADMID cycle and the ten largest projects in the Assessment phase.[65] Over the years,

**Figure 5.5. The CADMID Cycle**




**Source: Great Britain, Ministry of Defence, Defence Acquisition High Level Blueprint, (London, HMSO, October 2008), page 13, http://www.aof.mod.uk/aofcontent/downloads/Defence_Acquisition_Blueprint.pdf, downloaded 10th January 2011.**

this annual scrutiny has resulted in harsh criticism of the MoD for its time and cost overruns. Kirkpatrick, one of the few to critique the NAO's accounting process, suggests that selecting the most complex and expensive projects produces an unrepresentative sample of the MoD's total acquisition programme.[66] However, he concurs with the NAO's assertions that the MoD consistently underestimates technical risks and their consequences, whilst being over-optimistic about forecast costs, suggesting a serious deficiency in project management skills. He also notes that it undertakes inadequate preparatory work resulting in cost overruns and delays later on; ignores or underestimates risks, giving a delusion of accuracy in approved budgets and schedules; and sometimes ignores the financial and operational penalties of delay.[67]

In 2009, the NAO found a shortfall of between £6 billion and £36 billion in the MoD's allocated budget and planned expenditure.[68] The inevitable conclusion was that the cost of the major procurement programme was no longer affordable.[69] The spotlight is now firmly on the MoD and its budget management. On 19th October 2010, the Prime Minister presented the *Strategic Defence and Security Review* (SDSR), noting that the "£38 billion black hole in the future Defence plans (was) bigger than the entire annual Defence budget of £33 billion". He described the MoD as "too big, too inefficient and too over-spent", requiring it to become "smaller, smarter, and more responsible in its spending".[70]

The MoD has responded to these continued criticisms with a series of proposed actions from both within and outside Defence over the past twelve years, the most influential of which are shown in greater detail at Appendix 5. They include the move to Smart Acquisition, which set in train guiding principles for the procurement process: a whole-life approach; Integrated Project Teams (IPTs); better relations with industry; increased investment early in the project; effective trade-off between cost, time and performance; new procurement approaches; and a streamlined process for project approvals. Alongside this, there have been numerous NAO analyses to improve Defence projects, identifying the need for better relations with industry; clear responsibility and lines of authority; improved project management, commercial management and risk management skills; a focus on project delivery; and learning from experience. The wide ranging 'Haddon-Cave Report' on the mid-air fire on Nimrod XV230 in Afghanistan considered not only airworthiness but also the Defence context and environment, highlighting problems with the competence and capacity of both the MoD and the supplier, the effects of a sustained period of organisational change and poor procurement practices.[71] Finally, the NAO's *Strategic Financial Management of the Defence Budget* highlighted the need for better financial controls, the rebalancing of the financial programme and improved skills.[72]

The themes within the MoD reports repeat those that appeared within government policy, discussed above, suggesting a lack of response at the operational level. They stress the need to manage the complexity of Defence procurement, requiring a range of skills, including project management, risk management, contract management, along with the need for financial and technical skills. Issues with supplier relationships are highlighted, particularly in terms of trust, transparency and communication. Governance and authority also need to be improved. Other key areas are poor estimations regarding the affordability of procurement projects and the VfM that they deliver.

Not only do these reports identify similar themes, they also repeat the six broad themes identified in Section 5.2 as well as the more specific CSFs identified in the analysis of government reports on IT project failure in Chapter Four. Their recommendations can be fitted into the twelve categories stemming from that analysis, as shown at Appendix 5. As discussed above, the Government sets policy, designed to translate "political priorities and principles into courses of action to deliver designed changes".[73] In response, the MoD translates that policy to its own context, designed to deliver change in practice. The examination of the 'Programme, Policy and Political Context' suggests an overarching lack of governance and authority to ensure compliance with best practice and an apparent inability to learn the lessons. This overview of the 'Organisational Setting' shows a department with strong governance structures and strong drivers for change. However, the organisational setting for the Technical Solution is one of continued problems. This suggests that neither government nor MoD policy is having any impact on practice. The literature review raised the issue of the difficulty of learning from past experience with organisations allowing dysfunctional patterns of behaviour to continue over long periods of time and a persistent pattern of reliance on the same processes with apparent disregard for their failure to deliver.[74] This is further tested as the lens narrows to an examination of the 'Business Process' and the focus moves from Defence procurement in general to the activities surrounding the procurement of IT for the MoD.

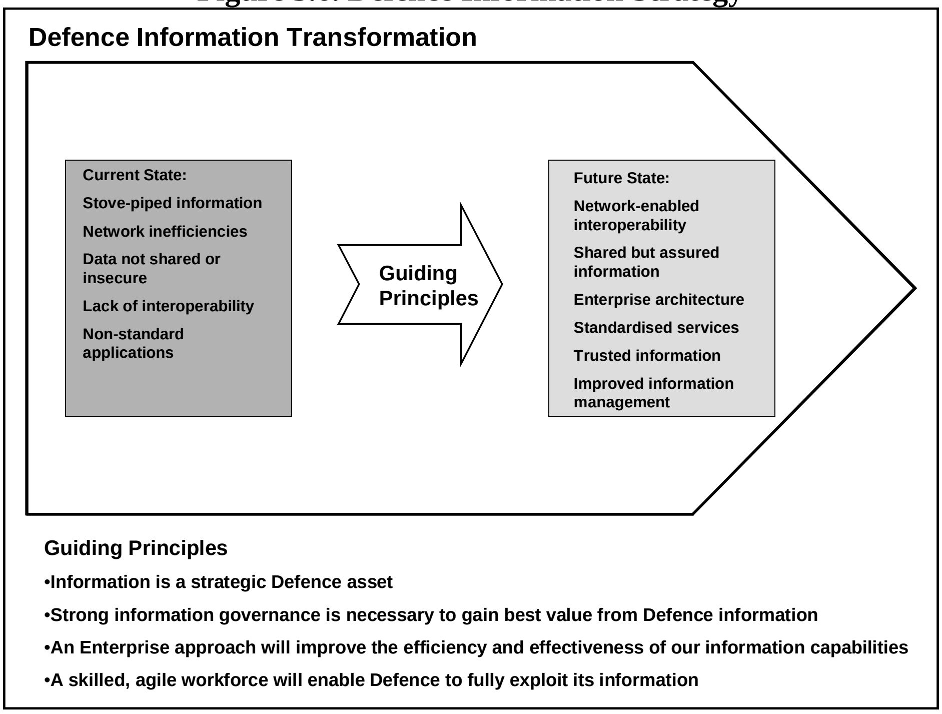
## 5.4. Business Process

Information is one of the DLoDs, as shown at Figure 5.3 above, and is, therefore, a key aspect of military capability. This is confirmed by the most recent MoD Information Strategy (MODIS), published in 2009, which sets out to transform the use and management of information in Defence and, in doing so, outlines a Vision for Defence information:

> Agile exploitation of our information capabilities to improve effectiveness and efficiency on operations and in support areas through access to, and sharing of, timely, accurate and trusted information.[75]

MODIS is a sub-strategy of the overarching Strategy for Defence[76] and, as such, it is part of the delivery mechanism for that Strategy. It demonstrates that information is vital to all aspects of Defence from front-line operations to support activities and highlights the strategic drivers for this, which include the increase in coalition and expeditionary operations, the emergence of cyber warfare and meeting the agenda set by government.[77] However, in sharp contrast to this emphasis on the value of information, MODIS also acknowledges that "progress with Information Management and Information Exploitation in Defence has been somewhat patchy".[78] The current state and desired state of Defence information, as defined in MODIS, is shown at Figure 5.6.

**Figure 5.6. Defence Information Strategy**




**Source: Great Britain, Ministry of Defence, *MoD Information Strategy*, (London, MoD, 2009).**

The 'Current State' indicates an inability to manage and share information in order to meet the vision, while the 'Future State' recognises the need for increased integration and the ability to share information both within the MoD and armed services and with Other

Government Departments (OGDs), allies and other stakeholders, such as industry.[79] This future state is based on four Guiding Principles, shown at Figure 5.7, which reaffirm the importance of information to Defence, the need for an organisation-wide approach along with the necessary skills and strong governance to manage it to best effect. This clearly demonstrates the requirement for a common platform to enable communication, collaboration and joint working.

While the required output is clear, the necessary process to deliver that output has been lacking. Davenport defines a business process as:

> A structured, measured set of activities designed to produce a specific output for a particular customer or market…a specific ordering of work activities across time and space, with a beginning and an end, and clearly defined inputs and outputs: a structure for action.[80]

In this instance, the 'specific output' is managed information and 'the structured, measured set of activities' relates to the business process for delivering that information. Therefore, in moving through the layers of government towards an examination of the 'Technical Solution', the 'Business Process' is taken to be the activities that have been put in place to deliver information, a key capability, to Defence. Nowadays, of course, both information management and its exploitation rely heavily on IT. In 2010, therefore, the Defence Information and Communications Technologies (ICT) Strategy was published, outlining a single direction for Defence and underpinning all of the Defence sub-strategies, including MODIS.[81] This notes that Defence was spending 4% of its operating costs on IT in 2010, and that "by delivering more efficient and effective ICT services this 4% can significantly improve how the remaining 96% is utilised to deliver Defence outputs".[82] However, given the situation with procurement generally, does the MoD have the business process in place to deliver more efficient and effective IT and, therefore, to exploit its information? In considering this question, this section examines the 'Current State', as described in Figure 5.6, identifying some of the factors behind the decision to move to a single information infrastructure, before going on to consider the business processes that have been put in place to deliver the ‘Future State’, in part through the DII Programme.

### 5.4.1. Defence Information: the Current State

As discussed in Section 5.2, the 1999 *Modernising Government* white paper, reinforced by *Transforming Government* in 2005, drove the move towards information age government, aiming to take the UK to the next level of e-government maturity, re-engineering back office services and incorporating information systems. In the MoD, *Modernising Government* was translated into *Modernising Defence*, aiming to integrate Defence more closely with other government departments, increase coherence in systems and procedures, and implement innovative changes in working practices and business solutions.[83] The MoD tasked five project groups to translate the five key commitments detailed in *Modernising Government* to Defence.[84] The organisation originally assigned to the information age commitment was later replaced with the Department of the Director General Information (DG Info), which was created to fill a gap in the MoD’s organisational structure with an overarching and corporate strategy for information.[85] However, it became increasingly evident that, somewhat ironically, Defence was being prevented from meeting that information age government agenda, from setting a corporate strategy and, therefore, from fully exploiting its information resources due to the state of its IT infrastructure.

The chaotic situation of Defence IT was largely a result of the Government’s adoption of the New Management Strategy in the late 1980s, designed to align accountability with delegated financial and management responsibilities. In the MoD, this meant that there was very limited allocation of money for IT. Responsibility for spend on ‘non-operational’ IT funding was delegated to the TLBs without any initial strategy, opening the way for a decade of random and uncontrolled spending with no mechanism for tracking overall expenditure. Many of these senior managers, it is suggested, viewed IT as an unnecessary luxury so that much of the IT procurement resulted from end-of-year spend to balance the books, rather than being a planned process.[86] This also meant that there was often no finance for ongoing support. For example, 150 PCs were reportedly stacked in a warehouse for 18 months because funds were available to buy them at the end of the financial year but there was then no money left to install them.[87]

While some larger, more centralised information systems were developed during this time, such as Corporate Headquarters Office Technology System (CHOTS), Unicom (the Army Unit Computer system), ISIS (the Army Secret infrastructure) and NavyNet, they each had a different approval process: the Investment Appraisal Board (IAB) formally approved CHOTS, other systems were approved at TLB level whilst there is no evidence of others having undergone any form of official approval at all. Similarly, each had different procurement arrangements: the system and service for CHOTS was outsourced, while the Royal Signals and Civil Service dealt with ISIS in-house. Within all this, there was considerable obsolescence, variable technology, variable service levels and patchy security. With no centralised view of Defence IT, the MoD struggled to integrate these multiple applications, a situation that severely hampered information sharing. This confirms the findings of Hackney and McBride, discussed in Chapter Two, that the cultural decentralisation of IT projects causes the proliferation of unlinked systems with operational factors overriding the need for management information from these systems and, ultimately, sub-cultural barriers being reinforced as a result of system incompatibility.[88]

The need for change was brought into sharp focus in 2000 when the Defence Procurement Agency (DPA) and the Defence Logistics Organisation (DLO) were formed as a result of the 1998 SDR and Smart Acquisition initiative and, not surprisingly, the two organisations wanted to share information, both internally and with industry.[89] In addition, there was a need to re-compete the contract for CHOTS, which was procured in 1991 to provide one of the few means for personnel to communicate securely at 24 Headquarter locations and more than 200 overseas locations.[90] DLO had absorbed a number of single service organisations and, as a result, had inherited a significant number of information systems. In accordance with the general picture of Defence IT at that time, the single services had developed bespoke systems to manage their own specific inventories and logistics chains. Not only was information sharing inadequate, there was no centralised view, making asset and configuration management difficult. Grappling with the large number of bespoke IT systems was a challenge for the DLO, delaying some of its overarching projects while attempts were made to convert these highly fragmented systems into a coherent whole.[91] It was evident that these systems could not meet the challenges required of the 21st Century MoD and armed services.

In 2000, the DLO initiated a major change programme, including a set of IT projects: the Defence Stores Management Solution (DSMS) to replace and modernise the separate warehouse and inventory functions held by the three services, giving a single view of the Defence inventory and allowing stock reductions and related savings; Delivering the Requirement for Unit Materiel Management (DRUMM) to improve management of engineering activity and provide visibility of the technical status of assets for Army Units; and In-Transit Visibility (ITV) to replace the legacy consignment tracking systems and provide an in-theatre stock management function. All three were subsequently cancelled, as discussed in Chapter One. In 2002 and 2003, the DLO established successor projects, designed to follow an incremental approach in accordance with McCartney's recommendations. These included Management of Materiel in Transit (MMiT), which succeeded ITV; Management of the Joint Deployed Inventory (MJDI), which followed some aspects of DSMS and ITV; and the Joint Asset Management and Equipment Support (JAMES) series of projects, which built on the DRUMM requirement.

This was a timely decision. In 2003, the NAO reported on Operation Telic, the codename for British operations in Iraq, which had begun earlier that year. It found that the means of tracking supplies was ineffective and inefficient, raising questions about the ability of the logistics systems to meet operational needs.[92] By and large, this was a reiteration of the problems that the DLO had itself identified in 2000 but failed to rectify with DSMS, DRUMM and ITV. There is little detailed information on the three successor projects in the public domain. The available evidence suggests that they are nearing delivery but that their development and implementation has not run smoothly.

In order to counteract the anarchy in Defence IT and to provide a focus, the tri-service Defence Communications Service Agency (DCSA) was formed in 1998. Its purpose was "to maximise Defence operational effectiveness and business efficiency through the delivery of integrated information solutions". DCSA identified the need for a coherent network; secure, integrated information services leading to coherent information; organisational autonomy of its infrastructure; and efficiencies through economies of scale.

Its focus on a coherent network was reinforced with the creation of the Defence Change Programme (DCP) in 2002. Led by the Secretary of State, this brought together the top 40 Defence change initiatives into a consistent programme aligned to the MoD's strategic priorities.[93] The original components of the DCP included the heavily IT-based Head Office Modern Environment (HOME) project; the Improved Budgeting and Planning Process, resulting in resource based accounting and output costing; the transformation of human resource management through the use of the Joint Personnel Administration (JPA) system for forces staff and the Human Resource Management System (HRMS) for MoD civil servants; Modernising Estates Delivery, which was aimed at improving the condition and use of the MoD estate; and the first Defence Information Strategy, which included the requirement for DII. A single information infrastructure was, therefore, both a component of the DCP and also critical to its delivery, enabling 12 of the key programmes, including JPA and HOME.[94]

There were, therefore, a number of drivers for the MoD to establish an infrastructure that would enable its valuable information to be shared across its business and battlespace. The benefits drivers can be divided into indirect (enablers) and direct (cost savings and more capability). Indirect benefits include a range of military capability and Defence modernisation drivers, such as JPA and HRMS. The direct benefit is increased capability in terms of improved information handling and improved resilience. Ultimately, DII should provide increased capability at reduced cost and improved VfM due to the economies of scale resulting from working on a single, large infrastructure rather than myriad smaller systems. It will integrate with battlefield systems and support systems to improve intelligence collection, analysis and decision-making as well as providing core systems and common desktop services, thereby moving Defence information towards its required future state as envisaged by the Networked Enabled Capability (NEC) vision and strategy.

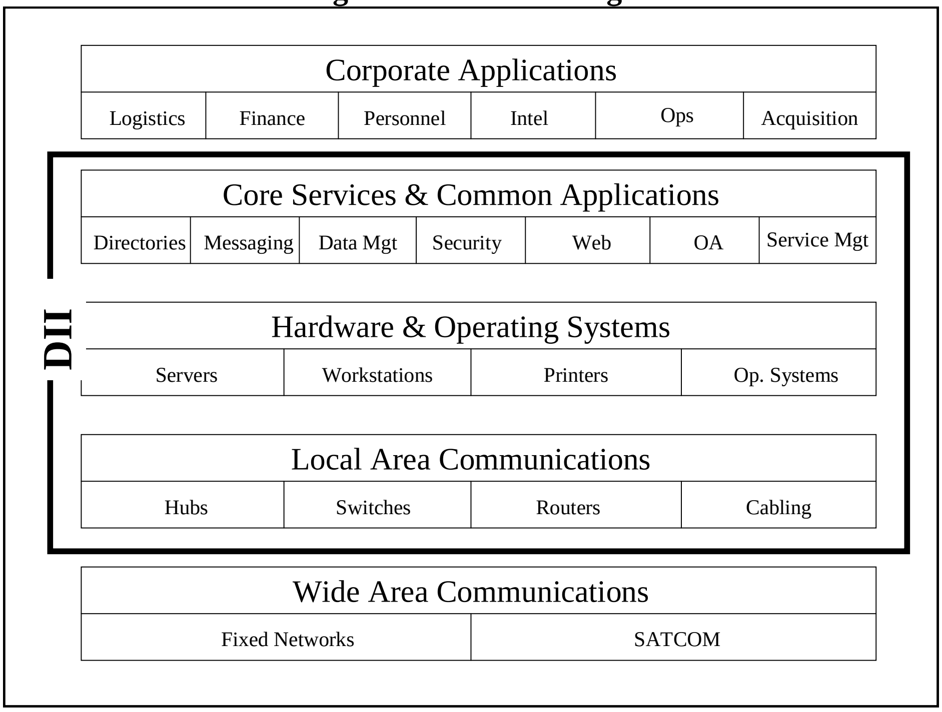
### 5.4.2. Defence Information: Achieving the Future State

DII is an ambitious project, one of the largest IT projects in the UK and set to deliver financial benefits of £1.6 billion on completion.[95] How then has the MoD gone about setting up the business process to deliver this infrastructure? This section begins by describing the creation of the DII Integrated Project Team (IPT), which later became the DII Group. It then goes on to discuss its decisions regarding the Technical Solution, whether it identified the project type, how it would be delivered, how it would be resourced and the structure of governance. The procurement process is then examined.

The DII IPT was formally established in 2000 under the auspices of the DCSA, now the Information Systems and Services (ISS) cluster, which is part of the Defence Equipment and Support (DE&S) organisation, formed in 2007 from the merger of the DPA and the DLO. The DFN (Defence Fixed Network) IPT was set up alongside it to provide Wide Area Networks (WANs), a project largely based on a PFI contract with BT. Although a separate commercial arrangement, it provides the means to connect the 2000 sites to DII.[96] Officially, the principal 'customer' for DII is the Director (Information Superiority) (D(IS)), who has now taken over from the MoD's Chief Information Officer (CIO) (formerly Director General Information (DG Info)) as the SRO for DII. However, the ultimate customers are the 300,000 military and civil service end users who will receive DII accounts, giving them access to around 1000 applications via 150,000 terminals at all UK overseas sites, on maritime platforms, at deployed Headquarters (HQs) and from other remote locations.[97] Around 150,000 of these are infrequent, occasional users and, therefore, do not need their own terminal but do require an account for access.

DII will provide core systems and common desktop services at a quality appropriate to the individual's operational or business requirements and at all classification levels from UNCLASSIFIED to TOP SECRET, as shown at Figure 5.7.[98] It delivers corporate applications, such as JPA, but does not develop or procure them.[99] Underpinned by 240

**Figure 5.7. DII Coverage**




**Source: Oldnall, M., 'Defence Information Infrastructure',** ***Presentation to Masters in Defence Administration Course,*** **(Shrivenham, Defence Academy, May 2006).**

individual infrastructures, DII will connect as many systems as possible, including Bowman battlefield radios and Skynet, a secure satellite communications system**.**[100] As discussed above, it also needs to connect with NATO forces, Non-Governmental Organisations (NGOs), other Government departments, US forces and the Internet.[101]

The first IPT Leader (IPTL) joined DCSA in February 2000, remaining in post until his retirement in 2008 but continuing on contract as an advisor. He spent his first eight months planning the incorporation of existing infrastructure and Business Units into DII before the IPT was formally established in October 2000 with the transfer of CHOTS and the NavyNet systems along with associated members of staff. He describes this as a frustrating time. Perceived as a threat by the IT owners, he had little senior management support and no budget. However, this situation began to improve with the appointment of a new Second Permanent Under Secretary for State ($2^{nd}$ PUS), who clearly saw the benefits of a single information infrastructure. His support was reinforced by the then Chief Executive of the DCSA and the project was given further impetus by the potential demise of CHOTS and the need to equip the refurbished MoD headquarters building in Whitehall. The focus then moved to setting up the DII organisation, its objectives and processes, developing its vision ('one information infrastructure) and its mission ('to deliver to Defence a secure and coherent information infrastructure at minimum whole life cost whilst maintaining continuity of service'). These were recently revised in the light of the latest strategic environment. The vision is now: 'the trusted partners of choice for the delivery and integration of information services; enabling the transformation of Defence and secure Government effectiveness through the delivery of: One Information Infrastructure'.[102] Key to this vision is the aspiration to have a trusted partner, noting the need for an enduring dependency between buyer and supplier, which requires a long-term relationship based on trust and clear understanding of the business imperatives.[103] Both factors were identified in government and MoD policy, discussed above. This translates into the following mission: 'To develop and deliver secure and coherent information services, at minimum whole life cost, in order to enable the Defence Change Portfolio, and Equipment Capability Plans and to achieve the aims of Network Enabled Capability'.[104]

For this to work, the IPT needed to get control of the right people, the legacy systems and infrastructure, and the necessary funding.[105] In 2001, the Defence Management Board (DMB), now the Defence Board (DB), decided that all information infrastructure and legacy systems should be transferred to the IPT along with additional staff and related finance, although new applications would be delivered separately to keep risks manageable and to increase flexibility.[106] Separating the two would also make it easier to load applications onto the infrastructure in the deployed space or to change applications in the event of new software provision. It was also decided that there would be a strict governance process with an authorised list of applications, overseen by the MoD CIO. With the creation of Information Systems and Services (ISS) in 2007, the DII IPT transformed into the DII Group with the IPTL becoming the DII Head. It also took on responsibility for other information infrastructures, such as the Joint Operations Command System (JOCS) and the Royal Navy Command Support System (RNCSS), which were scheduled to migrate to DII in due course.

Having gained responsibility for introducing and upgrading new capability, the next stage for the Group was to decide how to deliver and maintain that new capability.[107] Studies demonstrated that outsourcing to a private sector Delivery Provider (DP) would be more cost effective than an in-house development. A single contract would cover the development, installation, maintenance and user support of the infrastructure, creation of a network of data centres to store information, provision of two large call centres to provide resilient service management and support to users. The DP would also take responsibility for the remaining legacy systems in each increment prior to migration to DII. It was acknowledged that the MoD lacked the skills and capacity to do this.[108] Transferring systems to the DP meant transferring relevant people under TUPE (Transfer of Undertakings (Protection of Employment)).[109] However, some technical staff and resources would be retained in-house to ensure operational capability.[110] The necessary end-user requirements were captured in the User Requirement Document (URD) and translated by the IPT into the set of services to support future operations and captured in a Service Requirements Document (SRD).

It was evident that the DII Group needed more staff at this stage. They lacked the necessary breadth of knowledge and needed high-level commercial support and legal advice. Therefore, they sought independent external assistance and the contract was awarded to PA Consulting Group.[111] They worked together on the DII contract with a view to letting it within 18 months, although it actually took 20 months. They developed a model based on the SRD that enabled comparisons to be made of variable numbers of users, sites and service levels against the options of in-house and external service delivery. The likely costs of the different procurement options were then evaluated, providing a sound basis for the resulting procurement strategy and Main Gate business case. The outcome was the decision to seek a service-based, PPP contract with the MoD paying on the basis of delivery to the desktop by the DP, while keeping the assets under MoD ownership, as required by accounting rules and to enable another organisation to take over should the DP fail.[112]

The forecasted cost was £5.8 billion over ten years, although the full cost of the deployed and TOP SECRET capabilities was unknown at that stage.[113] Unusually for MoD procurement, a contingency fund of £528 million was included, suggesting awareness of the inherent risks with such an extensive, complex project.[114] Programme funding of £6.2 billion was identified at contract letting, which provided additional flexibility, allowing for changes to implementation plans, cost and scope increases, and changes to forecast funding. In 2008, the NAO reported a forecast cost of just over £7 billion, including the deployed and TOP SECRET capabilities and dependent programmes.[115]

Having identified the means of delivery and the costs, the next problem was to find the funds. At this point, no money was allocated to this project but, in taking over the existing information infrastructures, funding previously held by the TLBs was transferred to the DII Group. However, as discussed, these systems had been run on a shoestring and, while the funding covered maintenance costs, it was insufficient to pay for updated technology or replacement systems. After much discussion, the MoD and the Treasury provided additional financial resources from the Defence Modernisation Fund (DMF) in 2003. This gave the DII Group a single budget of £450 million per annum for ten years and simplified the financial management.

It was envisaged that work would not start on the new infrastructure before Financial Year (FY) 2004/5 as time was needed to prepare for the competitive contract. In line with academic thinking, discussed in Chapter Two, and the recommendations of the reports, discussed in Chapter Four, the project was broken into modular phases or increments, rather than taking a ‘big bang’ approach: DII (Current) to support and maintain existing systems; DII (Convergent) to ensure that all resources on the information infrastructure worked towards the future requirement; and DII (Future), known as DII(F), the contract to deliver the single information infrastructure. During DII (Current), the Group managed the services being provided by MoD staff and used existing commercial arrangements to manage any services being provided by contractors. They also worked on harmonising service procedures and rationalising applications, reducing them from over 6,000 to around 600. Internet Protocol (IP) addresses and Domain Name Systems (DNS) were standardised to reduce problems with interconnections, so providing a sound foundation for the introduction of DII(F).

Life did not stand still during this pre-contract phase and there was an ongoing requirement for the replacement of legacy systems and new IT investment. The DII (Convergent) project ensured that any expenditure fitted with the DII(F) strategy. In maintaining this plan, the DII Group had strong support from the 2nd PUS. In 2002, he wrote to remind all Senior Finance Officers:

> …of the importance of scrutiny and consultation with the DII team before further IT commitments, including applications, are made in your respective areas within your TLB's delegation. Convergence towards DII can no longer be considered optional – we need to ensure that every £1 spent on IT gives us the maximum return, consistent with the DII's objectives.[116]

A number of major site developments resulted from the DCP. FY2003/4 saw the move back into the refurbished Head Office Building in London (the HOME Project) and the new builds at Andover and Portsmouth, while a number of other sites, including High Wycombe and Northwood, were restructured. These new buildings were all furnished with DII (Convergent) rather than refitting legacy systems, providing a common platform of key business software, access to user data, internal and external communication, collaborative working, an Electronic Document and Record Management System (EDRMS) and a platform for the introduction of modern technology.[117]

The third project area was DII(F), the new, competitive ten year contract to replace current and convergent DII with a single architecture. Again, in line with scholarly and policy thinking, the plan was to deliver DII(F) in three increments. Each increment was driven by the benefits realisation model and described the number of terminals (User Access Devices or UADs) and user accounts to be implemented at that stage. The original three increments were later sub-divided into seven, but have since been reduced to five, as shown at Table 5.1, as Increments 3b and 3c are currently on hold due to lack of funds.

**Table 5.1. DII(F) Incremental Development**

| | Increment 1 | Increment 2a | Increment 2b (Alamein, Blenheim and Cambrai) | Increment 2c | Increment 3a |
|---|---|---|---|---|---|
| **Scope** | Fixed DII: Royal Navy (RN) Vessels; RESTRICTED/SECRET; Managed service for DII/legacy systems | Fixed DII infrastructure replacing legacy systems with DII (RESTRICTED/SECRET) | Deployable systems and services at SECRET levels | Above SECRET to support key operations and intelligence users. | Remaining fixed MoD sites operating at RESTRICTED and SECRET |
| **Contract Award** | March 2005 | December 2006 | September 2007 | January 2009 | January 2010 |
| **Number of UADs including DII(C) (18,500)** | 72,000 (69,200 after the Medium Term Work Strands) (62,800 excluding maritime rollout) | 44,000 | 3,332 1,608 to be deployed | | 42,000 UADs |
| **Number of Users** | 201,500 (195,100 after the Medium Term Work Strands) | 57,500 | Undefined | | 60,000 |
| **Number of Sites** | 680 locations, plus RN vessels | 660 locations | 78 different HQs plus RN vessels | | |

**Adapted from: Great Britain, National Audit Office, *Ministry of Defence: Defence Information Infrastructure*, (London, HMSO, 2008), http://www.nao.org.uk/whats_new/0708/0708788.aspx, downloaded 29th January 2011.**

The implementation is further broken down into the desktop capability being delivered, which is described as Release 1 (basic core functionality necessary for most enabled benefits) and Release 2 (full functionality, mainly required to realise the direct, additional capability and benefits), shown at Table 5.2. This was later split into 2a and 2b, but is now described by three project names: Alamein, Blenheim and Cambrai. Increments 1, 2a and 3a are Release 1 implementations. Increment 2b is implementation to fixed and deployed sites and 2c is Above SECRET. Increments 3b and 3c are like 2b and 2c but include the remaining sites, which are mainly Royal Air Force (RAF). Therefore, the

RAF is receiving most of the required basic capability but there is no funding for the remainder at this stage.

**Table 5.2. Release 1 and Release 2 Core Software Functionality**

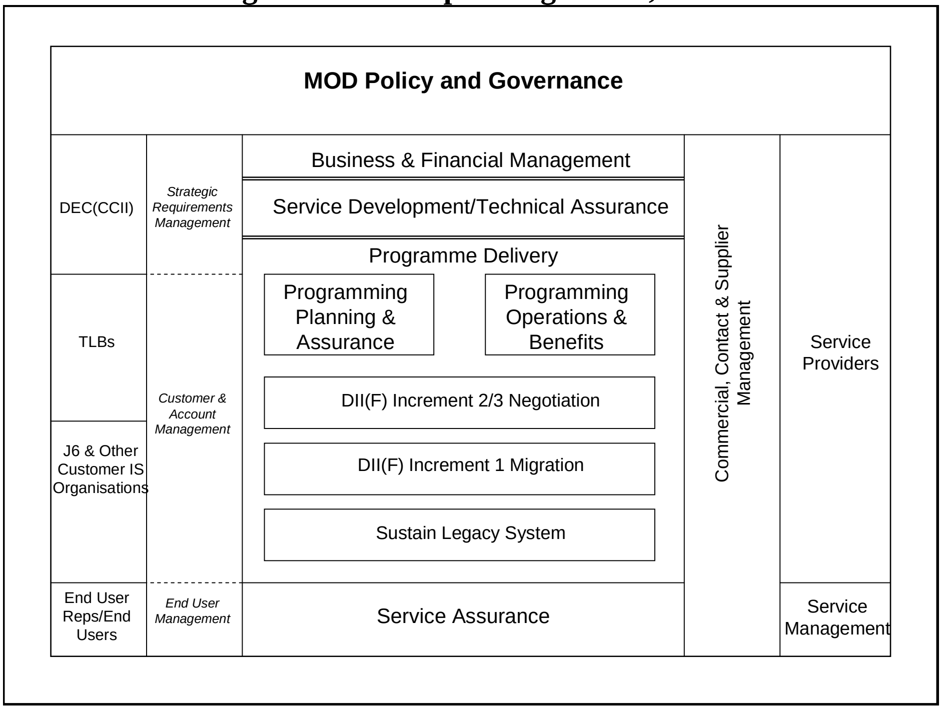
| Type of Software | Key Elements of Release 1 | Key Elements of Release 2 |
|---|---|---|
| Software that the MoD needs to conduct its business, including office automation, web-browsing and electronic document and records management. | Standard office tools, including word processing, internet and e-mail access, and standard file storage<br><br>Desktops and laptops supported<br><br>Access to a contractually agreed list of applications | Electronic Document and Records Management Services (EDRMS)<br><br>Collaborative tools<br><br>A new MoD-wide personnel directory<br><br>An enterprise-wide search capability<br><br>Scanning services<br><br>Remote access to MoD intranet for laptop users |
| Software needed to monitor the system and to deliver the managed 'end-to-end' service. This includes software to measure Key Performance Indicators and online catalogues to allow users to order additional services or changes to their existing IT environment. | Software tools to allow the helpdesk to manage contacts, user configurations and change requests<br><br>Software to track resolution and to monitor customer satisfaction<br><br>Tools to measure a contractually agreed subset of the Performance Indicators and Key Performance Indicators<br><br>Pairs of data centres holding back-up copies of all data to ensure service continuity | Tools to measure all of the Performance Indicators and Key Performance Indicators<br><br>Web and application hosting services |
| Software that is required to make the system secure from external attack and to ensure that material classified as RESTRICTED and SECRET can be handled safely. | Discrete systems that can safely handle material classified as RESTRICTED and SECRET<br><br>Identification, authentication and authorisation services, including, for instance, password protection Vulnerability testing and audit<br><br>Basic Grade Messaging | Public Key Infrastructure services supporting additional security such as signing and encryption<br><br>A domain that can handle material classified as Confidential and provide access to the Government-wide XGSI domain<br><br>Full business continuity support<br><br>Medium and High Grade Messaging |

**Source: Great Britain, House of Commons, Public Accounts Committee, *Defence Information Infrastructure: First Report of Session 2008-09*, HC100, (London, HMSO, 2009).**

The plan was to select the DP on its ability to deliver the complete ten-year requirement but with the MoD only committing to Increment 1 initially. Once successfully delivered, it would then obtain Investment Appraisal Board (IAB) approval to contract for further increments.[118] This process is essentially a contract amendment from the original contract and each increment requires a separate assessment phase and a separate Best and Final Offer (BAFO) submission from the DP. This was seen as a way of retaining control over the supplier's performance and protecting against failure.[119] It also allowed the MoD to review its requirements on a regular basis, enabling it to maintain technological currency and adapt to any changes in its operational and business needs, whilst ensuring continued VfM.[120] The contract was also structured in this way so that the consortium could recoup most of its investment in the Programme through performance-based payments, charging for both terminals and for user accounts. Different charges apply to different user types based on their usage, security requirements, location and level of support. There is a flat payment for Release 1 and a sliding scale of charges for Release 2. There is also a service charge for hosting applications and other services from the DII catalogue.

Before the contract was awarded, the DII Group re-structured to set up an internally agreed organisation and processes so that the DP could be accommodated immediately the contract was signed.[121] A DII Operating Model was created, shown at Figure 5.8, which included existing responsibilities, such as support of legacy contracts and services, as well as the negotiation, implementation and ongoing support for the DII(F) contract and service. The IPT customers are shown on the left, MoD corporate bodies on top and the DP and legacy suppliers on the right. A significant portion of service management rests with the supplier, but is assured by the DII Group. Service delivery and management is based on the Information Technology Infrastructure Library (ITIL), which is a set of concepts and practices for IT services management, development and operations provided by the OGC. Support and management of legacy services remains a

**Figure 5.8. DII Operating Model, 2005**




**Source: Quick, B., (2009), Unpublished Paper on the History of DII.**

Delivery function. With this major change, the Group re-organised around functions, rather than legacy systems, as shown at Table 5.3.

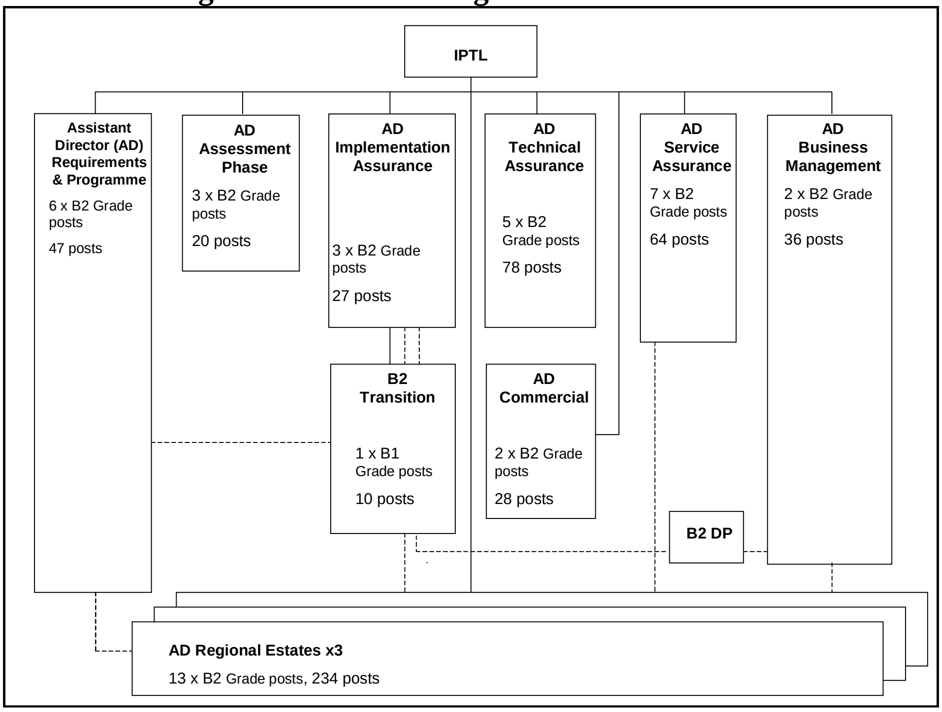
**Table 5.3. DII: Functions**

| Business & Finance Management | Contract & Commercial | Project Engineering | Programme Delivery | Service Assurance |
|---|---|---|---|---|
| Strategic Planning | Procurement & Acquisition | Service Development | Programme Planning, Processes & Governance | Performance Management |
| IPT Structure & Processes | Supplier/Corporate Relationships | Technical Assurance | Implementation | Service Change Management |
| Information & Knowledge Management | Legal/Contractual | Engineering Management – Non-Data Processing Systems | Programme Operations | Performance Improvement |
| Financial Management | | Application Integration | DII(F) Increment 1 Transition & Migration Management | Systems Operations |
| Secretariat & Office Management | | Local Identity Assurance/Identity Assurance | Legacy Programme Management | Local Performance Measurement |
| Personnel Support | | | Increment 2/3 Assessment | Local Service Change Management |
| Local Business Management Activities | | | | |

**Source: Quick, B., (2009), Unpublished Paper on the History of DII.**

The Business and Finance Management, Project Engineering, Contract and Commercial, and Service Assurance elements of the structure had existed previously and Programme Delivery incorporated the other functions. Based on these functions, the revised organisational structure was initiated in early 2005 and is shown at Figure 5.9.

**Figure 5.9. DII IPT Organisational Structure**




**Source: Quick, B., (2009), Unpublished Paper on the History of DII.**

The number of Full Time Equivalent (FTE) staff was stated in STP04, as shown at Table 5.4. These numbers were adjusted to reflect transfers in and out and so are based on a common baseline.

**Table 5.4. DII Manpower Numbers (Envisaged) 2004**

| | **FY 05/06** | **FY 06/07** | **FY 07/08** | **FY 08/09** |
|---|---|---|---|---|
| **STP 05** | 671.5 | 653 | 647 | 611.5 |

**Source: Quick, B., (2009), Unpublished Paper on the History of DII.**

It was estimated that around 400-450 staff would retain oversight of service delivery and manage change, thereby operating as a so-called ‘intelligent customer’. Therefore, a plan was put in place to reduce staff numbers but to replace them with Technical Support contractors, giving the savings shown at Table 5.5. These numbers were fed through the Planning Round for 2008, resulting in a lower baseline position than originally envisaged.

**Table 5.5. DII Manpower Numbers (Actual) 2004**

| | FY 05/06 | FY 06/07 | FY 07/08 | FY 08/09 |
|---|---|---|---|---|
| **Actual** | 579 | 557 | 559 | 565 |
| **Reductions (against STP05)** | 92.5 | 96 | 88 | 46.5 |

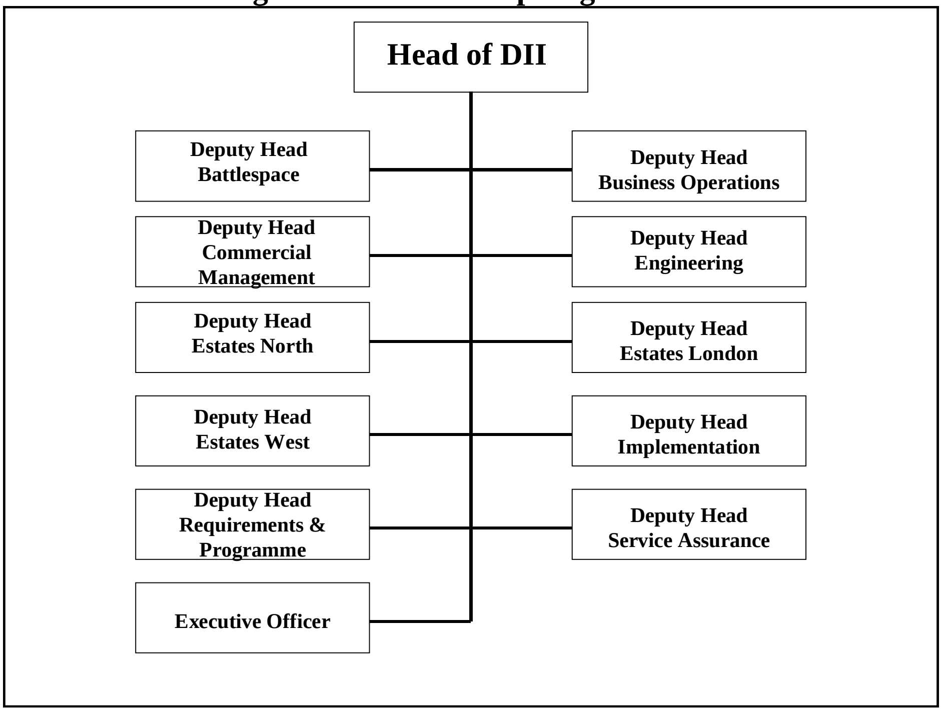
**Source: Quick, B., (2009), Unpublished Paper on the History of DII.**

Under the plans for the creation of the ISS cluster, the numbers continued to decrease through reductions and transfers to other ISS Business Units.

The operations of the DII Group are complex. Unlike other procurement teams, it is not simply focused on one piece of equipment and it will continue to manage the contract and to operate DII(F) throughout both the project and product lifecycle. This is different from most major equipment procurement where the equipment is handed over and managed by an in-service team following its development and manufacture. Therefore, the DII Group was expected to have a long term and extended involvement with the system. To some extent, this explains the rationale behind the planned size and structure of the Group.[122]

The creation of the ISS cluster in 2007 resulted in a series of changes to the Group. Following the contract award and the increase in Urgent Operational Requirements (UORs), which describes the allocation of extra money from the Treasury to provide rapid equipment provision, a Battlespace Group was formed in January 2008. This was given responsibility for Deployed and Maritime Systems, Above SECRET Systems and UORs. The resulting top-level organisation structure is shown at Figure 5.10. It remains very flat with eleven deputy heads looking after different disciplines and reporting directly to the Head of DII while the Executive Officer acts as a programme manager, keeping oversight of the various functions within the organisation. Then, in 2008, an Enterprise Management function was created to provide both the DII and the Defence Cryptosecurity Authority (DCA) Groups with Financial and Commercial support as well as covering the Requirements, Programmes, Finance, Commercial and Business Management groups. This generated efficiencies but also provides specialist functional

**Figure 5.10. DII Group Organisation**

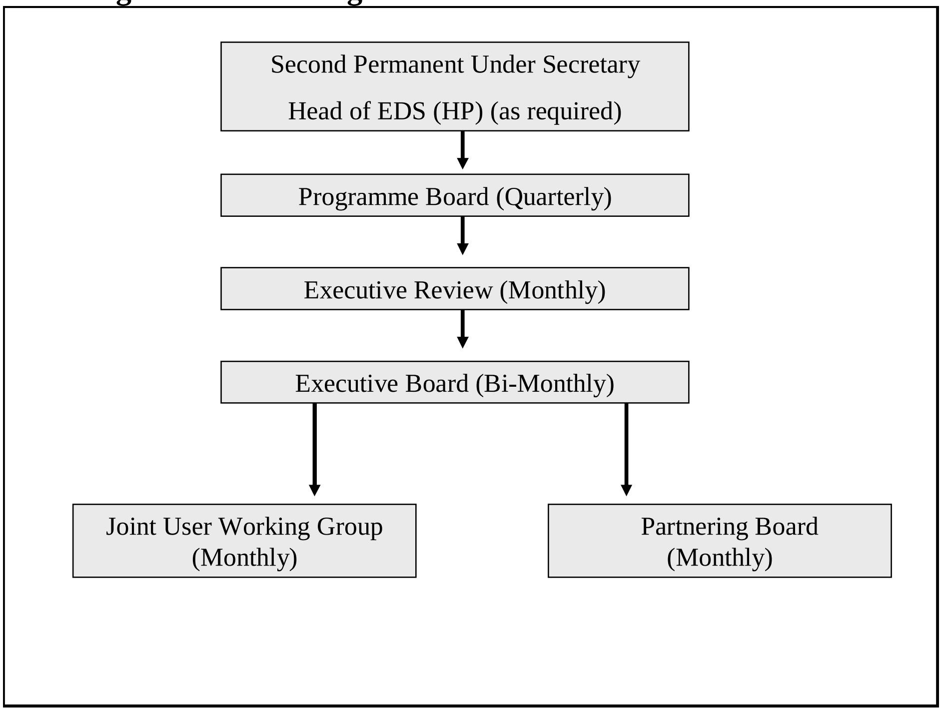



**Source: Great Britain, Ministry of Defence, Defence Equipment and Support, Information Systems and Services, *Defence Information Infrastructure: Joint Business Plan 2009-2010*, (London, HMSO, 2009), page 27.**

expertise to DCA in Finance and Commercial. Further work has been undertaken to identify other functions common to both Groups and place them within the Enterprise Management Group. Finally, the DII Programme Delivery staff within the regions became ISS staff.

Having acquired the necessary resources in terms of finance and staff, the DII Group also required a governance structure for the Programme with clear lines of authority and responsibility. As shown at Figure 5.11, the Chief Executive (CE) of ATLAS and 2nd PUS meet regularly as do the Partnering Board and Joint User Working Group, which is chaired by the Programme Director, as SRO, and addresses issues raised by the user community. Many of the internal stakeholders sit on the Programme Board, which meets quarterly or more frequently, if necessary. The Executive Review was established in 2007 and meets monthly. Its purpose is to strengthen oversight by senior members of the

**Figure 5.11. The High Level Governance Structure of DII**




**Source: Great Britain, National Audit Office, *Ministry of Defence: Defence Information Infrastructure*, (London, HMSO, 2008), page 16.**

DII Programme from both the MoD and ATLAS. Finally, there is an Executive Board of Directors, Brigadiers and 1-Star equivalent staff, which meets more frequently, as necessary. The Director of Equipment Capability for Command, Control and Information Infrastructure (DEC CCII), the internal expert on using IT on deployments, is a full member of the relevant boards, formal sponsor of the programme and owner of the URD. This governance structure includes all of the important stakeholders, such as representatives of the three services and other TLBs. However, interestingly, the diagram, taken from the NAO report on DII, suggests only a downward flow through the Boards, rather than a two-way interaction.

The Procurement Strategy for DII is based on the principles of Smart Acquisition, detailed at Appendix 5. In response to the requirement for innovative acquisition, it was decided that the procurement process would be incremental, as discussed above, and that the DP would take the form of a consortium. Contracting for a group of suppliers rather than a single supplier and requiring them to shadow one another would provide security and continuity of supply.[123] It was also decided that, rather than local procurement officers purchasing the hardware and software, the DP would select and supply on behalf of the MoD. In addition, legacy systems, along with existing PFI contracts, would be brought under DP management. This centralised procurement and control was seen as an essential step in achieving coherence across the MoD. The DP would also manage the network and its systems, providing a single helpdesk for fault resolution, rather than the 50 individual IT helpdesks for the MoD user community that existed at that time.[124] Payment would be for performance. Each service would have a linked Key Performance Indicator (KPI) to ensure the right level of performance, which would be defined in a service-based PPP contract. Mandated by the OGC for complex programmes, PPP is considered to minimise risk and volatility.[125] This Consortium arrangement gives diversity, depth and resilience. However, it also creates additional complexity and challenges, which are likely to impinge on the operation of the Programme.

The Initial Gate Business Case was approved in July 2002 and the project entered the Assessment phase of the CADMID cycle, shown previously at Figure 5.5. The Procurement Strategy received Ministerial approval at the end of March 2003 and expressions of interest were invited. Of the ten received, four were shortlisted with lead suppliers shown in bold:

| | |
|---|---|
| ACTUS | **IBM**, BAE Systems, Computer Centre, Steria, NTL, Echelon |
| ATLAS | **EDS**, Fujitsu, EADS, General Dynamics, LogicaCMG |
| Radii | **CSC**, BT, CGEY, Thales E-Security |
| Lockheed Martin | **Lockheed Martin**, Deloitte Consulting, Hewlett Packard (HP), Qinetiq, SAIC, Unisys.[126] |

Detailed negotiations were held with the preferred bidders in September 2003 and Main Gate approval was reached in the third quarter of 2004 when final offers were requested from ATLAS and Radii.[127] Unusually, the DII Group then developed a partnership with both, negotiating two separate contracts to expedite the move from announcing the preferred bidder to contract signature and to remove the instability created during final contract negotiations.[128] The plan was to gain approval and funding from the MoD in October 2004 for contract signature in December 2004. However, the decision was taken to extend the negotiations in order to present a stronger business case. This was a costly decision as, by that stage, spending for industry was at the level of about £2 million per month per consortium and spending for the DII Group was about £1 million.[129] As a result, the MoD did not approve the DII Programme until 1 March 2005. The contract was let to the ATLAS Consortium three weeks later with Hewlett Packard (HP) and IBM in minor roles. At the PAC hearing following the NAO report in 2008, there seemed to be some confusion about IBM's role, with the Secretary of State unaware of their involvement and the CIO claiming their involvement in a consultancy capacity during the early days.

The delay in letting the contract meant the scheduled three-month start-up phase was lost. However, the Group decided against revising the timetable as elements of the DCP, particularly the implementation of JPA, were dependent on the implementation of DII. Conversely, DII was set to claim around £180 million in financial benefits as a result of the JPA implementation, making its delivery imperative.[130] With the cost models written on the basis of supporting the DCP, any delays would necessitate rewriting them. It was for these reasons that everyone was keen to keep to the original timeline. ATLAS agreed that it would be able to find premises and staff in time to begin work within the timeframe although, given the competitive procurement in which it was working, it was difficult to refuse to co-operate.[131] Based on previous experience, ATLAS believed that it could achieve the implementation dates without a start-up period.[132] However, this put the project three months behind from the start of the contract and it remained in catch-up mode from that point.[133]

As a result of the pre-contract preparation discussed above, the first members of ATLAS began work with the DII Group within two days of the contract being signed, setting up common plans and processes.[134] However, ATLAS still needed to employ and build up its team. It took until August 2005 for it to reach a complement of 800 trained personnel with security clearance in place, only five months before the first DII(F) terminals were to be installed. In the first six months, the Group and ATLAS worked together to ensure that key milestones were delivered on time. Legacy computer systems were transferred to ATLAS and the helpdesk was opened in November 2005, two months later than planned. The rollout of DII(F) was due to start in early 2006, which meant that preparations had to begin as soon as the contract was let with sites being prepared to receive new hardware, and software having to be designed. However, the lack of a start-up period had given little opportunity for MoD site preparation, to agree ways of working or to pilot implementation processes. The outcomes of this are discussed in further detail in Chapter Six.

The appointment of EDS as lead supplier was controversial.[135] A US company, EDS arrived in the UK in 1984, and held a 54% share of the market for central government IT projects by 2003.[136] However, its history with government was chequered, suffering much criticism over its high profile failures, most notably the Child Support Agency.[137] In 2002, it was reportedly "haemorrhaging money" after losing a reported £900 million working on the Affinity programme to modernise IT systems in the Department of Work and Pensions (DWP).[138] The ambitious project to run the US Navy's Intranet services, the Navy Marine Corps Intranet (NMCI), discussed in Chapter Four, was considered to be successful, but the company struggled to gain any financial reward from the work.[139] Its contract to provide NHS email under the National Programme for IT was terminated in 2004.[140] In November 2005, it was involved in 'complex' negotiations with the government over the tax credit system failure, described by the PAC as 'disastrous'.[141] That same year, it paid HM Revenue and Customs compensation of £71.25 million and came close to litigation.[142] In February 2005, just before the MoD awarded the contract, it was revealed through a Freedom of Information request that Whitehall had reported four times on EDS's activities over the previous three years.[143] Following due process, once the NAO had published its report on DII in 2008, the PAC held its hearing. The MoD was scrutinised over this decision but maintained that the contract had been won in open competition and described the relationship that it had with ATLAS as something of a model. Its experience of working with EDS did not confirm the reports of its poor performance on other projects.

In May 2008, HP bought EDS for $13.9 billion dollars, doubling its services business to $38 billion a year and 210,000 employees, and putting it in a strong market position behind IBM.[144] HP covers all aspects of IT from design, manufacturing, selling and services to banking. Although it was the only major IT company to cover every aspect of IT outsourcing, it was weak in the service industry, an area where EDS had strengths. Therefore, EDS became a business group within HP, cutting its workforce and evolving into HP Enterprise Services in 2009.[145] HP's Defence and Security arm now runs six major contracts, although DII dwarfs the others in terms of its size and revenue base.[146] Therefore, EDS fitted the HP portfolio and the two companies dovetailed, rather than merged.

The overall process to set up the DII Programme took two years from initial invitation to contract award, an impressive achievement for a project of this scale and complexity.[147] During this time, the project went through the OGC Gateway review process and was rated amber at its Initial Review in 2003 with a recommendation to create more detailed implementation plans.[148] The Gateway Three Review was held in 2004 and DII was rated in the top 10 per cent of public sector IT projects, although more work was required on its benefits plan.[149] The project was also reviewed in the NAO's 2003 Major Projects Report, which heavily criticised the MoD for underestimating risks and for time slippage.[150] In accordance with the contract requirement, ATLAS organised its workloads to minimise the risk of both failure and delay.[151] Fujitsu shadows EDS, while EADS, General Dynamics and Logica cover for one another, as shown at Table 5.6.[152]

The legacy systems are transferred to ATLAS about four months after the contract is awarded for the increment in which they will be replaced. This allows for detailed planning and ensures that there is appropriate consultation with the Trades Unions prior to the transfer of support staff under TUPE provisions. Some legacy systems, such as

**Table 5.6. ATLAS Consortium: Members and Role**

| Consortium Member | Role |
|---|---|
| EDS (now HP) | Prime Contract Management, Programme Management,<br>Design, Roll-out and Service Management of DII(F) IT Infrastructure |
| Fujitsu | Design, rollout and service management of DII(F) IT infrastructure, programme management and risk sharing, backup to EDS as prime |
| EADS/Cogent<br>(now Cassidian) | Network communications, security, service management and deployed services |
| General Dynamics | Network communications, deployed services, training services |
| Logica CMG | Security, core EDRM, collaboration applications, legacy applications migration, risk management, management of change, training |
| Others, including Dell, HP, IBM, EMC[2], Cisco Systems, Microsoft, Fujitsu/Siemens | Capability partners |

**Source: Oldnall, M., 'Defence Information Infrastructure', *Presentation to Masters in Defence Administration Course,* (Shrivenham, Defence Academy, May 2006).**

NavyAdmin and NavyNet, are split across all increments due to their size and complexity, and to best support the delivery of benefits.[153] Where systems have to be outsourced, the original contractor continues to manage the system but is paid by ATLAS rather than directly by the DII Group. ATLAS receives a 5% corporate overhead fee for this service, considered to be an acceptable price to pay for the reduction in risk gained by having a single supplier for both the legacy and new system at the point of migration.[154]

This review of the Business Process for contracting and operating DII has shown that information is considered a key aspect of military capability and that the MoD has undertaken clear strategic planning in order to deliver that information. However, translating that strategy into operational effect has been hindered by the state of the legacy Defence information infrastructure, which made it difficult to manage or share information. The identified means to rectify that situation was the move to a future state through the DII Programme. This discussion has charted the creation of the DII Group and the associated processes and structures, designed to deliver that solution. With a clear vision and mission in place, the Group has ensured top-level support and made moves to acquire control of the necessary systems, people and funding. It has apparently followed many of the 'rules' identified in the literature review and the reports. The next phase of this research is, therefore, to examine whether this has had the desired effect. Have the identified CSFs been understood and applied to the DII Programme?

### 5.5. Summary

This chapter has unpeeled the layers of complexity surrounding the Technical Solution, examining the Programme, Policy and Political Context, the Organisational Setting and the Business Process. The overview of the wider government context showed the collision of two policies, greater reliance on IT as a means of delivering government services and the move to outsourcing, resulting from the adoption of business tools and techniques as a means of improving efficiency and control. This has resulted in a number of initiatives to provide more effective government procurement and project management. Four key themes arose from this discussion, three relating to CSFs identified previously: the need for common practices and processes along with some means of ensuring compliance (Consistency and Coherence); the need for an improvement in government's skills and knowledge in the areas of commercial management, financial management, project and risk management, and IT capability (Competence and Capacity); ensuring economy, efficiency and effectiveness in terms of both procurement and project management (Value for Money); and a much greater emphasis on the need to manage contracts, rather than simply letting them and handing over responsibility to the supplier. These are potentially undeliverable without also tackling the two overarching themes: the need for increased governance, much stronger authority in terms of directed and required compliance, and the lack of priority given to the learning of lessons in government.

These themes were followed through to the next layer, Organisational Setting, which examined how the MoD translates government policy into action in order to deliver changes in practice within its own specific context. The description of the structure and organisation of the MoD shows a department with strong lines of authority and strong drivers for change. On the face of it, its systems are well considered, logical and should be the basis of a successful organisation operating within the boundaries of public expenditure planning, control and accountability. However, it is an organisational setting that is currently suffering serious problems with its procurement and project management. There is an apparent interaction across the boundaries of the Programme, Policy and Political Context and the Organisational Setting. However, whilst the number of reports being published by the MoD provides evidence of that policy being translated to the Defence context, there is little evidence that it is then having an impact on the 'Business Process'.

The final stage of the discussion, therefore, examined the background to the setting up of the DII Programme, driven by an urgent need to improve the state of Defence information. It then described the creation of the DII Group, designing its structure and processes to deliver a single information infrastructure for Defence and, finally, discussed the setting up and letting of the contract to a DP in the form of the ATLAS Consortium. Ostensibly, the DII Group appears to have understood and applied many of the CSFs identified in Chapter Four. There were efforts to gain the necessary funding (Affordability); consideration of how it was going to fulfil the need for an infrastructure (Alternatives Certainty); clarity around the business need for the project (Benefits Certainty) and the need for the organisation to change (Change Readiness); shared understanding by key stakeholders (Clarity and Perception); the right people with the right skills (Competence and Capacity); tactics to manage risk (Complexity Management); a desired integration of established systems (Consistency and Coherence); awareness of cost, time and scope (Constraints Certainty); the adoption of a modular and incremental approach (Scalability and Flexibility); recognition of the need to communicate with stakeholders (Stakeholder Management); and the need to run the project economically and efficiently (Value for Money). In order to ascertain whether these assumptions are correct, Chapter Six examines the Technical Solution.

Despite the above assertion that the activity undertaken at the Programme, Policy and Political Context and the Organisational Setting layers has had little effect on the Business Process, this initial examination of the DII Programme suggests that there has been sound planning to provide a good basis for a successful outcome. Therefore, the next stage of this research is to examine what happened next and whether this successful outcome has been achieved. It does this by analysing the Technical Solution, considering the development and implementation of the hardware and software. It then goes on to explore the understanding and application of the identified CSFs in greater detail before analysing their impact on the management and performance of the DII Programme.

## References


[1] Yin, R.K., *Case Study Research, Design and Methods*, 3rd Ed., (Beverley Hills, CA, Sage, 2003), page 13.
[2] Center for Technology in Government, *Making Smart IT Choices: Understanding Value and Risk in Government IT Investment*, (Albany, NY, University of Albany, April 2004).
[3] Great Britain, National Audit Office, *Modern Policy-Making: Ensuring Policies Deliver Value for Money*, HC 289, Session 2001-2002, (London, HMSO, 2001), page 1.
[4] Mitev, N.N., 'More than a Failure? The Computerized Reservation Systems at French Railways', *Information Technology and People*, 1996, 9, pages 8-19.
[5] Flynn, N., *Public Sector Management*, 4th Edition, (Harlow, Pearson Education, 2002), page 29.
[6] Ferlie, E., *The New Public Management in Action*, (Oxford, Oxford University Press, 1996).
[7] Crawford, L., Costello, K., Pollack, J., and Bentley, L., 'Managing Soft Change Projects in the Public Sector, *International Journal of Project Management*, 2003, Vol.21, pages 443–448.
[8] Anon., 'Government Structures', *Serco Website*, 4 November 2010, http://www.serco.com/instituteresource/subjects/publicsectorreform/govstructures/Index.asp, downloaded 19th January 2011.
[9] Ghobadian, A., Viney, H., and Redwood, J., 'Explaining the Unintended Consequences of Public Sector Reform', *Management Decision*, Vol. 47, No. 10, 2009, pages 1514-1535, this page 1514.
[10] Anon., 'Market Testing', *Serco Website*, 4 November 2010, http://www.serco.com/instituteresource/subjects/UKmkt/mkttest/Index.asp, downloaded 19th January 2011.
[11] Garden, T., 'Last Post for the Chiefs?' *RUSI Journal*, March 1999.
[12] Anon., 'Market Testing', *Serco Website*, 4 November 2010, http://www.serco.com/instituteresource/subjects/UKmkt/mkttest/Index.asp, downloaded 19th January 2011.
[13] Anon., 'PPP/PFI', *Serco Website*, 4 November 2010, http://www.serco.com/instituteresource/subjects/UKmkt/ppppfi/index.asp, downloaded 19th January 2011.
[14] Anon., 'Public Services Industry, *Serco Website*, 4 November 2010, http://www.serco.com/instituteresource/subjects/UKmkt/PSI/index.asp, downloaded 19th January 2011.
[15] Flynn, N., 'Modernising British Government', *Parliamentary Affairs*, Vol. 52, No.4, October 1999, pages 582-597, this page 597.
[16] Anon., 'David Cameron: Public Sector Reform Cannot Be Delayed', *BBC Website*, 17 January 2011, http://www.bbc.co.uk/news/uk-politics-12203000, downloaded 20th January 2011.
[17] Anon., 'Transformational Government Fundamentals', *Improvement Network*, 16 December 2009, http://www.improvementnetwork.gov.uk/imp/core/page.do?pageId=1068533, downloaded 22nd January 2011.
[18] Cross, M., 'A Measure for Success', *Government IT*, November 2003, page 4.
[19] Great Britain, HM Treasury, *Review of Civil Procurement in Central Government*, (London, HMSO, 1999), http://www.ogc.gov.uk/documents/reveiw_of_civil_procurment.doc, downloaded 20th January 2011.
[20] Great Britain, National Audit Office, *The Efficiency Programme: A Second Review of Progress*, (London, HMSO, 2007), http://www.nao.org.uk/whats_new/0607/0607156.aspx, downloaded 20th January 2011.
[21] Great Britain, National Audit Office, *Press Release: Improving IT procurement: the Impact of the Office of Government Commerce's Initiatives on Departments and Suppliers in the Delivery of Major IT-Enabled Projects*, (London, HMSO, 2004), http://www.nao.org.uk/publications/0304/improving_it_procurement.aspx, downloaded 22nd January 2011.
[22] Great Britain, House of Commons, Public Accounts Committee, *The Impact of the Office of Government Commerce's Initiative on the Delivery of Major IT-Enabled Projects*, HC 555, (London, HMSO, 2005), http://www.publications.parliament.uk/pa/cm200405/cmselect/cmpubacc/555/555.pdf, downloaded 23rd January 2011.
[23] Say, M., 'Leaner and Meaner', *Government Computing*, March 2007, pages 12-13, this page 12.
[24] Say, M., 'Leaner and Meaner', *Government Computing*, March 2007, pages 12-13, this page 12.
[25] Great Britain, National Audit Office, *Managing Resources to Deliver Better Public Services*, (London, HMSO, 2003), http://www.nao.org.uk/publications/0304/managing_resources_to_deliver.aspx, downloaded 20th January 2011, page 7.

[26] Great Britain, National Audit Office, *Managing Financial Resources to Deliver Better Public Services*, (London, HMSO, 2008), http://www.nao.org.uk/publications/0708/managing_financial_resources_t.aspx, downloaded 20th January 2011, page 7.
[27] Great Britain, National Audit Office, *Managing Financial Resources to Deliver Better Public Services*, (London, HMSO, 2008), http://www.nao.org.uk/publications/0708/managing_financial_resources_t.aspx, downloaded 20th January 2011.
[28] Great Britain, Cabinet Office, Office of Government Commerce, *'Making a Difference': Reducing Bureaucracy in Central Civil Government Procurement*, (London, HMSO, 2003).
[29] Great Britain, National Audit Office, *Improving Procurement: Progress by the Office of Government Commerce in Improving Departments Capability to Procure Cost-Effectively*, HC 361, (London, HMSO, 2004), http://www.nao.org.uk/publications/0304/improving_procurement.aspx, downloaded 23rd January 2011.
[30] Great Britain, National Audit Office, *Improving IT procurement: the Impact of the Office of Government Commerce's Initiatives on Departments and Suppliers in the Delivery of Major IT-Enabled Projects*, (London, HMSO, 2004), http://www.nao.org.uk/publications/0304/improving_it_procurement.aspx, downloaded 22nd January 2011.
[31] Great Britain, House of Commons, Public Accounts Committee, *The Impact of the Office of Government Commerce's Initiative on the Delivery of Major IT-Enabled Projects*, HC 555, (London, HMSO, 2005), http://www.publications.parliament.uk/pa/cm200405/cmselect/cmpubacc/555/555.pdf, downloaded 23rd January 2011.
[32] Great Britain, National Audit Office, *Central Government's Use of Consultants*, (London, HMSO, 2006), http://www.nao.org.uk/whats_new/0607/0607128.aspx, downloaded 20th January 2011.
[33] Great Britain, National Audit Office, *Central Government's Use of Consultants and Interims*, (London, HMSO, 2010), http://www.nao.org.uk/publications/press_notice_home/1011/1011488.aspx, downloaded 20th January 2011.
[34] Great Britain, National Audit Office, *Central Government's Use of Consultants and Interims*, (London, HMSO, 2010), http://www.nao.org.uk/publications/press_notice_home/1011/1011488.aspx, downloaded 20th January 2011.
[35] Great Britain, HM Treasury, *Transforming Government Procurement*, (London, HMSO, 2007), http://www.hm-treasury.gov.uk/d/government_procurement_pu147.pdf, downloaded 20th January 2011.
[36] Great Britain, Civil Service, 'Improving Delivery', *Policy Hub*, 15 February 2008, http://www.nationalschool.gov.uk/policyhub/improving_delivery/, downloaded 20th January 2011.
[37] Great Britiain, National Audit Office, *Assessment of the Capability Review Programme*, (London, HMSO, 2009), http://www.nao.org.uk/whats_new/0708-1/0809123.aspx, downloaded 20th January 2011.
[38] Great Britain, Cabinet Office, Office of Government Commerce, *Major Projects Review Group*, 13 July 2009, http://www.ogc.gov.uk/programmes___projects_major_projects_review_group.asp, downloaded 7th April 2011.
[39] Say, M., 'Leaner and Meaner', *Government Computing*, March 2007, pages 12-13, this page 13.
[40] Great Britain, National Audit Office, *Central Government's Management of Service Contracts*, (London, HMSO, 2008), http://www.nao.org.uk/publications/press_notice_home/0809/080965.aspx, downloaded 20th January 2011.
[41] Great Britain, National Audit Office, *Central Government's Management of Service Contracts*, (London, HMSO, 2008), http://www.nao.org.uk/publications/press_notice_home/0809/080965.aspx, downloaded 20th January 2011.
[42] Great Britain, National Audit Office and Office of Government Commerce, *Good Practice Contract Management Framework*, (London, HMSO, 2008), http://www.ogc.gov.uk/documents/Management_Framework_Good_Practice_FINAL.pdf, downloaded 20th January 2011.
[43] Great Britain, The Treasury, *Operational Efficiency Programme: Final Report*, (London, HMSO, 2009), http://www.bis.gov.uk/assets/biscore/shex/files/oep_final_report_210409_pu728.pdf, downloaded 11th February 2011.
[44] Great Britain, Cabinet Office, Office of Government Commerce, *Programmes and Project Delivery: Joint Statement of Intent*, (London, HMSO, 2009), http://www.ogc.gov.uk/documents/ppd_it_projects_joint_statement.pdf, downloaded 11th Feburary 2011.

[45] Great Britain, National Audit Office, *Commercial Skills for Complex Government Projects*, (London, HMSO, 2009), http://www.nao.org.uk/publications/0809/commercial_skills.aspx, downloaded 20th January 2011.
[46] Great Britain, National Audit Office, *Commercial Skills for Complex Government Projects*, (London, HMSO, 2009), http://www.nao.org.uk/publications/0809/commercial_skills.aspx, downloaded 20th January 2011.
[47] Great Britain, National Audit Office, *Helping Government Learn*, (London, HMSO, 2009), http://www.nao.org.uk/publications/press_notice_home/0809/0809129.aspx, downloaded 20th January 2011.
[48] Great Britain, National Audit Office, *Modern Policy-Making: Ensuring Policies Deliver Value for Money*. HC 289, Session 2001-2002. (London: HMSO, 2001), page 1.
[49] Great Britain, National Audit Office, *Defence*, http://www.nao.org.uk/our_work_by_sector/defence.aspx, downloaded 10th January 2010.
[50] Alvarez, A.J.S., 'Towards an Interpretative Integrative Framework to Conceptualise Social Processes in Large Information Systems Implementations', *Information Technology for Development*, 2003, Vol. 10, pages 233-247, this page 233.
[51] Great Britain, Ministry of Defence, *How Defence Works: Defence Framework*, (London, HMSO, December 2010), page 3, http://www.mod.uk/NR/rdonlyres/D9DD5017-2E12-43C9-8E4D-3C245A9726B9/0/defenceframework_dec10.pdf, downloaded 9th January 2011.
[52] Great Britain, Ministry of Defence, *How Defence Works: Defence Framework*, (London, HMSO, December 2010), page 3, http://www.mod.uk/NR/rdonlyres/D9DD5017-2E12-43C9-8E4D-3C245A9726B9/0/defenceframework_dec10.pdf, downloaded 9th January 2011.
[53] Great Britain, National Audit Office, *A Short Guide: the NAO's Work on the Ministry of Defence*, (London, HMSO, June 2010), page 3, http://www.nao.org.uk/publications/1011/short_guide_mod.aspx, downloaded 9th January 2011.
[54] Great Britain, Ministry of Defence, *How Defence Works: Defence Framework*, (London, HMSO, December 2010), page 9, http://www.mod.uk/NR/rdonlyres/D9DD5017-2E12-43C9-8E4D-3C245A9726B9/0/defenceframework_dec10.pdf, downloaded 9th January 2011.
[55] Great Britain, Ministry of Defence, *About Defence: Defence Spending*, http://www.mod.uk/DefenceInternet/AboutDefence/Organisation/KeyFactsAboutDefence/DefenceSpending.htm, downloaded 10th January 2010.
[56] Great Britain, National Audit Office, *A Short Guide: the NAO's Work on the Ministry of Defence*, (London, HMSO, June 2010), page 8, http://www.nao.org.uk/publications/1011/short_guide_mod.aspx, downloaded 9th January 2011.
[57] Great Britain, Ministry of Defence, *How Defence Works: Defence Framework*, (London, HMSO, December 2010), page 5, http://www.mod.uk/NR/rdonlyres/D9DD5017-2E12-43C9-8E4D-3C245A9726B9/0/defenceframework_dec10.pdf, downloaded 9th January 2011.
[58] Hartley, K., *UK Defence R&D Policy: An Economist's Perspective*, http://www.york.ac.uk/depts/econ/research/documents/dera.pdf, downloaded 14th July 2003.
[59] Hartley, K., *UK Defence R&D Policy: An Economist's Perspective*, http://www.york.ac.uk/depts/econ/research/documents/dera.pdf, downloaded 14th July 2003.
[60] Kirkpatrick, D., 'Is Defence Inflation Really as High as Claimed?' *RUSI Defence Systems*, October 2008, pages 66-71, http://www.rusi.org/downloads/assets/17kirkpatrick.pdf, downloaded 23rd January 2011.
[61] Chalmers, M., 'Defence Inflation: Reality or Myth?' *RUSI Defence Systems*, June 2009, pages12-21, http://www.rusi.org/downloads/assets/Comment_Defence_Inflation_Myth_or_Reality.pdf, downloaded 23rd January 2011.
[62] Kirkpatrick, D., 'Is Defence Inflation Really as High as Claimed?' *RUSI Defence Systems*, October 2008, pages 66-71, this page 70, http://www.rusi.org/downloads/assets/17kirkpatrick.pdf, downloaded 23rd January 2011.
[63] Kirkpatrick, D., 'Is Defence Inflation Really as High as Claimed?' *RUSI Defence Systems*, October 2008, pages 66-71, this page 71, http://www.rusi.org/downloads/assets/17kirkpatrick.pdf, downloaded 23rd January 2011.
[64] BBC, Current Affairs Group, *File on Four: Transcript of Programme on Defence Acquisition*, Programme Number 04VY3023LHO, Broadcast 8th June 2004.

[65] Great Britain, Ministry of Defence, 'Introduction to Acquisition Lifecycles', *Acquisition Operating Framework*, http://www.aof.mod.uk/aofcontent/strategic/guide/lifecycles/sg_introduction.htm, downloaded 14th January 2011.
[66] Kirkpatrick, D., 'Lessons from the Report on MoD Major Projects', *RUSI Defence Systems*, June 2009, http://www.rusi.org/downloads/assets/Acquisition_Issues_Lessons_from_the_MoD_RDS_Summer_09.pdf, downloaded 10th January 2010.
[67] Kirkpatrick, D., 'Lessons from the Report on MoD Major Projects', *RUSI Defence Systems*, June 2009, http://www.rusi.org/downloads/assets/Acquisition_Issues_Lessons_from_the_MoD_RDS_Summer_09.pdf, downloaded 10th January 2010.
[68] Great Britain, National Audit Office, *Major Projects Report 2009*, HC85-I, (London, HMSO, 2009), http://www.nao.org.uk/publications/0910/mod_major_projects_report_2009, downloaded 14th January 2011.
[69] Great Britain, National Audit Office, *Major Projects Report 2009*, HC85-I, (London, HMSO, 2009), http://www.nao.org.uk/publications/0910/mod_major_projects_report_2009, downloaded 14th January 2011.
[70] Prime Minister, *Statement on the Strategic Defence and Security Review*, Number.10.gov.uk, 19 October 2010, http://www.number10.gov.uk/news/statements-and-articles/2010/10/sdsr-55912, downloaded 15th January 2010.
[71] Great Britain, House of Commons, Haddon-Cave, C., *An Independent Review into the Broader Issues Surrounding the Loss of the RAF Nimrod MR2 Aircraft XV230 in Afghanistan in 2006*, HC1025, (London, HMSO, 2009).
[72] Great Britain, National Audit Office, *Defence: Strategic Financial Management of the Defence Budget*, (London, HMSO, 2010), http://www.nao.org.uk/publications/press_notice_home/1011/1011290.aspx, downloaded 22nd January 2011.
[73] National Audit Office, *Modern Policy-Making: Ensuring Policies Deliver Value for Money*. HC 289, Session 2001-2002. London: HMSO, 2001. Page 1.
[74] Robey, D. and Newmand, M., 'Sequential Patterns in Information Systems Development: an Application of a Social Process Model', *ACM Transactions on Information Systems*, Vol. 14, No. 1, pages 30-63.
[75] Great Britain, Ministry of Defence, *MoD Information Strategy*, (London, MoD, 2009).
[76] Great Britain, Ministry of Defence, Unclassified PUS/CDS Statement, *A New Strategy for Defence*, (London, MoD, no date), http://www.mod.uk/NR/rdonlyres/32421DC3-CA13-49BC-88F4-2F77E973CB67/0/strategystatement.pdf, downloaded 4th February 2011.
[77] Great Britain, Ministry of Defence, *MoD Information Strategy*, (London, MoD, 2009).
[78] Great Britain, Ministry of Defence, *MoD Information Strategy*, (London, MoD, 2009).
[79] Great Britain, Ministry of Defence, *MoD Information Strategy*, (London, MoD, 2009).
[80] Davenport, T., *Process Innovation: Reengineering Work through Information Technology*, (Boston, Harvard Business School, 1993).
[81] Great Britain, Ministry of Defence, *Defence ICT Strategy*, (London, MoD, 2010).
[82] Great Britain, Ministry of Defence, *Defence ICT Strategy*, (London, MoD, 2010), page 4.
[83] Great Britain, Ministry of Defence, *Modernising Defence*, (London, MoD, 1999).
[84] Great Britain, Ministry of Defence, *Modernising Defence*, (London, MoD, 1999).
[85] Taylor, J.C.T., *Information Management: a Strategy for Defence*, Powerpoint presentation, downloaded from ModWeb, 9th January 2001.
[86] Interview with DII Group, 16th July 2009.
[87] Interview with DII Group, 16th July 2009.
[88] Hackney, R.A. and McBride, N.K., 'The Efficacy of Information Systems in the Public Sector: Issues of Context and Culture', *The International Journal of Public Sector Management*, 1995, Vol. 8, No.6, pages 17-30.
[89] Proud, I., 'Communicating Coherence', *Defence Director*, Vol.1, No.6, November 2003, Pages 21-23.
[90] Proud, I., 'Communicating Coherence', *Defence Director*, Vol.1, No.6, November 2003, Pages 21-23.
[91] Lake, D., 'Special Delivery', *Defence Director*, Vol. 4, No. 6, November 2006, pages 48-49.
[92] Great Britain, National Audit Office, *Ministry of Defence: Operation Telic – United Kingdom Military Operations in Iraq*, HC60, (London, HMSO, 2003), http://www.nao.org.uk/publications/0304/operation_telic.aspx, downloaded 24th January 2011.

[93] Great Britain, Ministry of Defence, *Annual Report and Accounts 2002-2003*, (London, HMSO, 2003), http://webarchive.nationalarchives.gov.uk/+/http://www.mod.uk/publications/performance2002/chap13.htm, downloaded 29th January 2011.
[94] Great Britain, National Audit Office, *Ministry of Defence: Defence Information Infrastructure*, (London, HMSO, 2008), http://www.nao.org.uk/whats_new/0708/0708788.aspx, downloaded 29th January 2011.
[95] Great Britain, Ministry of Defence, *Defence ICT Strategy*, (London, MoD, 2010), page 27.
[96] Anon., 'Contracts Signal the Green Light for DII(F)', *Preview*, April 2005, page 8.
[97] Great Britain, National Audit Office, *Ministry of Defence: Defence Information Infrastructure*, (London, HMSO, 2008), http://www.nao.org.uk/whats_new/0708/0708788.aspx, downloaded 29th January 2011.
[98] Great Britain, National Audit Office, *Ministry of Defence: Defence Information Infrastructure*, (London, HMSO, 2008), http://www.nao.org.uk/whats_new/0708/0708788.aspx, downloaded 29th January 2011.
[99] Oldnall, M., 'Defence Information Infrastructure', *Presentation to Masters in Defence Administration Course*, (Shrivenham, Defence Academy, May 2006).
[100] Hardgrave, M., 'Fast Response', *Defence Director*, Vol. 1, No.6, November 2003, pages 32-34.
[101] Hardgrave, M., 'Fast Response', *Defence Director*, Vol. 1, No.6, November 2003, pages 32-34.
[102] Great Britain, Ministry of Defence, Defence Equipment and Support, Information Systems and Services, *Defence Information Infrastructure: Joint Business Plan 2009-2010*, (London, HMSO, 2009), page 5.
[103] Great Britain, Ministry of Defence, Defence Equipment and Support, Information Systems and Services, *Defence Information Infrastructure: Joint Business Plan 2009-2010*, (London, HMSO, 2009), page 5.
[104] Great Britain, Ministry of Defence, Defence Equipment and Support, Information Systems and Services, *Defence Information Infrastructure: Joint Business Plan 2009-2010*, (London, HMSO, 2009), page 6.
[105] Interview with DII Group, 16th July 2009.
[106] Interview with DII Group, 16th July 2009.
[107] Great Britain, MoD, DII IPT, *Defence Information Infrastructure*, (Copenacre, DCSA, 2004).
[108] Interview with DII Group, 16th July 2009.
[109] Interview with DII Group, 5th August 2009.
[110] Anon., 'MoD to Wage £5 billion IT Campaign', *KableNet.com*, 18 March 2003,
[111] Interview with DII Group, 12th June 2006.
[112] Interview with DII Group, 5th August 2009.
[113] Great Britain, National Audit Office, *Ministry of Defence: Defence Information Infrastructure*, (London, HMSO, 2008), http://www.nao.org.uk/whats_new/0708/0708788.aspx, downloaded 29th January 2011.
[114] Great Britain, National Audit Office, *Ministry of Defence: Defence Information Infrastructure*, (London, HMSO, 2008), http://www.nao.org.uk/whats_new/0708/0708788.aspx, downloaded 29th January 2011.
[115] Great Britain, National Audit Office, *Ministry of Defence: Defence Information Infrastructure*, (London, HMSO, 2008), http://www.nao.org.uk/whats_new/0708/0708788.aspx, downloaded 29th January 2011.
[116] Oldnall, M., 'Defence Information Infrastructure', *Presentation to the Masters in Defence Administration course*, (Shrivenham, Defence Academy, May 2006).
[117] Great Britain, Ministry of Defence, DII IPT, *Defence Information Infrastructure*, (Copenacre, DCSA, 2004).
[118] Great Britain, Ministry of Defence, DII IPT, *Defence Information Infrastructure*, (Copenacre, DCSA, 2004).
[119] Anon., 'All Present and Correct', *KableNet.com*, 25 April 2003,
[120] ATLAS Consortium, 'Increments and Releases', *ATLAS Consortium Website*, http://www.ATLASconsortium.info/what-is-dii/increments-and-releases.aspx.htm, downloaded 3rd February 2011.
[121] Harte, M., 'Defence Information Infrastructure (Future)', *Defence Management Journal*, September 2005, pages 78-79.
[122] Interview with DII Group, 16th July 2009.
[123] Great Britain, National Audit Office, *Ministry of Defence: Defence Information Infrastructure*, (London, HMSO, 2008), http://www.nao.org.uk/whats_new/0708/0708788.aspx, downloaded 29th January 2011.
[124] Great Britain, House of Commons, Public Accounts Committee, *Defence Information Infrastructure*: *First Report of Session 2008-09*, HC100, (London, HMSO, 2009).
[125] Great Britain, Ministry of Defence, DE&S Information Systems and Services, *Defence Information Infrastructure: Joint Business Plan 2009/10*, (London, HMSO, 2009).
[126] Anon., 'Sights set on DII', *KableNet.com*, 11 June 2003.

[127] Harte, M., 'Defence Information Infrastructure (Future)', *Defence Management Journal*, September 2005, pages 78-79.
[128] Harte, M., 'Defence Information Infrastructure (Future)', *Defence Management Journal*, September 2005, pages 78-79.
[129] Inteview with DII Group, 12th June 2006.
[130] Interview with DII Group, 5th August 2009.
[131] Interview with DII Group, 17th August 2009.
[132] Interview with DII Group, 17th August 2009.
[133] Interview with ATLAS, 17th January 2011.
[134] Harte, M., 'Defence Information Infrastructure (Future)', *Defence Management Journal*, September 2005, pages 78-79.
[135] Anon., 'Defence Infrastructure Gets Supplier', *KableNet.com*, 2 March 2005, downloaded 20th May 2005.
[136] Anon., 'MPs Attack EDS', *KableNet.com*, 19 January 2004, downloaded 24th January 2004.
[137] Anon., 'Defence Infrastructure Gets Supplier', *KableNet.com*, 2 March 2005, downloaded 20th May 2005.
[138] Anon., 'Government Projects Drain EDS', *KableNet.com*, 7 October 2002,
[139] Anon., 'Government Projects Drain EDS', *KableNet.com*, 7 October 2002,
[140] Anon., 'NHS IT Settles Dispute with EDS', *PublicTechnology.net*, 14 July 2004, http://www.publictechnology.net/content/1392, downloaded 31st January 2011.
[141] Anon, 'EDS Pays for Tax Credit Debacle', *Kablenet.com*, 22 November 2005, downloaded 28th November 2005.
[142] Anon, 'EDS Pays for Tax Credit Debacle', *Kablenet.com*, 22 November 2005, downloaded 28th November 2005.
[143] Anon., 'Defence Infrastructure Gets Supplier', *KableNet.com*, 2 March 2005, downloaded 20th May 2005.
[144] Fay, J., 'HP Pays $13.9bn for EDS: Silicon Valley Opens a Branch in Texas', *The Register*, 13 May 2008, http://www.theregister.co.uk/2008/05/13/hp_buys_eds/, downloaded 15th January 2011.
[145] HP, *News Release: EDS, an HP Company, Becoming HP Enterprise Services*, (Palo Alto, CA, HP, 23 September 2009), http://www.hp.com/hpinfo/newsroom/press/2009/090923xa.html, downloaded 15th January 2011.
[146] Interview with ATLAS, 11th January 2011.
[147] Harte, M., 'Defence Information Infrastructure (Future)', *Defence Management Journal*, September 2005, pages 78-79.
[148] Anon., 'Defence Infrastructure Gets Supplier', *KableNet.com*, 2 March 2005, downloaded 20th May 2005.
[149] Anon., 'Defence Infrastructure Gets Supplier', *KableNet.com*, 2 March 2005, downloaded 20th May 2005.
[150] Thomas, D., 'MoD Cuts £4bn IT Overhaul Shortlist to Three', *ComputerWeekly.com*, 18 December 2003, downloaded 20th January 2004.
[151] Williams, M., 'Defining Network Enabled Capability', *Defence Management Journal*, pages 77-78.
[152] Great Britain, National Audit Office, *Ministry of Defence: Defence Information Infrastructure*, (London, HMSO, 2008), http://www.nao.org.uk/whats_new/0708/0708788.aspx, downloaded 29th January 2011.
[153] Great Britain, National Audit Office, *Ministry of Defence: Defence Information Infrastructure*, (London, HMSO, 2008), http://www.nao.org.uk/whats_new/0708/0708788.aspx, downloaded 29th January 2011.
[154] Great Britain, National Audit Office, *Ministry of Defence: Defence Information Infrastructure*, (London, HMSO, 2008), http://www.nao.org.uk/whats_new/0708/0708788.aspx, downloaded 29th January 2011.

# Chapter Six
# Defence Information Infrastructure (DII) Programme: Impact of Identified CSFs

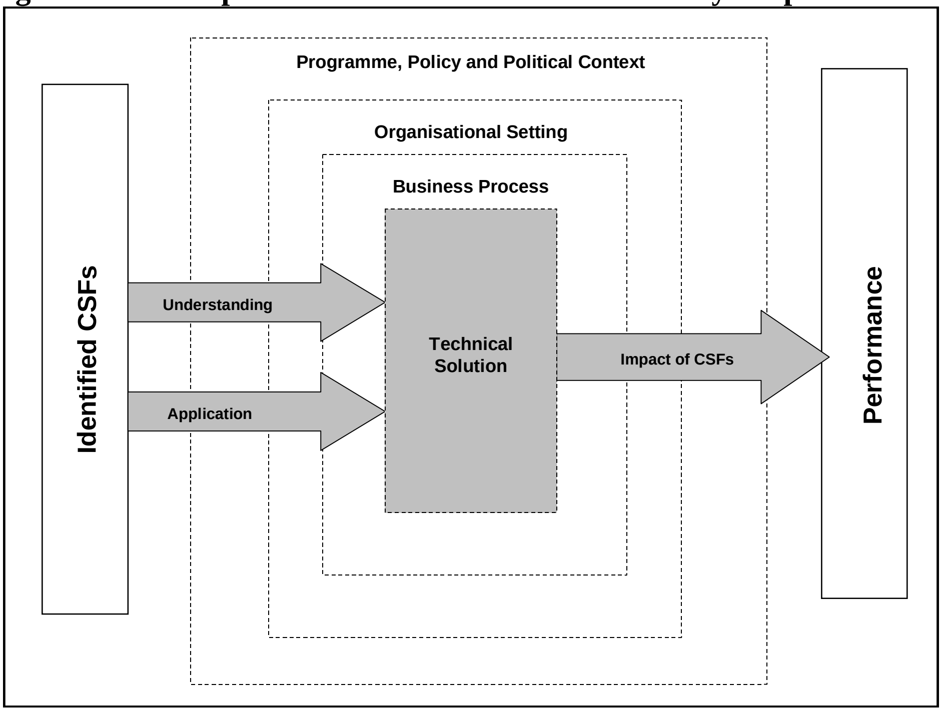
## 6.1. Investigating the Impact

Chapter Five examined the context of this project, highlighting government policy on project management and procurement, describing how this has filtered into the Organisational Setting of the Ministry of Defence (MoD) with regard to equipment and Information Technology (IT) procurement, and then examining how this has impacted on the Business Process for the Defence Information Infrastructure (DII) Programme. Over time, governments of all persuasions in the UK have moved to greater reliance on IT with increased outsourcing of their business requirements to the private sector. This has not been without its problems and, as a result, there have been a number of government initiatives requiring greater Consistency and Coherence, Competence and Capacity, Value for Money and improved contract management. However, overarching these is the need for greater governance to ensure that these initiatives become reality along with effective tools to capture and share learning across government. There have been a number of MoD reports that have translated the resulting government policy to the Defence setting to ensure that it becomes embedded into practice. However, the ongoing problems with the MoD's major projects raise questions about the effectiveness of this process. The scale and value of the DII Programme puts it at the crux of the demand for improved MoD procurement on the one hand and the drive to reduce the number of IT project failures in government on the other. The overview of how it was set up, structured and contracted, which was presented in Chapter Five, suggests that many of the CSFs identified from the major reports scrutinised in Chapter Four have been understood and applied. However, as a complex IT mega-project operating in a highly uncertain environment, how has the Programme fared since the contract was let?

This chapter presents the second stage of this case study, which sets out to investigate the impact of the identified CSFs. It begins by focusing on the central core of the Conceptual

Framework, the 'Technical Solution', the IT project under review. Having highlighted some of the key issues surrounding project type and the technical development and implementation of DII, it then investigates the 'Understanding' and 'Application' of the identified CSFs before finally considering their impact. The structure closely follows the logic described by the Conceptual Framework, shown again at Figure 6.1 with the elements under review in this chapter highlighted.

**Figure 6.1. Conceptual Framework: the DII Case Study: Impact of CSFs**




**Source: Author**

The process of data collection for this analysis is described in Chapter Three and was based on 23 interviews, 17 with ATLAS and DII Group representatives and five with representatives of the wider government context. Whilst also making use of secondary data, it is recognised that this is by no means a full account of this large, complex project and only those incidents considered critical to this study are reported here. The purpose of the interview questions was to encourage discussion rather than elicit quantitative data. Therefore, no statistical analysis has been applied to the resulting data and the graphs are intended to be generally representative of the views expressed, rather than exact quantifications.

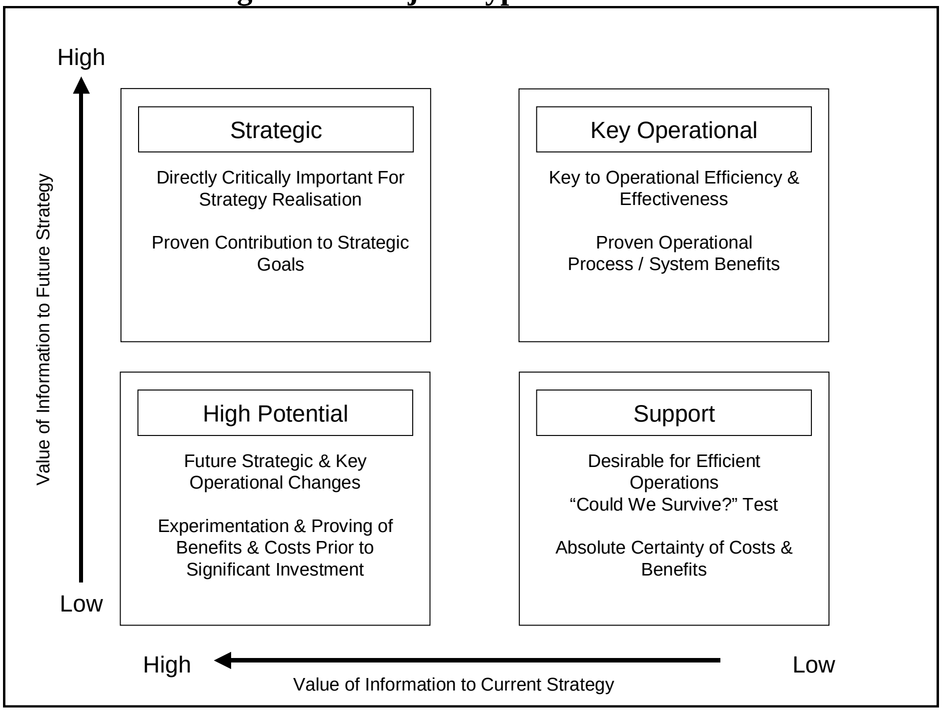
## 6.2. Technical Solution

Brown observed that IT mega-projects in government often ignore the needs of their users and opt for leading edge technology.[1] However, DII has not followed this route and is now delivering significant benefits simply by providing around 90% of users with access to Microsoft Office, e-mail and a web browser, at security levels ranging from UNCLASSIFIED to RESTRICTED, available at standard office hours in UK and overseas locations, with access to specialist applications as necessary.[2] Therefore, it is using relatively mature technology and aiming for achievable goals.[3] The major technical challenge is the environment into which it is being implemented, particularly the maritime and deployed spaces, and the rationalisation of existing infrastructure and applications.[4] Brown has also noted that government IT projects suffer from the speed of technological change.[5] With the normal lifecycle for desktop services being around three to four years and an IT half-life of around 18 months, this presents a risk to the DII Programme.[6] The Institute for Government recently recognised the difficulties that the traditional project lifecycle presents in terms of keeping pace with rapid technology changes given its pre-defined specifications and pre-determined timescales.[7] The Government discontinued PFI for IT projects, recognising that the cost of replacing assets during the average ten-year contract eroded the supplier's profit margin.[8] In addition, meeting the requirements of a contract defined ten years ago makes it likely that the delivered product will be based on out-dated technology even with planned refreshes.[9] Operating within the realm of a ten-year contract, the DII Programme, therefore, needs to be managed through life, including the necessary technology updates.[10] However, at present, the main concern for ATLAS is the delivery of current capability: the development of the requisite software and the implementation of both hardware and software. Before examining this, the issue of project type is assessed, whether DII was categorised in this way and into which category the Programme fits.

### 6.2.1. Project Type

The issue of project type was discussed during the literature review. Pinto and Covin found that CSFs vary according to project type.[11] IT projects can be clearly differentiated from other types of project, largely due to the complexity of their product. McFarlan[12] and later Ward and Griffiths[13] extended this thinking to identify types of IT projects, noting that different IT projects add value to an organisation in different ways and, therefore, are likely to require different management approaches and, therefore, different CSFs.[14] Identifying and understanding the project type informs the management, thereby increasing the likelihood of value being delivered to the organisation. Ward and Griffiths devised a portfolio model, shown again at Figure 6.2, classifying projects as Strategic, Key Operational, High Potential or Support. They argue that the first stage in any IT project should be to understand the type of project that needs to be managed and then to identify the relevant CSFs.

**Figure 6.2. Project Type Classifications**




**Source: Ward, J. and Griffiths, P., *Strategic Planning for Information Systems*, (Chichester, Wiley, 1996), page 364.**

Although the utility of this process was recognised, the interviewees were unfamiliar with this model and did not know whether the project had been classified in this way. When asked to classify DII according to these types, there was no real consensus but the most frequent suggestions were either Strategic, as it links the business of Defence to military effect, or Key Operational, as it is about the efficient operation of the MoD. Based on Ward and Griffiths' explanation, it fits most sensibly into Strategic, as shown at Table 6.1. This demonstrates that DII is providing information, both internal and external,

**Table 6.1. Strategic IT Project Type**

| Typical Strategic Information Requirements | DII Information Requirements |
|---|---|
| Access to new information about markets, customers, competitors, suppliers or other external bodies, to improve competitiveness | Exploit information as a strategic asset in support of Defence outcomes; the key enabler of the change Programmes that are transforming the MoD and the wider Defence community. |
| Establishment of electronic links with external bodies, to speed up and improve communications | Support the sharing of information with Allies and other external parties, including other government departments |
| Access to external information to gain intelligence | Access to the Internet |
| Restructured existing information in order to meet the CSFs of the business | Access to secure information and services with protection from attack and misuse |
| Capability to integrate and utilise multimedia data | Capability to integrate and utilise multimedia data |
| Very fast access to integrated information so that visibility is provided from end to end of the key processes and information based services can be delivered effectively throughout the processes | Appropriate access from any appropriate location; allow users to collaborate interactively; guaranteed levels of availability and continuity of operational and business services |
| Access and filtering mechanisms for unstructured information to satisfy executive information needs relating to critical business issues | Facilitate the electronic management of information and records to meet the Freedom of Information Act and government targets on electronic public records |
| Performance measures to monitor progress on strategic factors | A quantifiable service to the user community; delivering capability to meet the business needs and benefits |
| Modelling data to perform 'what if' analysis on critical business issues | Delivering information management |
| Better information about staff to enable more effective use of the human resource | Delivery of corporate applications, such as JPA |

**Source: Adapted from Ward, J. and Griffiths, P., *Strategic Planning for Information Systems*, (Wiley, Chichester, 1996), page 365 and DII, *Frequently Asked Questions: Finance and Funding*, (DII, Corsham, n.d.).**

which is critical to strategic business initiatives and associated with business drivers, objectives or measures of success. This type of information requires a flexible system that can be adapted as business needs evolve. It also assists the organisation in gaining sustainable competitive advantage or, in MoD terms, best value and operational capability. Therefore, having clearly identified the type of project and understood the value that it is delivering to the organisation, the discussion now turns to the provision of the Technical Solution, looking first at the software development and then the implementation of both the software and hardware.

### 6.2.2. Software Development

Although largely available with DII(Convergent), it was decided by ATLAS to redesign the required software to deliver, monitor and manage the DII(F) service, security requirements and data centres, and to provide access to other software programs. The National Audit Office (NAO) described this process as being of "a low technical risk".[15] Before each implementation, ATLAS integrates and enables the relevant applications. EDS (now HP), the lead supplier for the ATLAS Consortium, ran the infrastructure project at the Department of Work and Pensions (DWP), an experience which provided a template for DII(F). Software development took four months at DWP and was extended to twelve months for DII(F), based on standard software engineering practice: a statement of requirement, high-level then low-level designs, and a series of tests and trials to produce usable outputs. At each stage, the DII Group Engineering team undertook assurance, checking for over-engineering, Value for Money (VfM) and conformity to MoD policy and regulations, particularly security. However, ATLAS had underestimated the technical difficulty of making each application compatible with DII along with the required manpower, resulting in poor quality designs, a high rejection rate and, therefore, increased scrutiny.[16] The core applications for DII(F) were due to be delivered in two stages: Release 1 in December 2005 and Release 2 in June 2006. These were delayed with most of the applications for the RESTRICTED element of Release 1 delivered about 18 months late.[17] Release 2 is yet to appear in full.

However, the biggest challenge in terms of the software development was the MoD's strict security accreditation process, undertaken by its independent accreditation authority.[18] ATLAS had difficulty in finding sufficient suitably skilled staff to develop software within these constraints. Their problems were further exacerbated by the publication of the so-called Burton Report in 2008, *Report into the Loss of MoD Personal Data,* a highly critical review of the MoD's information security procedures, which caused a clampdown on security requirements.[19] As a result, it took two years longer than planned to develop a version of DII(F) that was able to handle SECRET material.[20] This relates back to the observations about 'political hyperactivism' that were discussed in Chapter Two, demonstrating that changes in policy can cause critical problems, particularly to an IT system under development.

The delays to the software development resulted in DII(F) being implemented without some essential business applications, meaning that some users had to work on two systems, extending the cost of retaining their legacy systems. Contractually, users would only be moved to DII(F) if it gave them increased capability. However, the failure to provide Release 2 and full functionality meant that DII(F) could not match the capability provided by DII(Convergent) at Main Building, the Royal Navy (RN) Headquarters (HQ) and the Royal Air Force (RAF) HQ. Therefore, all three HQs had to be provided with additional data storage at a cost of £1.3 million.[21] Rather than receiving full functionality in one delivery, software is being released in batches with significant delays. Release 2, the full functionality, including the Electronic Document and Records Management Service (EDRMS), has been broken into smaller work packages with the final one due in 2013, seven years late.[22] This will deliver the final major indirect benefits, the IT-enabled change, that Defence requires. However, the delay means that it will deliver only two years of benefit, rather than the nine years originally envisaged, raising significant questions about its VfM.

In 2008, ATLAS formed teams to work on each software release, enabling multiple streams of work, with new protocols agreed for the design and review cycle.[23] The DII Group dedicated more resources to the assurance process, whilst also agreeing test and trial criteria explicitly at the beginning of each design cycle.[24] The Programme is currently working on 'DII Optimisation', a business transformation initiative, which will result in joint production of every design and reduced costs to both the MoD and ATLAS.[25] Over time, therefore, lessons have been learned and put into practice. In terms of the Technical Solution, one interviewee described DII as a “simple technology project, the only issue is scale”. [26] Ironically, the perceived simplicity of the technology has proved more complex than anticipated. How then has the DII Programme coped with the issue of scale?

### 6.2.2. DII(F) Implementation

As with the software development, the implementation of DII(F) was considered relatively straightforward. Again, based on experience at DWP, ATLAS proposed a Fixed Rollout Methodology: a generic 38-week plan applied at every site irrespective of size, complexity or condition.[27] This had proved to be consistent and efficient, delivering the DWP infrastructure ahead of schedule.[28] It also required minimal oversight, so reducing the requirement for project managers.[29] As part of the contract preparation, the DII Group and ATLAS surveyed around 50 sites to estimate IT provision, but without taking into account the physical condition of the land or buildings. Therefore, the Group made assumptions that existing infrastructure, such as network switches, cabling and ducting, could be reused and that there would be suitable space available to house the network and server equipment. The Group also assumed that site plans and statutory Health and Safety documentation, such as asbestos and power supply surveys, would be up-to-date and available. Given this, they had little contact with Defence Estates, the body responsible for MoD-owned land and property. At DWP, it had taken six months to plan the implementation at fairly standard sites with uniform infrastructure and good quality communications.[30] However, given the size and complexity of MoD sites, this planning period was extended to twelve months with eighteen months allocated to the implementation with no prior pilot testing. In reality, it took around eighteen months to set up the engineering, while the installation continues to date.

Twelve weeks before implementation, a survey was carried out to assess requirements at each site. To assist this, the Second Permanent Under Secretary for State (2$^{nd}$ PUS) demanded that change across Defence should be minimised with no further changes once the site surveys had been completed.[31] Despite this, users at many sites continued to make changes, delaying implementation further. More critically, and unlike DWP, the MoD sites proved to be very diverse, ranging from infrequently used TA buildings to Main Building in London.[32] Some of the buildings are in a decrepit state with limited functionality, whilst some are privately rented. There were also some very idiosyncratic problems: asbestos and unexploded devices had to be removed from a number of sites[33]; Craigiehall, the HQ of the 2nd Division of the Army, was listed and so trunking could not be used;[34] planning permission had to be sought to put cabling through a listed lawn at the Cavalry barracks.[35] Substantial work had to be undertaken at a number of sites to bring them to the minimum standard required for implementation. ATLAS had to re-do virtually every single survey and around half of the designs.[36]

Changes to the implementation plans resulted in an increase in the number of terminals scheduled for delivery in the first two months. However, ATLAS had only employed a small number of basic project managers, each responsible for up to 30 sites, making a flexible response to delays impossible. The contract required 62,800 terminals to be installed by the end of July 2007, which meant that between 6,000 and 7,000 terminals had to be installed each month, an unachievable target as resources became increasingly stretched.[37] Only 29,000 had been delivered by the end of April 2008.[38] This meant that legacy systems had to be maintained, causing further cost and an 18-month delay to Increment 1.[39] These additional costs were shared with the DII Group, which used some of its contingency fund, although the service contract meant that ATLAS could only charge if it were able to prove expense over and above the agreed fixed price or that the delays were caused by the MoD.[40] However, the major loss was time, proving critical to the delivery of the Joint Personnel Administration (JPA) system, which depended on the installation of DII(F).[41] Therefore, during 2006 and 2007, installation was focused on those sites awaiting JPA. In some cases, additional legacy terminals were added at an additional cost of around £12 million.[42] Ultimately, the implementation date for JPA was delayed by four months, although this was partly due to JPA application delays.[43]

As with the software development, learning took place. The Fixed Methodology was discarded and the so-called Decision Point Process, based on gates and stages, was adopted instead.[44] Now, both the DII Group and ATLAS carry out the surveys with the ATLAS project managers undertaking the detailed preparatory work. Meetings are held regularly with key stakeholders, including Defence Estates, BT and local planning bodies. The overall quality of the survey and associated design work has improved. Realistic assessments are made about how long preparatory work will take, which dictates the order of site implementation. The new process was implemented in 2007 with significant improvements and is now working to plan, producing positive statistics with 240,000 of the 300,000 accounts rolled out to date.[45]

Despite these improvements, further difficulties have been encountered. For example, the largest implementation to date has been at Defence Equipment and Support (DE&S), Abbeywood near Bristol. The plan to install software remotely proved too slow and so a locally managed build room had to be set up where software was installed from compact discs. When the system went live, an unanticipated number of users experienced problems, overwhelming the ATLAS support staff and necessitating a rapid recruitment drive. Since this implementation, the business that is carried out at Abbeywood has evolved in response to changing MoD requirements, which means that the site now has a fundamentally different purpose. ATLAS originally installed 7,000 terminals, but the ongoing business change has doubled the number of people now working on that site.[46] Making provision for them on DII(F) entails not just moving terminals, but also moving data, ensuring access to applications and installing additional network rooms. Therefore, the continued flux in Defence creates additional work and cost.

To date, ATLAS has made two attempts to roll out DII to Cyprus. The first was based on an assumption that the network between the UK and Cyprus was suitable for the job. In order to expedite the contract, the state and capacity of the cable connection with Cyprus had been estimated by the MoD, ignoring the fact that the bandwidth is shared with other services.[47] ATLAS then designed their solution based on the estimate. When the solution failed, the MoD argued that ATLAS should have acted as an intelligent supplier and questioned the assumption.[48] However, ATLAS claimed that they had been unaware of any obvious discrepancy and so had simply accepted the requirement.[49] Ultimately, there has been legal intervention to resolve this debate and implementation in Cyprus has yet to happen.[50]

As the implementation moves to the deployed maritime environment, a whole raft of new problems is emerging. Rather than relying on the helpdesk, service support for DII(F) is obtained from Military Service Providers (MSPs) on board the ships. This raises issues about how to measure this service. In the fixed environment, the Key Performance Indicators (KPIs) measure the service provided by ATLAS: the speed with which it responds to calls, user satisfaction with the response and so on. However, it is likely that operational matters will take precedence over problems with DII(F) on board ship, meaning that the resolution process is likely to experience delays.[51] There is some concern that the number of challenges yet to be confronted in the deployed space will present more issues for the Programme as implementation proceeds.

Overall, the core elements of the Technical Solution, the software development and implementation process, have proved problematic. However, over time, problems have been dealt with and solutions have been found. Unfortunately, this has not prevented an impact on the time and cost of the project and, potentially, on its scope. The next stage of this chapter is to consider whether these problems have occurred because the identified CSFs have been neither understood nor applied, or whether they have been both understood and applied, but have had little impact.

## 6.3. Understanding and Application

Interviews were conducted with a sample of personnel from the DII Programme, who were asked to assess whether lessons had been sought and learned. The issue of learning lessons was identified in Chapter Five and has recently become a critical government initiative. Interviewees were asked if they recognised the reports on IT failure used in this study before being asked about lessons learned from other IT mega-projects. They were then asked to gauge their level of understanding of these CSFs, whether they thought that they had been applied within the Programme and, if so, to what effect.

### 6.3.1. Lessons Learned?

The literature review identified that learning from past experience can substantially improve the chance of success.[52] Therefore, the purpose was to identify whether learning from past experience has taken place and, if so, how beneficial it has proved to be. About half of the DII Group interviewees were aware of the reports identified in Chapter Four, particularly the key government material (McCartney, the OGC and NAO reports) with less awareness on the ATLAS side. While some of the DII Group knew about the DWP report before the contract was let, most had learned about it through the application of its lessons to DII. Interestingly, only one ATLAS interviewee recognised it. Although not everyone recognised all of the report titles, it was pointed out that their lessons are integrated within, and disseminated through, MoD policy and resulting processes, such as the Acquisition Operating Framework (AOF), thereby impacting on operations.[53] There is also considerable oversight and assessment of the DII Programme by a variety of bodies, cognisant of the CSFs identified in these reports and assessing on this basis, which has greatly increased awareness within the Programme.[54] It was apparent from these discussions that little could be deduced from the low recognition of the original source documents as the CSFs were highly likely to have permeated the project by other means.

It was evident that the message about 'IT-enabled change', first proffered by the McCartney report and later picked up by the NAO, has permeated thinking within this IT project but that people are still grappling with its meaning. The general view was that changing IT does not deliver business change. The two have to be dealt with separately, otherwise the IT project becomes mired in the business change and both will fail. The focus of the DII Programme is the infrastructure delivery and, as such, it is considered simply the bearer or enabler of the organisational and cultural change that will result from the Defence Change Programme (DCP). However, many of the interviewees felt that the DII Programme often appears to be taking both infrastructure delivery and change delivery roles.[55]

It was evident that a great deal of effort had gone into examining the processes and outcomes of similar projects during the Planning phase, most notably the Navy Marine Corps Intranet (NMCI) and the DWP (both supplied by EDS), the Bowman Combat Infrastructure Programme (CIP), the DFTS (Defence Fixed Telecommunications System) and the NHS National Programme for IT. Some interviewees stressed the importance of this benchmarking process in working out how to do things and not repeating previous mistakes.[56] NMCI became the main point of comparison. One of the key lessons from both NMCI and DWP was to keep applications separate from infrastructure.[57] The DII Programme had to deal with over 10,000 applications and it would have been impossible to do this at the same time as developing the infrastructure.[58] Another lesson was to consolidate applications. There were around 6000 in the MoD, reduced to 600 before the contract was let.[59] The NHS National Programme for IT was tracked throughout the contract phase for DII. The Group concluded that it was too complex and over-ambitious with no central, overarching view.[60] It also highlighted the dangers of failing to engage with key stakeholders. This latter was taken as a major lesson by the DII Group, particularly in terms of its relationship with the Top Level Budget holders (TLBs).[61]

Opinion varied over whether learning had continued once the contract was let. One interviewee said that there had been ongoing reference to other experience, not just in terms of implementation but also in terms of contract management.[62] Others felt that the effort of delivery had distracted the Group from taking a more strategic view.[63] However, it was also evident that, while some lessons from previous experience matched DII and improved it, others could not be applied to the MoD. This supported the contention made by Lyneis et al that, if each project is unique, then learning across projects is difficult.[64] Lessons are learned in a particular context and cannot be directly re-applied to a variable of that context. The same mistakes may not have been repeated to the same degree within DII, but it has presented its own set of different problems: “there isn’t really a comparator”.[65] As it matures, the project is becoming increasingly unique and so the lessons from previous projects, including NMCI, are less relevant.[66] In the early stages, there was frequent referral to the US experience but this has now ceased as “the contract is different, the users are different, the environment is different, everything has now moved on".[67] NMCI operates in fixed locations and only manages RESTRICTED information; DII is progressing into the above SECRET and deployed space.[68] Therefore, there is little more that can be learned from other projects at this stage in the lifecycle.

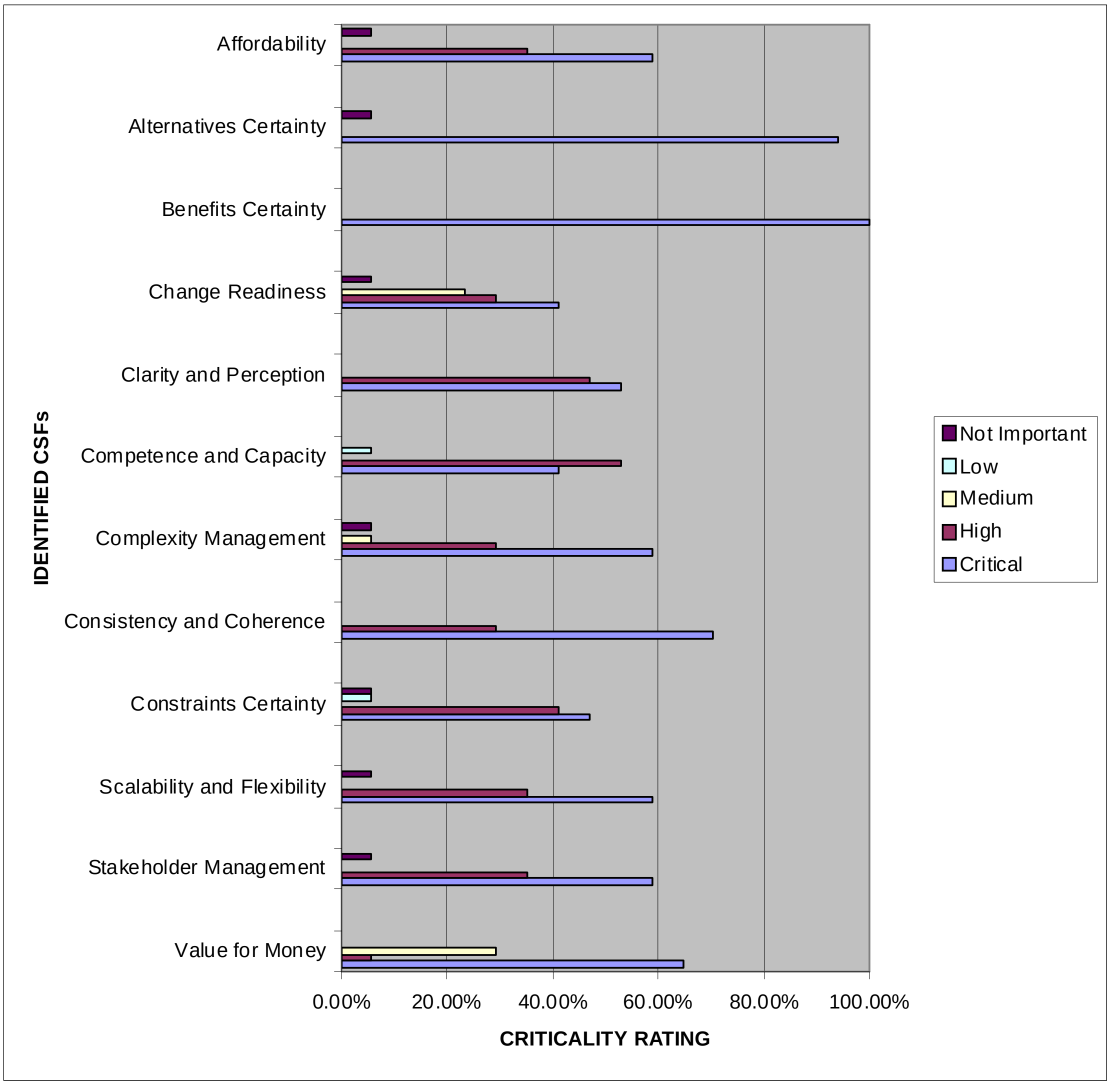
As well as learning lessons from external sources, there is also a wealth of experience within the DII Programme, enabling the team to deal with exceptions and to find solutions: personnel within the DII Group have been involved in a range of MoD IT projects, including previous infrastructure, IT and equipment projects, as well as a number of non-MoD projects; ATLAS has a wealth of experience of MoD, public and private sector projects.[69] The array of military, ex-military and non-MoD working within the DII Programme provides a wide range of relevant experience, different blends of which are needed at different times. Learning appears to be shared within the DII Programme and things are done slightly differently with each successive increment. However, it was thought that lessons tend to be tightly encapsulated in specific groups with specific responsibilities, rather than the same lesson being picked up across the board.[70]

This discussion revealed that lessons had been learned and, where applicable, applied. The scrutiny that the project undergoes has made the Programme very aware of the CSFs stemming from the reports, suggesting that this form of oversight is beneficial and raising questions about Liu and Yetton's assertion that conducting reviews in a high task uncertainty environment, such as might be found early in a project's lifecycle and in an IT project, has a negative effect on performance.[71] Other projects were observed and the lessons from these evidently applied. However, learning external lessons appears to have utility only in the early stages of a project. As it matures, it becomes increasingly unique and so develops its own specific solutions to problems.

### 6.3.2. Understanding and Application of CSFs: Self-Assessment

As described in Chapter Four, twelve CSFs were synthesised from the lessons of ten key reports and tested against those identified in the scholarly literature. Interviewees were shown the resulting list of CSFs and asked whether they recognised their importance, rating them on a scale ranging from Critical to Not Important. All of the CSFs were recognised and understood with all receiving some level of Critical rating, as shown at Figure 6.3. Benefits Certainty received the highest rating, closely followed by

**Figure 6.3. Understanding: Recognised Importance of Identified CSFs**

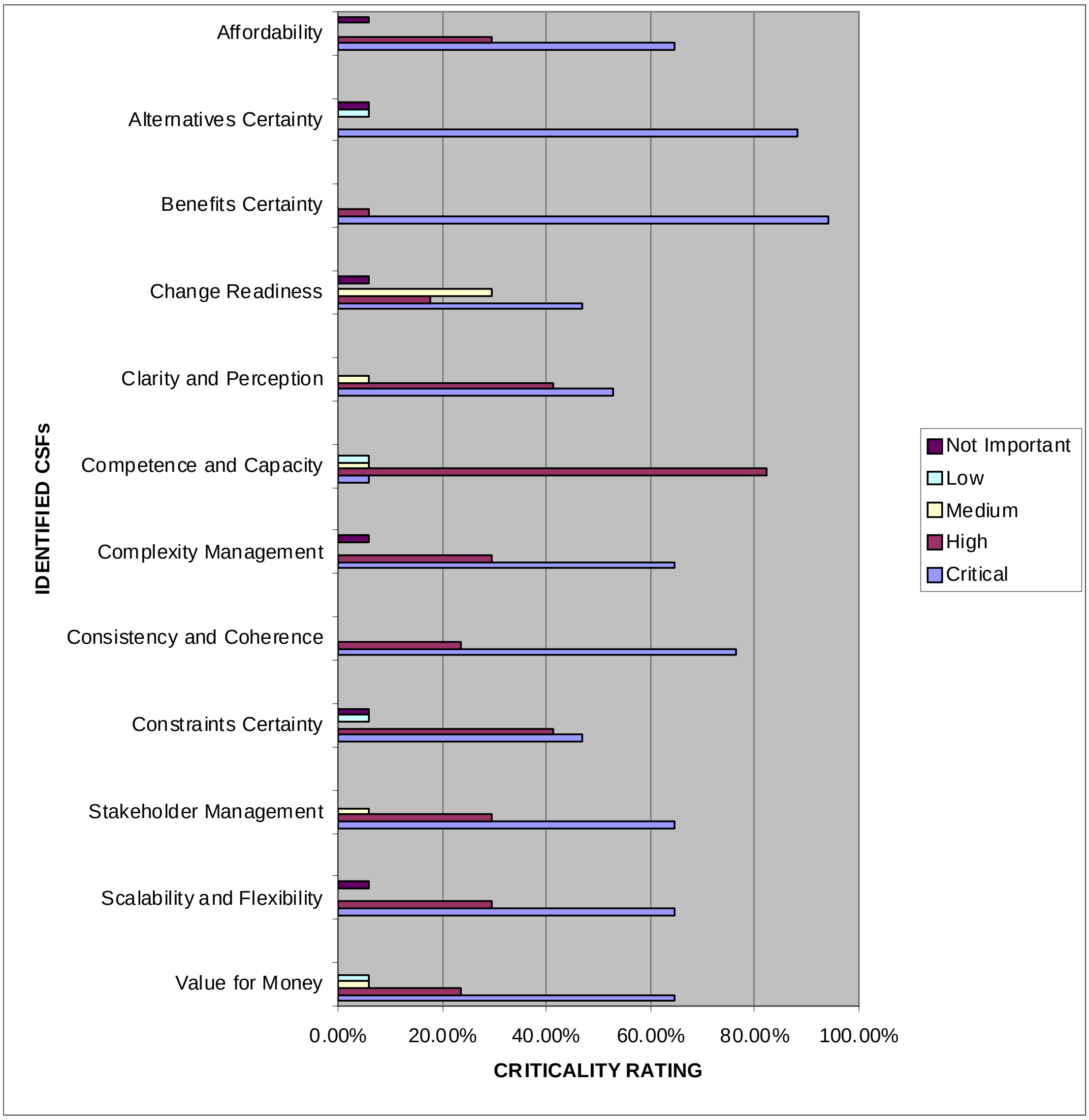



**Source: Author**

Alternatives Certainty, then Consistency and Coherence.

The interviewees were then asked to rate the extent to which they felt this importance had been recognised within the DII Programme using the same rating scale. Whilst the response was less decisive, the same three CSFs were rated most critical and, again, all of the CSFs received a relatively high rating in terms of their criticality, as shown at Figure 6.4.

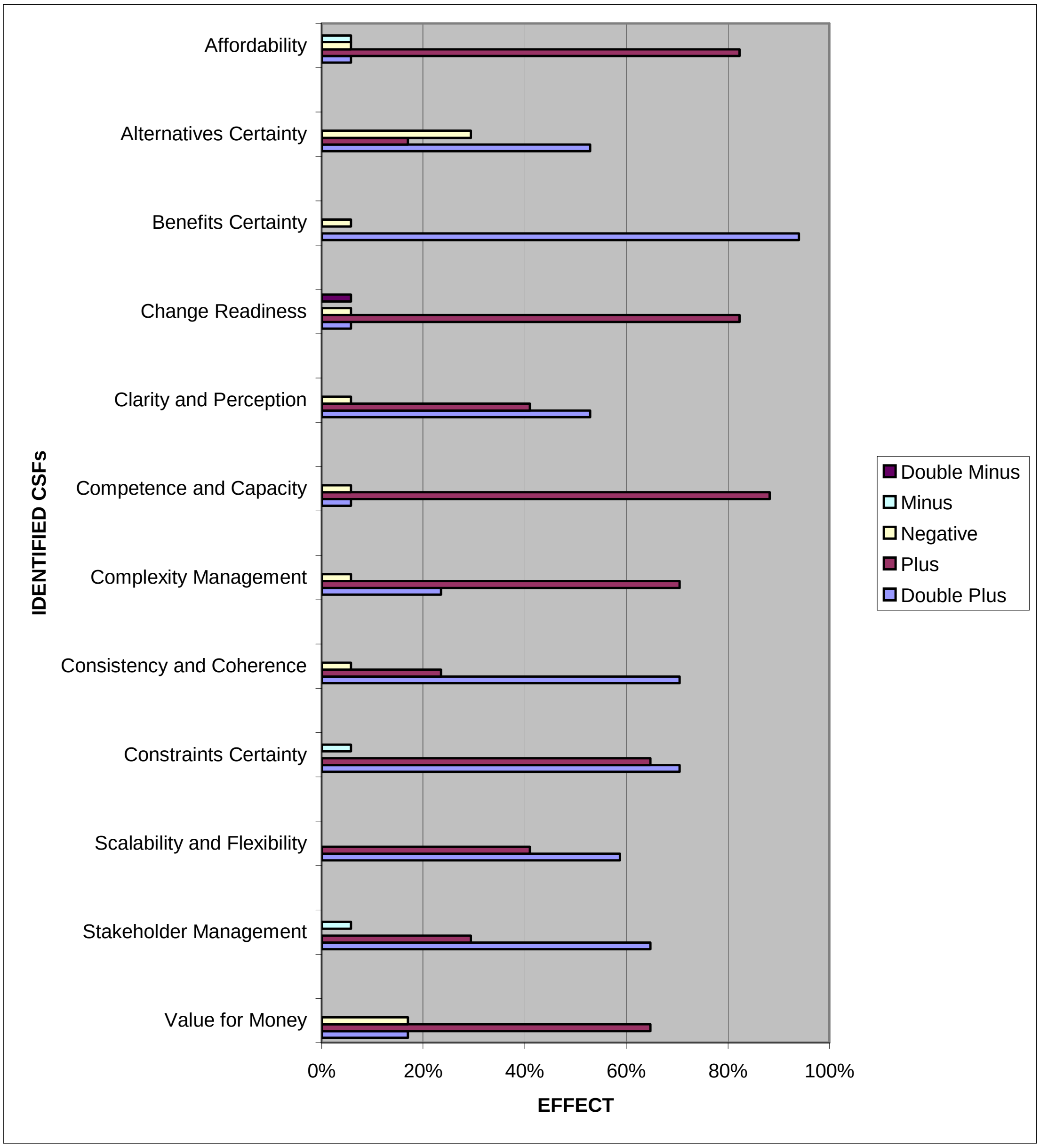
**Figure 6.4. Application: Extent of CSF Recognition Within DII Programme**




**Source: Author**

Finally, the interviewees were asked to assess the effect of the identified CSFs on the management of the project, using a rating scale ranging from strongly positive to strongly negative. The most influential was undoubtedly Benefits Certainty followed by Consistency and Coherence, along with Constraints Certainty while Stakeholder Management and Scalability and Flexibility were not far behind, as shown at Figure 6.5.

**Figure 6.5. Effect of CSFs on Management of DII Programme**




**Source: Author**

A broad comparison of the CSFs identified as part of this study shows little correlation between them, as shown at Table 6.2. The CSFs identified for the DII Programme do not correspond with those identified for infrastructure projects or extracted from the general reports on IT projects. Similarly, although the two literature sources showed some similarity, neither corresponds with the DII Programme. The generic project management literature recognises that there are specific types of project in specific contexts, acknowledging that not all projects are the same, which means that they need to be managed in different ways using different CSFs. These findings support this view. However, Pinto and his co-authors also suggested "that CSFs vary throughout a project lifecycle with some important in the early stages whilst others become critical later".[72] Therefore, the interview discussion turned to the relative importance of the CSFs across

**Table 6.2. Top Three CSFs Compared**

| | **CSF 1** | **CSF 2** | **CSF 3** |
|---|---|---|---|
| **DII Programme** | Benefits Certainty | Alternatives Certainty | Consistency and Coherence |
| **Infrastructure Reports** | Complexity Management | Constraints Certainty | Scalability and Flexibility |
| **General IT Reports** | Competence and Capacity | Complexity Management | Clarity and Perception |
| **IT Project Management Literature** | Clarity and Perception<br>Stakeholder Management | Alternatives Certainty<br>Benefits Certainty<br>Clarity and Perception | Clarity and Perception |
| **Generic Project Management Literature** | Clarity and Perception | Alternatives Certainty<br>Benefits Certainty<br>Clarity and Perception | Alternatives Certainty<br>Benefits Certainty<br>Clarity and Perception |

**Source: Author**

the Project Lifecycle and whether there had been different imperatives during the Planning, Development and Operational phases.

### 6.3.3. Relative Importance of CSFs across the Project Lifecycle

Pinto and his co-authors noted that the important factors in the early stages of a project lifecycle are 'internal' (i.e. project related), meeting time, cost and scope; while 'external factors' (i.e. product related), such as customer needs and satisfaction, become important later.[73] How then do these findings compare with the DII Programme? Not surprisingly, the answer to this question was not clear-cut: "they all come into play at different times and with different impact".[74] With interviewees representing seven different groups within the DII Group, as well as the ATLAS view coming from two different companies, it was inevitable that there would be different views. Generally, Affordability, Alternatives Certainty, Benefits Certainty and Value for Money were seen as critical at the Planning stage in terms of gaining top-level support for the project. However, in terms of gaining the necessary resources from the organisation, it was considered that Competence and Capacity, Complexity Management, Constraints Certainty and Scale and Flexibility were key. During development and implementation, the stress is on Change Readiness, Clarity and Perception, and Stakeholder Management, but there are ongoing issues with Affordability, Competence and Capacity, Complexity Management, and Scalability and Flexibility. These findings broadly support Pinto's claims of an internal focus during planning, moving to the product during development and implementation.

### 6.3.4. Understanding and Application of CSFs: Analysis

The in-depth discussion about the CSFs provided the basis for a more detailed and informed analysis. The results presented here focus on those elements considered most relevant to this study. It should be noted that, given that this research is driven by an interpretive philosophy, the evidence presented here is opinion. However, this has been carefully referenced across the interview findings and supported by fact where possible. The tables show the percentage of respondents who recognised these CSFs, the extent to which they considered that they had been applied within the DII Programme and the effect that they were considered to have had. The first two were rated according to a five-point scale: Critical, High, Medium, Low or Not Important; the latter was rated according to whether its effect was Double Plus, Plus, Negative, Minus or Double Minus. Most respondents rated most CSFs as Critical, as shown in the tables, or High, which is also included in the presentation of the results where necessary.

| **Affordability** | | Critical % | High % |
|---|---|---|---|
| | **Recognised** | 59 | 35 |
| *An assessment of whether proposals can be paid for in terms of resources, cash flows and funding* | **Extent** | 65 | 30 |
| | **Effect** | ++<br>6 | +<br>82 |

The need for sufficient, well allocated resources and an adequate budget was identified in the literature review but featured more prominently in the reports, particularly the infrastructure reports. The interviewees gave it a similarly high rating, although its effect was considered positive, rather than strongly positive. Most believed that the project was affordable at the time that the contract was let.[75] However, irrespective of funding, the imperative to act overrode any funding constraints, as the MoD was perilously close to being unable to afford to either maintain its current systems or to replace them.[76] The plan was to fund DII(F) from the savings made by discontinuing legacy systems. Despite also receiving finance from the Defence Modernisation Fund (DMF) and the TLBs, it never had sufficient funding to deliver the entire infrastructure.[77] Therefore, the project proceeded into its first phase with no assurance of approval for the second and third phases. From the beginning, therefore, the Programme was under funded and in search of additional savings.

Due to delays, there has been continued expenditure on maintaining legacy systems, offset to some extent by savings on new terminals. In addition, there have been delays in letting some of the increments with question marks about the future of the final increments due to the funding difficulties. The delay to Increment 3a caused particular consternation during the summer of 2009. Twenty MoD projects needed approval to continue. Of those, the Chief of Defence Materiel (CDM) took only four to the Treasury, including Increment 3a. Initially refused, it was finally approved in December 2009, costing £540 million and providing a further 42,000 terminals to around 60,000 personnel, mainly within the RAF.[78] The delay was due to the overspent MoD budget and government spending constraints resulting from the global financial crisis. Within the Programme, it is envisaged that DII(F) could be stopped after nine and a half years, six months early, as there is unlikely to be sufficient funding to continue.[79] It is thought that alternative means will be found to deliver Increment 3b, which completes the implementation in the deployed environment, and Increment 3c in the above SECRET environment, as "the appetite for putting in a note to Treasury is diminished".

Despite the views of the interviewees, it is questionable whether this CSF was either understood or applied. It appears that the strength of will to initiate the project was paramount and that funding was secondary to necessity in this instance, confirming the 'conspiracy of optimism', discussed in Chapter Five.

| **Alternatives Certainty** | | **Critical %** |
|---|---|---|
| | **Recognised** | 94 |
| *Consideration of alternative approaches capable of fulfilling the objectives creates project confidence and commitment with the key stakeholders i.e. Do Nothing, Do minimum, Defer, Outsource, Consolidate* | **Extent** | 88 |
| | **Effect ++** | 53 |

Alternatives Certainty did not feature highly in the reports. However, the interviewees recognised it as a CSF and treated it as such, although views on its effect were less emphatic. Dvir et al identified an essential, urgent operational need as the most important factor for success.[80] It is evident that DII(F) was considered both essential and urgent, which certainly gave great certainty. There was a strong sense that doing nothing or the minimum were not feasible options and there was a single-minded view of the future within the Programme.[81] More consideration was given to how to deliver it without sufficient authority or funding, rather than what to deliver. Once outsourcing was identified, the alternatives concerned only the degree of outsourcing required.[82]

It was observed that this certainty should have been challenged at various intervals.[83] However, the appropriateness of the solution and the approach is tested with each successive increment. As with equipment projects, there is significant governance and scrutiny of IT projects at the approvals stage by the MoD's Investment Appraisals Board (IAB).[84] Each increment also has to undergo the public sector comparator, used to assess whether a project provides better value if delivered by the government, by the government in partnership with the private sector, or by the private sector alone.[85] The project has also been through the Gateway Review process, although reports on only two are available in the public domain. In their examination of Gateway Reviews, Liu and Yetton suggested that the outcome was dependent on the certainty of the task. [86] There appears to have been great certainty over DII and its Reviews have reflected that. At its Initial Review in 2003, it was rated amber due to the need for more detailed implementation plans, a point that was to prove critical later, as discussed above.[87] In 2004, the Gateway Three Review rated DII in the top 10% of public sector IT projects, although requiring further work on its benefits plan.[88] The NAO's 2003 Major Projects Report criticised it heavily for underestimating risks and for time slippage.[89] The DII Group also tested the Programme very positively against the NAO's review of common causes of failure for IT projects, which is shown at Appendix 6. Whilst this CSF appeared to be understood and applied, it is debatable how much analysis of alternatives actually took place. Chapter One highlighted the danger of people inside the system considering it closed, paying little attention to the environment while overestimating their own power. Referred to as 'groupthink', this is a potential source of project failure.[90] It may be that an element of groupthink occurred with regard to DII.

| **Benefits Certainty** | | **Critical %** |
|---|---|---|
| | **Recognised** | 100 |
| *Clear identification and definition of the business need for the project and the required performance improvement outcomes along with how these will be managed in terms of measures, owners, targets and strategic alignment* | **Extent** | 94 |
| | **Effect** **++** | 94 |

Benefits Certainty featured more highly in the infrastructure reports than in the general IT reports and received the highest ratings for the DII Progamme. The benefits that DII is expected to deliver are clearly identified and categorised, as discussed in Chapter Five. This focus on benefits, particularly indirect financial benefits, ultimately secured the initial funding.[91] The delivery was, therefore, shaped around the benefits, ensuring that critical financial benefits would be achieved in the first few years, in particular via JPA, which enabled the biggest single benefit for the project.[92] McCartney clearly identified the poor systems used to track benefits in government but the DII Programme has a robust benefits tracking mechanism, reporting at 2-star level and above, and also reviewed at every governance board.[93] In addition, the DII Group tracks benefits back from delivery to the Main Gate business case to ensure that they are being delivered as originally intended, whilst they also scan for potential risks to benefits.[94]

In addition, there are currently seven CSFs for the Programme, as shown at Table 6.2. These are reviewed monthly, link to the strategic plan and are revised each year to ensure that they reflect critical issues at specific stages. Furthermore, each service provided by ATLAS has a Key Performance Indicator (KPI) to ensure that the right level of performance is delivered and that benefits are being realized, as this is linked to payment. Discussion at interview suggested that these KPIs sometimes drive the wrong behaviour and result in more expensive design decisions than necessary. For example, the original suggestion for the back-up of data was considered unaffordable and was downgraded. However, overall, benefits certainty has been central to the DII Programme, demonstrated by the extensive awareness of them: "We absolutely recognise the importance of delivering the benefits... (they) have been a strongly positive effect".[95]

**Table 6.3. DII Programme: CSFs**

| Critical Success Factor | Comment |
|---|---|
| **Service Excellence** | |
| CSF1: Live-Service Delivery | Measured by KPIs for Availability and Performance, and User Satisfaction Survey |
| CSF2: Legacy Closure | Reducing expenditure on legacy is key to the affordability of the Programme |
| CSF3: Enabled Benefits | Delivery of support to other MoD systems and improved ways of working |
| **Capability Development** | |
| CSF4: Capability Development | Software releases, Labyrinth, infrastructure and applications |
| CSF5: Fixed Implementation | Terminals, applications and strategic sites |
| CSF6: Deployed Implementation | Land deployed and maritime |
| **Growth** | |
| CSF7: New Increments | Increment 3a and High Grade Messaging |

**Source: Great Britain, Ministry of Defence, Defence Equipment and Support, Information Systems and Services, *Defence Information Infrastructure: Joint Business Plan 2009-2010*, (London, HMSO, 2009), page 12.**

| **Change Readiness** | | Critical % | High % |
|---|---|---|---|
| | **Recognised** | 41 | 30 |
| *The current state of the organisations involved in the project and their perceived ability to absorb, adapt to, and assimilate change* | **Extent** | 47 | 17 |
| | **Effect** | ++<br>6 | +<br>82 |

This CSF was not prominent in either set of reports or the analysis of the literature. Understood and applied in the DII Programme, although less so than some of the other CSFs, its effect was seen as positive. Overall, the DII Group believed that they had learned lessons from previous projects and prepared Defence well for the change. Some saw this as one of the project's successes, encouraging the right response from the wider organisation and, as a result, "users have not given any problems".[96] Others thought that the Group had not driven the change as strongly as expected with less central direction than anticipated and change management left largely to the TLBs.[97] There was also a view that it was not the DII Group's role to drive cultural change, considered to be the domain of the Senior Responsible Owner (SRO) for the Programme, the MoD's Chief Information Officer (CIO), the Director General Information (DG Info) and the TLBs.[98]

Others felt that DII is a change programme in its own right, set up to deliver organisational change, but these non-financial benefits have suffered due to the focus on financial benefits, resulting in most of the effort being focused on installing the system.[99] As discussed above, the move to Release 2 will drive significant change across Defence.[100] Linking to the changing significance of CSFs over the project lifecycle, as discussed at Section 6.3.3, the Programme is becoming increasingly concerned with business change with the focus currently shifting to consideration of the performance of both system and service, and the KPIs.[101]

Overall, there is a mixed understanding of the change readiness required as well as differing perceptions of the DII Group's role in delivering change. The application of this CSF within the project is, therefore, debatable. It appears that the Programme has paid ever-diminishing attention to this. The overall change readiness is gauged more clearly through the user survey discussed at Section 6.4.1.

| Clarity and Perception | | Critical % | High % |
|---|---|---|---|
| | **Recognised** | 53 | 47 |
| *Clarity of the rationale, scope and scale of the project and shared understanding by key stakeholders across broad communities involved* | **Extent** | 53 | 41 |
| | **Effect** | ++<br>53 | +<br>41 |

The need for shared understanding by key stakeholders has been understood by the DII Group and applied with a positive effect. It was the second most important CSF identified in both the generic and IT project management literature recognising the need for clear, joint understanding about the project rationale along with a shared perception of how it is going to be developed and implemented. It is evident from this case study that the rationale for DII, along with its scale and scope, has remained fixed throughout. Despite the change in security policy stemming from the Burton Report, it has not suffered from major changes in either policy or political direction, one of the key problems identified within the government context, as discussed in Chapter Two. It emerged relatively unscathed from the halting of IT mega-projects by the newly elected Coalition Government in May 2010.

There has been strong top-level support from a number of key people, in particular the 2nd PUS who held the MoD post during much of the planning and development phase, identified unanimously at interview as a major force in driving this project and, in doing so, increasing support and commitment at Defence Board (DB) level.[102] In addition, as indicated in both Chapter Five and Section 6.2.2 above, he was willing to be directive. It was his tenacity that enabled the funding of DII, requiring the TLBs to part with their funding. In addition, DG Info, who was also CIO and SRO at the time of the project's inception, was a strong supporter.[103] There was a very positive working relationship between these two, along with the first DII Head and CEO of ATLAS, which the NAO recognised as a strength of this Programme.[104] This integrated top-level support has become less important as the project has progressed through its lifecycle. However, as it moves to a stage where it will bring greater levels of change, it is likely that such top-level support will again become imperative.

The NAO Report noted that the maintenance of key personnel throughout the project has helped to maintain this clarity of purpose and recommended that this should be continued.[105] This has been noted and, despite the military and civil service posting/appointing system, this stability has been particularly evident within the DII Group.[106] Nearly all of the DII Group interviewees had been with the project since inception whilst, on the ATLAS side, three of the six interviewees had moved from the Group to work for ATLAS. In addition, the first DII Group Head stayed in role for eight years, a major factor in maintaining the project's vision and momentum.[107] This CSF was undoubtedly both understood and applied within the DII Programme to good effect.

| **Competence and Capacity** | | **Critical %** | **High %** |
|---|---|---|---|
| | **Recognised** | 41 | 53 |
| *The requirement for individuals associated with the project to be able to properly perform specific jobs through a combination of knowledge, skills and behaviour, along with the capacity, in terms of the availability of the right people with the right skills, to execute and effectively deliver the option* | **Extent** | 6 | 82 |
| | **Effect** | ++<br>6 | +<br>88 |

The reports discussed in Chapters Four and Five revealed an overwhelming emphasis on Competence and Capacity, an issue that was also very evident in the literature analysis. However, this CSF was less apparent in the DII Programme. It was rated highly, rather than as critical, and treated as such with a positive effect. As discussed at Section 6.3.1, there is a wealth of experience and understanding within the Programme and it was generally felt that both teams had the right skills. However, there was a view that, early on, ATLAS had often failed to field the right expertise in the right quantity at the right time, blamed on HP's "ruthless control of costs".[108] ATLAS interviewees admitted to having been challenged at times but felt that they had been able to access the relevant skills from within the Consortium as required.

Despite this, there was strong evidence of key personnel possessing critical skills. An engineer by background, the first DII Head had previously implemented three secure information infrastructures, including 55,000 terminals in Australia in just three years using four contractor firms, bringing together 94 separate systems in the face of considerable resistance. Similarly, the first CEO of ATLAS had led similar projects and spent a year "acclimatising" to Defence by working on other EDS MoD projects before leading the DII Programme. [109] The effect of experience and related skills cannot be underestimated in a project of this type. As with Clarity and Perception, retention of personnel is critical to Competence and Capacity in maintaining knowledge, skills and understanding, as well as engendering the right behaviours. However, it was also noted that there is an inherent danger of people becoming complacent, stagnant and constrained in their thinking if they stay for too long.[110] A balance is required between retained understanding and the influx of fresh thinking. Related to this, different skills are required at different stages in the project lifecycle, as demonstrated by the use of considerable external support during the contract phase, discussed in Chapter Five.

As discussed in the literature review, Brown questioned whether it was possible for contractors to understand the government context sufficiently.[111] ATLAS estimated that it normally takes six to 12 weeks to become embedded in an IT outsourcing account.[112] However, this has not been the experience with DII. Many ATLAS personnel struggle to understand the structure and culture, "like working on a foreign account".[113] In order to deliver a service-based contract, there has to be some understanding of how the service is constructed.[114] This underlines the need for retention of personnel to give them time to fully comprehend the context, so optimising their contribution. However, the DII Group identified a high level of personnel changes within ATLAS, where there is a similar culture of short-term postings as a means of expanding skills and experience, as a negative factor.

Despite the recognised complexity of the context, there was an expectation from the DII Group that ATLAS should be capable of understanding it but that it did not engage with the DII Group to improve its understanding, demonstrating a lack of appreciation of the available local knowledge. In turn, ATLAS questioned the DII Group's contextual understanding, raising questions about their oversight of, and insight into, the wider customer base and, therefore, their ability to either manage the delivery of capability to the customer or to guide the supplier as intelligent customers.[115] It was considered that decisions made by the DII Group might not be endorsed or even comprehended by the users receiving the solutions.[116] By and large, the Group focused on managing the supplier's delivery against the contract, although this did not necessarily reflect the user's current requirement. Therefore, ATLAS often negotiates with the DII Group on behalf of the users.[117]

The contextual complexity is exacerbated by the inherent complication of the DII Programme itself. Dvir et al noted the cohesion of the development team as a success factor.[118] However, potentially, the interrelationships between a variety of groups and organisations within the DII Programme hamper cohesion. The identified tensions between the military and the civil service make it a difficult environment for a supplier: "they don't have a good impression of civil servants and the civil servants don't have a good impression of them in the business space".[119] Some ATLAS interviewees (not ex-military) questioned the role of military personnel in an IT outsourcing project and whether they were able to be "a jack of all trades", noting a façade of presumed expertise and highlighting a tendency to over-complicate.[120]

In turn, some of the military personnel expressed exasperation with ATLAS's requirement for a process to be in place before taking action.[121] Further complexity is created by the consortium construct, described by one DII Group interviewee as "a loose affiliation of warring tribes".[122] Whilst ATLAS understands the rationale, integration within the Consortium is described as "challenging".[123] As the lead supplier, discussions between HP and the customer concerning requirements and financing then have to be relayed to the other members of the Consortium. Working within teams that consist of both HP and Fujitsu personnel means that every action has to be considered in terms of contractual and cost implications. This requires not only integration but also trust.

General Dynamics (GD), one of the second tier suppliers, left the Programme in 2010 as a result of "tensions between the Consortium partners" and was replaced by another provider.[124] GD then began legal proceedings to obtain more than £1.7 million from

EDS, a row centred on a management charge and risk premium.[125] There have also allegedly been tensions between HP and Fujitsu.[126] Overall, there were suggestions that five companies is too many and that two might ensure the required certainty of supply, whilst enabling better communication, integration and, therefore, higher levels of trust.[127] However, there were some suggestions that single source supply was preferable: “this whole environment is down to relationships so if relationships are souring that makes it difficult”.[128]

Despite having outsourced the project, there are still around 500 in the DII Group, including external contractors other than ATLAS. One interviewee noted that BAE Systems manages a similar contract with a team of 50 people.[129] However, the DII Group has remained very involved in the DII Programme. From the ATLAS viewpoint, this has resulted in over-checking, needless activity and associated cost.[130] This may be due to a lack of trust, but there was also a perception that it is part of the MoD culture. Many of the DII Group personnel are used to taking a project management role and feel duty bound to ensure the most effective solution, stepping in to take control where necessary.

Ideally, an IT service contract should result in a reduced in-house IT department with the onus being on the supplier to deliver within certain measurable parameters.[131] However, the DII Group Engineering team retains over 100 staff.[132] Of these, around two thirds are contractors other than ATLAS, providing skills lacking in the MoD and making this an expensive resource.[133] This contradicts Brown’s view that outsourcing is due to a lack of skills in government.[134] Prior to the contract award, this team was closely involved in the software development. However, it now acts as the ‘intelligent customer’, providing systems assurance, but with no reduction in size. This change in role has caused great resentment, as personnel are still keen to be involved with the technical design.[135]

With the benefit of hindsight, both sides recognise the difficulties with this arrangement, acknowledging that there was a need for effort earlier in the project to encourage more effective joint working between the ATLAS and DII Group engineers.[136] Spending time initially creating a culture of openness, co-operation, trust and a shared understanding of the assurance role would have made a major difference to the software development.[137] As discussed in Chapter Five, a great deal of effort went into selecting the right Delivery Provider (DP), but little consideration was then given to “how we were going to look after this beast”.[138] As one interviewee stated, the management of the contract is arguably more critical than selecting the supplier. If not managed well, then the supplier is unable to work to optimum capability. Given its maturity in managing major projects and suppliers, there was an apparent lack of understanding and application on the MoD side of the roles required to manage a new, unique, service delivery contract, which requires taking action that benefits both buyer and supplier, as identified by Brown in Chapter Two.[139]

The Group admitted to experiencing a ‘step change’ once the contract was let, identifying that their skill set was inappropriate for both managing the contract and creating a partnering relationship.[140] Overall, there was a suggestion that there is a limited view of contract management, focusing on oversight of the contract while the supplier concentrates on the customer, rather than a broader view that considers the building of relationships and trust.[141] However, ATLAS appears to take a more mature view, seeing their role as managing the client as well as the project. Therefore, if they feel that the wrong actions are being taken, there should be a positive and corrective response, rather than simply saying, “they were wrong and we allowed them to be wrong”.[142]

In 2009, Pinto et al discussed the importance of trust, particularly between project team and contractors.[143] It is evident from this discussion that the contractual relationship, particularly one that also involves a consortium, contains “interesting human tensions”.[144] Ultimately, partnering overlays a commercial contract and, inevitably, client and supplier remain on different sides of that divide. This potential for adversarial behaviour was fully recognised by the DII Group from the start and the requirement for good working relationships became a formal part of the evaluation process.[145] There were also efforts to clarify ATLAS’s role in delivering the MoD’s requirements while the Group needed to be cognisant of their partner’s commercial realities.[146] Further action has been taken on this post-contract through the DII Partnering Charter and the Joint Partnering Board (JPB), which provide governance over the partnering relationship.[147] Nevertheless, the *Joint Business Plan* for 2009/10 highlighted the intention to further improve relationships through more fully integrated working and mutual understanding, which appears to be taking effect in terms of the Technical Solution.[148] However, it was felt that this relationship building is becoming increasingly difficult in the current financial climate where the commercial drivers on both sides appear to be overriding the partnering relationship.[149] Despite this, it is apparent that, at the operational level, different groups within the Programme are at different stages in this partnering journey, with some working well, others in transition whilst others remain relatively adversarial.

Overall, there was evidence of understanding and application of this CSF within the DII Programme and some confirmation that the findings of the many reports had permeated this operation. However, the emphasis in this discussion is on the competence and capacity to 'execute and effectively deliver the option' within a contractual arrangement. Despite the NAO having reported positively on the partnering within this Programme, there was less evidence at the operational level of understanding of how to manage the contract and the related relationships. This confirms the conclusions drawn in Chapter Five, Section 5.2 about the need for Contract/Supplier Management.

| **Complexity Management** | | **Critical %** | **High %** |
|---|---|---|---|
| | **Recognised** | 59 | 29 |
| *The level of likely risk and the scale, novelty, diversity, interdependency and volatility of a project* | **Extent** | 64 | 29 |
| | **Effect** | ++<br>23 | +<br>70 |

Complexity Management was rated the second highest CSF in the analysis of the general IT reports and highest in the infrastructure reports, although it was not so evident in the literature analysis. Just over half of the interviewees recognised it as critical with a slightly higher rating for its application within the Programme and its effect rated as positive. Therefore, it seems that the complexity of the project has informed the overall approach but has not necessarily resulted in risk avoidance.[150] Two key lessons emerged from this discussion: the wisdom of overlaying complexity with similarly complex processes and the management of risk.

There was much discussion about the use of the Fixed Rollout Methodology, with a suggestion that simple, flexible rules would have been a better option.[151] Trying to impose conformity on something that was never going to conform was never going to work, in one view.[152] Similarly, the standard solutions written into the contract were never intended to be applied regardless of cost, complexity or dependencies that could not have been foreseen at the time of writing the contract. However, with rigid processes in place, both ATLAS and the DII Group tend to follow them without questioning their specific utility in a particular circumstance. This strongly supports the view of Pich et al that appropriate action is preferable to the 'instructionist' approach.[153] In retrospect, there needed to be a means of translating the intent of the contract to the operational level, indicating that standard solutions should be applied without redesign where possible but adapted to circumstances where necessary.[154]

Similarly, there was an underlying belief that, ultimately, delivering the exact number of terminals required at each site was not cost-effective. Any saving was believed to have been eradicated by the management costs incurred by both ATLAS and the DII Group in trying to achieve this, particularly as nothing in the MoD remained static long enough to enable a precise count. With the benefit of hindsight, a 'quick and dirty' method might have been cheaper with a quick survey two weeks prior to implementation and then a rapid process of installing a terminal wherever one had been previously, whilst allowing some expansion capacity. The implementation could then have been 'fine tuned' at a later date. The extra cost of this flexibility and potentially paying for excess terminals would probably have been offset by the removal of bureaucracy, shorter timescales and minimal overheads, with savings on months of project management.[155]

The second lesson concerns the questionable risk management in government projects, which has been addressed in a range of reports discussed in this study. The DII Programme was required to have a risk management process in place and there is evidence of inherent risk being both considered and, ostensibly, managed.[156] The risk register lists around 800 risks. Not surprisingly, the DII Group feel unable to understand, let alone manage, this number of risks concurrently and, therefore, tend to focus on five to ten key risks at any one time. These alter according to the stage of the project lifecycle. Some interviewees were concerned that risk management can become a mechanical process. For example, one remarked that the risks had not been properly reviewed for three years, despite the fact that there was money put aside for them and a lot of people managing them. As a result, a recent rapid review has released a substantial amount of the budget that had been set against dead risk.[157]

The DII Group was aware of the risk involved in not surveying every site in advance. The lack of surveys led to the false assumption that sites were properly maintained and that this was documented. However, it would have been impossible for them to do this, not least due to the time and cost involved.[158] This was a foreseeable, known risk that could have been controlled and managed. However, the perception of the Group was that senior management would not have been supportive of a project to ready the Defence estate, that the imperative was the infrastructure and not the preparation for it, which was considered not only unrealistic but, perhaps, also unattractive to senior officials.[159] There was no available evidence that any form of cost-benefit analysis had been carried out for this, raising questions about whether time and money spent on preparation might have offset expenditure and delay further down the line.

The implementation problems concerned known risk. However, risk is not always known or foreseeable. This is evidenced by the delay to Increment 3a, which could potentially have stopped the Programme in its tracks. Whilst due to MoD budget constraints, these had become elevated as an issue due to the Treasury concern with the national deficit and its implications for public spending. With risks related to sub-prime mortgages in Southern California causing reverberations around most of the developed world, it is questionable whether the DII Group could have foreseen risk in this form emerging from the environment, much less have set in place processes to manage it. This suggests that it is impossible to provide the necessary funding to give a 90% confidence level on every aspect of the Programme.[160] The trick is to manage risk in such a way that progress can be made, rather than trying to manage every potential risk.

Overall, there is evidence of understanding and application, along with some learning of lessons. However, it is questionable that a project like the DII Programme can manage all risks, particularly unforeseen environmental disturbances. As discussed in Chapter Five, in 2009, the OGC noted a range of factors likely to cause an IT project to stray from its original objectives, including global or national events, new policies or deliberate changes in scope. This suggests that there is a growing understanding in government that projects of this complexity inevitably face unforeseeable risk.

| **Consistency and Coherence** | | **Critical %** | **High %** |
|---|---|---|---|
| | **Recognised** | 70 | 29 |
| *Integration of the selected option with established systems, processes and policies* | **Extent** | 76 | 23 |
| | **Effect** | ++<br>23 | +<br>70 |

The interviewees recognised the importance of Consistency and Coherence, felt that it had been applied within the Programme and its effect was generally positive. This CSF appeared as less of an issue in the analysis of the reports and the literature. As well as integrating with established systems, processes and policies, the overall purpose of DII is to drive such integration with its stated aim of making a single system available everywhere, thereby delivering more uniform ways of working.[161] The MoD is a microcosm of the vertical and insular structure of wider government, discussed in Chapters One and Two. Each TLB interprets policy differently, adopting different ways of working. As a major government body, the MoD needs to operate corporately. However, enforcing such commonality is seen as problematic due to the "fiefdoms and leadership".[162] During the Planning phase, as discussed in Chapter Five, it was evident that the people running the existing IT systems and the funding had to be gathered together. One interviewee wryly observed that the Group was never going to corral the "forces of darkness" until they had them under their control.[163]

Previous IT provision in Defence was very diverse, variable and inconsistent. Some users had local access to locally produced, advanced, client-specific IT systems, designed to meet their needs and supported by their own system administrators. For those working on such systems or using DII (Convergence), the transfer to DII(F) has provided less capability or simply links back to the old system, data files and processes.[164] Whilst still awaiting Release 2 and, therefore, without full functionality, this makes it difficult to appreciate DII(F)'s ultimate utility. However, for those using "green screens and tablets of stone", as one interviewee described the Army's information systems, DII(F) is seen as delivering benefit.[165] This variable experience means that DII(F) represents a retrograde step for some users, which affects their reaction to it. A single infrastructure delivering uniform applications is a means of standardising Defence, thereby increasing organisational efficiency, but it is also introducing practices that are counter-cultural.[166] For example, DII(F) gives universal access to online calendars, exponentially cutting the time that it takes to arrange meetings, but causing disquiet amongst some high-ranking personnel, uncomfortable with this level of transparency and requesting RESTRICTED access to their personal information, rather than accepting the need to change their attitude and approach.[167]

Issues relating to Consistency and Coherence, therefore, extend beyond the single infrastructure debate and can be seen more broadly in terms of integration within Defence. The need for this is ostensibly recognised and welcomed, but is often thwarted by the underlying cultural factors. This is demonstrated by a series of observations from the interviews. The ATLAS team was very aware of the tendency towards partisanship within the armed services and the lack of enforced joint solutions, which often results in variants of the same solution being applied.[168] This lack of a joint approach appears to be due to a relatively cavalier attitude to policy, seen as a moveable obstacle or simply ignored.[169] As an example, the MoD has contracted ATLAS to provide data capacity for users within certain parameters.[170] Many of the users far exceed that quota, thereby incurring costs, but do not have the funding to buy additional capacity. However, the MoD does not enforce its rulings.[171] Similarly, there is a policy that Microsoft Access should not be used within the department except in specific circumstances.[172] This is also not enforced and Microsoft Access databases remain very popular with thousands in existence, some hundreds of megabytes in size. Once simply useful, over time, these databases have often become business critical, although the way that they are managed does not reflect this status. Not only does this use of Access fly in the face of policy, it also causes system problems for DII(F) as users access their data and applications remotely, rather than locally. Microsoft does not recommend running Access over a Wide Area Network (WAN), as it then impedes system performance for all users, resulting in a large number of complaints about the speed of DII(F).[173]

This CSF has been understood and is being applied to some extent. However, given the strength of the culture that it is trying to change, the effect that this will have on Defence and, hence, the overall success of the DII Programme, remains open to question.

| **Constraints Certainty** | | **Critical %** | **High %** |
|---|---|---|---|
| | **Recognised** | 47 | 41 |
| *An estimate of costs, resource requirements and timescales with project planning, design and implementation* | **Extent** | 47 | 41 |
| | **Effect** | ++<br>29 | +<br>65 |

Constraints Certainty was rated second highest CSF in the infrastructure reports but less highly in the general IT reports. It received an average rating in the literature analysis, although it was spread across a range of CSFs. The assessment at interview was that it had been understood and applied with a positive effect on the project. The review of the literature confirmed its continuing importance with Dvir et al noting that exact definition of the operational and technical requirements of the product is a major factor for success, whilst also noting that changes in scope do not necessarily improve the end product and may even detract from user satisfaction.[174] This project is perceived as having set achievable goals and there is general awareness of its constraints. However, there is disagreement about their relative importance. Some felt that the MoD is mainly concerned with scope and time.[175] Others felt that scope is critical and the MoD is not interested in time delays. Some ATLAS interviewees rated time and cost over scope, considered to be a rational approach when dealing with a project of this size and complexity.[176]

Time was the key measure and the key driver for this project.[177] It was considered easier to acquire more funding than to regain lost time.[178] The emphasis was on 'maintaining traction' and making progress, based on the premise that 90% of problems sort themselves out as the project proceeds, providing evidence of the MoD's 'conspiracy of optimism', discussed in Chapter Five.[179] This imperative was widely accepted, but there was evident concern that the timetable had not been adjusted following the delay to the contract, providing a key lesson. The contract had defined plans, but the resource requirement to meet those plans was still unclear at that stage. Although ATLAS agreed to adhere to the original timescale, sufficient time should have been given to recruit the required personnel, to clarify plans and to create the necessary working relationships. It was suggested that a project of this size and complexity needs an eighteen-month start-up period for both organisations.[180] However, the DII Group was under pressure to begin work due to the overwhelming benefits requirement of JPA, which meant that timescales for the original plan were unachievable from day one.[181]

The number of terminals being installed is closely monitored by ATLAS as it has to supply monthly figures and is paid according to delivery. During Increment 1 and 2a, which involved a large number of terminals being rolled out, this became the DII Group's principle method of controlling time, providing an easy measure of success or failure. From the ATLAS viewpoint, this took no account of the time required to embed the implementation process or taken trying to cope with "the moving target of the MoD".[182] Inevitably, this measurement drove certain behaviours, resulting in a focus on the quantity rather than the quality of the implementation: "we achieved it but we're still picking up the pieces".[183] Despite this focus on time, the programme is significantly late, up to two years and possibly more in some areas.[184] One interviewee expressed surprise that "there hasn't been more outcry from Defence about those delays".

Failure to deliver on time impacts on both the Consortium's revenue and the DII Group's ability to spend their annual allocation. By the end of 2008, £334 million of the £528 million contingency fund had been spent, although the Group believes optimistically that risk is likely to be greater during the initial stages of a project lifecycle.[185] It is very difficult to ascertain the exact costs of DII, particularly the costs of delivery. There is no publicly available account of how much has been spent to date: it is "hard to say and no one has tried to show the full picture".[186] The total estimated cost is reckoned to be around £7 billion, initially estimated at £5 billion and, as such, it is considered to be a successful contract.[187] However, £1 billion is notional interest on capital and includes money not spent by the DII Group directly. The actual contract value to ATLAS is around £4.5 billion. However, as discussed above, cost appears to be largely disregarded as a metric of success and the overspend reportedly came as a complete surprise.[188] At the time of writing, this was quoted as being in the order of £500 million, which both sides are currently trying to amend by trading requirements, such as reducing service cover at the help desk.[189] Despite these issues, the DII Group firmly believe that they have managed to protect the benefits, totalling an estimated £1.6 billion, although some will be realised later than originally planned.

There was a view that costs could have been better controlled if the Programme had been allocated a single sum, rather than being contracted in increments, although MOD annuality rules would probably still have applied and limited flexibility. There was an associated view that this had resulted in the early years of the project being bountiful and the later years increasingly difficult financially.[190] A greater availability of money would have given much greater flexibility, it was thought, so that problems could be managed more easily across the programme. Increment 3a was a top priority in terms of releasing additional funding, making it even more critical for the Group to get the business case approved. Allegedly, these programme-wide difficulties were played down in the IAB business case, driven by the fact that approval would be withheld if problems were identified.[191] This supports the findings of Snow et al that project managers are reluctant to transmit bad news, presenting an optimistic view to senior management[192] along with those of Oz and Sosik who noted the suppression of certain issues in communications between the project team and senior management.[193]

The scope of the DII Programme was clearly defined two years before contact award. However, it was felt that the pressure to award the contract on time resulted in corners being cut. In addition, the underlying rationale for the requirements was not communicated by the contract team to the rest of the Group, in order to control the release of information about the new contract.[194] This has caused subsequent difficulties in translating the requirements into the services actually being delivered. For example, an assumption about the long-term strategic direction of Microsoft has proved to be flawed, which means that selected products are likely to become obsolete so that "by 2015, what we will have on the desktop will be a really big headache".[195] Overall, the requirements are considered to be very rigid, making it expensive and difficult to make changes. One interviewee went so far as to state that "some of the requirements are insane", referring to the mantra of the same level of information being available anywhere and questioning the viability of that approach in the deployed space, which is yet to be tested. This suggests a need to re-balance the requirement against what is currently achievable and affordable. An exercise to examine this 'cost to complete' has recently been completed. ATLAS considers potential inflexibility with regard to delivery of the requirements a threat, specifically if they are expected to deliver every element of the original contract at the original cost, in the face of continual change within Defence.[196]

There is an expectation that the requirement will remain unchanged for the duration of the contract, which is unlikely to be the case. [197] As the project has progressed, the pace of change in Defence has made some of the original requirements defunct and there have been thousands of requests for minor changes although very few major changes to the requirements. This is partly due to the contract but also results from a strong motivation within the Group to resist changes, in order to obtain what has been contracted for and paid for, as well as protecting the MoD from financial penalty.[198] Minor changes have cost around £300 million and are increasingly resulting from Urgent Operational

Requirements (UORs), funded by extra Treasury money to provide fast solutions for operational needs.[199] These are perceived as lucrative for ATLAS.[200] It was felt that there had been very little change in ATLAS's likely profit margins of about £560 million on this project, even though it is late and not everything has been delivered.[201] The contract also focused on 'fixed cost', creating an attitude that the MoD could be more demanding of quality and less concerned about the cost or timescales, which were considered to be the supplier's problem.[202]

Although the DII Group set out with the laudable aim of creating a service contract, it then proved "too novel for them to handle".[203] The appendices to the contract contain detailed information about the core software functionality required to run, monitor and protect the system, as well as the office automation, web browsing and other standard activities.[204] These requirements have changed very little since the contract was signed.[205] This suggests that, ultimately, the MoD felt the need to constrain decisions and this created many of the "long winded IT design arguments".[206] ATLAS found the assurance oversight by the Engineering team difficult, questioning whether they had the breadth of knowledge to undertake this task. It frequently hampered the technical decisions that were being made.

Despite these observations, there was an overall view that the contract is detailed and well considered. It specifically includes levers to ensure that ATLAS accesses additional resources and expertise as required.[207] However, very often, the DII Group has chosen not to use these levers, even though they would have given the financial incentives to force ATLAS to deliver.[208] For example, the Group paid between £300-400 million in compensation to ATLAS for delays, rather than challenging them more robustly, which meant that ATLAS received the same payment as if they had delivered on time. Culturally, it is felt that challenging ATLAS too robustly will not set the right relationship but there is also a worry that overt concerns about delivery performance might cause the Treasury to withhold funds.[209] Finally, there is the need to align MoD spending with allocation year-on-year to avoid losing funding due to annuality rules alongside the requirement on ATLAS to meet corporate revenue profiles and targets.

Overall, the degree to which this CSF has been understood and applied is debatable. However, in terms of an IT mega-project, the delays to DII and the cost overruns are considered minimal. In 2008, commenting on the NAO report on DII, the Public Accounts Committee (PAC) noted "disappointment to veterans of the Committee Of Public Accounts because it seems to indicate that you are only 3% overspending and only 18 months behind before catching up."

| **Scalability and Flexibility** | | **Critical %** |
|---|---|---|
| | **Recognised** | 59 |
| *Consideration of the versatility of a future option and its anticipated survivability of an option in a future unpredictable environment, requiring an understanding of the scalability (both up and down) and of the degree of flexibility* | **Extent** | 65 |
| | **Effect** ++ | 59 |

Third highest in the infrastructure reports, this CSF was rated relatively highly in the literature analysis but was not a significant factor in the general IT reports. Interviewees understood it, believed that it had been applied and considered it to have had a positive effect. DII is being developed and implemented through a series of increments, as discussed in Chapter Five. This gives the ability to scale the project up or down in terms of volume and was designed to meet McCartney's recommendation of modular and incremental development.[210] Therefore, increments are considered to be beneficial, driven by government due to problems with IT mega-projects and preferred by the IAB, wary of the potential risk that a contract the size of DII poses and seeing this as a means of mitigating that risk, controlling costs and complexity. In addition, given the constant flux within Defence, the increments provide a means of managing and incorporating this change, which would have been very difficult to accommodate with a single contract. Despite these seemingly strong arguments, the original procurement strategy, which was rejected, was for a single contract.[211]

The interviews suggested that incremental procurement has provided challenges. For example, the DII Group felt that they had spent too much time worrying about obtaining approval for the next increment.[212] For example, the Group had already stated the benefits that would be delivered by Increment 2b at a cost of £750 million, but then had to spend additional time and effort on taking it through the government procurement process.[213] Each increment is essentially an amendment to the original contract, requiring a separate assessment phase by the MoD, which means working out the scope, related TUPE issues, the transition process for extracting systems and money from the TLBs and a public sector comparator, while ATLAS has to provide a separate BAFO (Best and Final Offer) submission.[214] A team of at least two within the DII Group work permanently on successive increments, whilst ATLAS also has a significant bid team. The incremental approach has, therefore, had resource impacts.

This process has also had its effect on the implementation plan with many sites having to be revisited for each increment. There was a view that it would have been easier in terms of the implementation to put the whole infrastructure and basic capability on contract with ATLAS and then look at a benefits-driven way to deliver it, resulting in greater flexibility with the implementation, rather than having to work within a specific increment providing a specific number of terminals.[215] However, this approach was not affordable and would have not have delivered the initial indirect (enabled) benefits (principally JPA) in the required timeframe. Despite the fact that Scalability and Flexibility is designed to provide control over the contract, there was much frustration over the hold up with Increment 3a, as already indicated. However, it was pointed out that the purpose of this increment was not to deliver new capability but simply more terminals. The required capability, in particular EDRMS, included in Increment 1, is yet to be delivered.[216] Therefore, the letting of the contract by increments, which were largely divorced from the capability releases, which it was assumed would be delivered on time, has proved problematic in terms of operating this contract.[217] Although this CSF has been understood and applied, it is apparent that it was with reluctance and that there are concerns about its benefit.

| **Stakeholder Management** | | **Critical %** |
|---|---|---|
| | **Recognised** | 59 |
| *The systematic identification, analysis and planning of actions to communicate with, negotiate with and influence all those who have an interest or role in the project or are impacted by the project.* | **Extent** | 65 |
| | **Effect** ++ | 59 |

As far back as 1989, Pinto and Slevin noted that the project team must work with the client organisation to ensure acceptance of the project.[218] This stress on stakeholder engagement remains apparent in the literature to date, as discussed in Chapter Two. Many studies of IT projects indicate that failure is due to organisational and social rather than technological factors.[219] If organisational change goals are to be met, then users have to be both willing to use the system and to exploit its capabilities. Despite this strong evidence from the literature, there were mixed views about the importance of this factor within the Programme. On the one hand, it was felt that the cultural issues had been largely ignored and that this was a mistake.[220] On the other, it was felt that this factor diminishes in importance at the operational level of the project if there is senior level support, which then drives the vision throughout the organisation, so ensuring cultural acceptance.[221] Despite this discrepancy, the self-assessment of this CSF by the interviewees indicated that they understood the importance of Stakeholder Management and felt that it had been applied to relatively good effect.

As discussed in relation to Change Readiness, a lot of work was carried out by the DII Group to inform the stakeholders, effectively the whole of the Defence community, and to increase their awareness of the benefits of a single infrastructure.[222] This was reinforced by events such as Operation Telic, the codename for all British operations in Iraq between 2003 and 2009, and Operation Herrick, the codename for operations in Afghanistan. This initial work was considered highly successful in gaining engagement with the project.[223] However, as DII has become the largest single system in the MoD and delivery has slipped, this positive view has been eroded. The initial stakeholder engagement has been overtaken by DII's reputation which, it was felt, the Group and SRO have probably not done enough to protect.[224] There was an acknowledgement that the concern with rolling out the Programme had been at the expense of continuing to make the case to the users. One interviewee believed that the Programme has repeated the mistake of the infrastructure project in the NHS: “we’ve bully-boyed our way through it...we haven’t really brought the stakeholders with us in quite the same way as we could have done”.[225]

There was a suggestion that stakeholder management in relation to an IT project is difficult because of the familiarity of the users with the product; it is something that they use all the time, whether in the workplace or at home. Therefore, they not only know what is available but are aware of the flexibility that it brings.[226] ATLAS has instigated local engagement with stakeholders to improve its understanding of the customer requirements. A Customer Service Management team liaises with the customer at site, regional or TLB level.[227] Once the customer’s concerns are understood, they are then articulated back to the ATLAS Delivery Centre. There are also three levels of customer service management review meetings, which discuss performance and the future requirement. This gives the opportunity to jointly understand what is working, what is failing and how to correct it. A similar process is carried out within the DII Group and Information Systems and Services (ISS) regional organisation but pressure on staffing levels has limited its effectiveness.

Overall, there appears to have been understanding of this CSF but limited application following the initial wave of stakeholder management. Although this is now being addressed, it is debatable whether the reputation can be retrieved. User satisfaction is seen as a key measure of success in the literature and was identified as such by the interviewees. The user survey presented below will provide some insight into whether this Programme is perceived as successful by its user base.

| Value for Money | | Critical % | High % |
|---|---|---|---|
| | **Recognised** | 65 | 6 |
| *The project offers the optimum economy, effectiveness and efficiency in delivering the product along with a qualitative and quantitative judgement over the manner in which resources have been utilised and managed and any reputational risk that has ensued to both public sector and supplier* | **Extent** | 65 | 23 |
| | **Effect** | ++ 17 | + 65 |

The VfM focus for this Programme revolves around finances, due to the limited budget and the need to demonstrate VfM as a key component of any IAB business case submission. It did not feature highly in the general IT reports and was only slightly more prominent in the infrastructure reports. However, it is becoming increasingly important within government as evidenced by the examination of the Programme, Policy and Political Context in Chapter Five. While there was some slight variance, the ratings by the interviewees showed that it was recognised as critical, seen as such within the Programme and had a positive effect. However, one interviewee felt that VfM is a very subjective measure,[228] whilst another felt that there is no real understanding of VfM in the MoD: it is simply taken to be "just about good enough and affordable".[229] There was also a belief that VfM can only be delivered if every requirement is subject to competition.[230] Given that this is impossible, a lot of the detail in the contract is motivated by the need to control VfM. This means that government contracts are necessarily constrained and restrictive in terms of requirements. It would be impossible to simply contract a supplier to deliver an information infrastructure as there would be no means of checking the ultimate VfM.

The service costs per terminal are readily available, averaging £1600-£1800 a year, with criticisms that they are too costly.[231] However, this sum includes the delivery of RESTRICTED, SECRET and above SECRET, the infrastructure and the service. With the additional functionality that Release 2 will bring, users may well become more convinced that DII represents VfM. From the point of view of the supplier, the service-contract is not the main revenue earner as the margins are very tight.[232] However, once the trust of the contracting organisation is gained, money is then earned by being the preferred supplier for the inevitable changes to requirements or through new business with the buyer. There was some concern from ATLAS that media reports on IT projects suggest that this is not a valid means of earning money.[233] However, unless the IT outsourcing contract is fulfilled to requirement, the supplier will not be in a position to make that additional revenue or to re-compete for the contract. Therefore, it is incumbent on the supplier to ensure VfM in order to protect the long term partnering interests and, more commercially, their potential income stream. Again, there is a level of trust required that the supplier is providing VfM and not simply increasing profit, whilst producing an outcome that is good enough to meet the requirement.

There is a formal process of VfM challenges. If there is a query over costs, then this enables the MoD to question ATLAS over their proposed solutions to requirements. However, it was felt that this engenders the wrong behaviour.[234] This ‘challenge’ process has frequently added to the delays as the cost of delayed delivery to users is rarely factored into the VfM equation. If ATLAS reduces its cost as a result of a challenge, then it is likely to encourage another challenge. Therefore, ATLAS is now more robustly resisting these challenges and defending its costs. It has also set up some set itemised costs for various services, such as moving terminals between offices, to ensure that there is greater clarity about costs on both sides. This gives some visibility of the VfM, which means that the contractor feels that they are getting better value. Again, this demonstrates how learning has taken place with the Programme to improve its processes and outcomes. It is questionable whether this CSF is either understood or applied.

### 6.4. Impact of CSFs

One of the measures of performance for this study, as identified in Chapter Two, is ‘meeting the expectations of the stakeholders, including the project team, in terms of value and usefulness’. It is evident from the above discussion that the project team believes that the DII Programme is delivering value and utility. However, it is also imperative to assess how users view the system in terms of its match with their requirements, their satisfaction and use of the system. The need to satisfy the users came out strongly from the interviews and was also apparent in the literature, evidenced in the reported work by Pinto and Slevin,[235] Sauer, [236] Dvir et al,[237] DeLone and McLean[238] and Shenhar and Levy, for example.[239] Dix et al identified four categories of stakeholders. [240] It is the primary stakeholders that are of interest here: "those who actually use the system and whose needs are usually predominant". [241] However, the 2008 PAC Report on DII noted that users were expressing low levels of satisfaction regarding the implementation, the training and the 'user friendliness' of the system.[242] How then has this situation evolved since then?

### 6.4.1. User Survey

In order to obtain a user view of the performance of DII, a survey was conducted, as described in Chapter Three. Of the 84 returns received, response rates to individual questions ranged from 79 to 84 as some respondents skipped some questions. However, as it was impossible to ascertain which responses were which, it was decided to work with all available data rather than trying to purge the overall dataset. It is recognised that this is by no means a representative sample but the purpose was simply to gauge user opinion generally. With representation from 20 different sites around the world, most respondents having used the system for two years or more and most categorising themselves as experienced or expert IT users, it was considered that there was enough representative experience of the system to guarantee informed responses. Interviewees were offered the option of commenting on each question with little expectation of a response. However, a number were motivated to express their views, suggesting that the comments received are particularly pertinent. The full questionnaire and results are presented at Appendix 7.

In terms of stakeholder management, 28 of 82 (34.2%) respondents had known little or nothing about DII(F) before its implementation, suggesting that the DII Group's assessment of having communicated the change well initially is somewhat misplaced. Most users (57 or 71.3%) said it gave them access to all of their hardware and software requirements, while 60 (75%) felt that they had received sufficient training. However, in comparing it with their previous IT provision, the view was split, with roughly half rating it the same or worse than their previous IT with a similar rating for its ease of use and the support received. The comments perhaps reflect the capability disparity of previous provision and the fact that DII is still not offering full functionality, along with problems with speed, as discussed above. Most (61 or 76.3%) were either neutral or disagreed that the system offered them high quality while 58 (71.6%) were neutral or disagreed about its responsiveness. A small majority thought it was more reliable. Issues raised concerned the speed of the system and its expense.

The final stage of the survey was an assessment of the DII Programme. The majority (79.2%) felt that they had not been consulted during its development and 65.4% during implementation. Of the 74 respondents to this question, 46 or 62.2% thought the implementation had been successful and 54 (70.1%) thought it met user requirements. In line with the views on consultation, 59 or 80.8% felt that they had not been involved with the project, perhaps justifying the DII Group view that they had lost sight of their user base during the implementation process. In terms of whether it is delivering new technology, the vote was split, again probably due to the disparity of systems available previously. In terms of improving services, 58 (78.4%) thought it had. Finally, respondents were asked to rate its success. The majority (89.7%) felt that it had not stayed within budget while 94.9% thought that it had failed to meet its time constraint. Just over half considered that it had delivered organisational benefits, while 62 (75.5%) were neutral or disagreed with its delivery of user satisfaction. The vote was split in terms of whether it was a project to deliver new technology but most (45 or 56.3%) felt that it had improved IT services.

Overall, the responses and comments are not very positive. There is dissatisfaction expressed by the respondents in terms of their experience of using the system and their evaluation of its overall success. However, as Markus and Robey observed, these adverse comments may not be sufficient to categorise DII as a failure in the users' eyes: "it is by no means certain that validity will lead to effective use or invalidity to ineffective use".[243] The purpose of DII(F) is not to fit the organisational reality but, as described by Heeks et al, to deliver a conception that shifts that reality.[244] Therefore, it is likely that DII(F) will yield major improvements in organisational effectiveness in time, if it has not already done so.[245] However, the poor perception may also signify that one viewpoint has dominated the design, resulting in an expectation failure, as discussed by Heeks et al. [246] The aim is to ensure that all stakeholders are involved in the initial design of the system, so that their views are aligned and given equal weighting.[247] According to the respondents to this survey, this did not take place and failure can result from a mismatch between the design realities and the desired realities of a group of stakeholders. Despite this, there does seem to be an acknowledgement that DII(F) has achieved some success in improving IT services and a recognition that it is something that Defence must do.

### 6.5. Analysis: "It's Good for Defence, It's the Right Thing to Do"

The scholarly consensus is that IT projects fail due to organisational and social factors: they "never fail because of technical causes".[248] However, it is evident that the DII Programme has struggled with technical issues that were considered to be low risk. These technical problems can be traced back to the people issues, having insufficient personnel with the right skills and too much reliance on assumption, and to the process issues, trying to transfer a way of working that proved successful in one situation to another, different situation. This problem of knowledge gained from past successes being incorrectly applied to present problems was evidenced in Chapter Two.[249] These technical problems might also be due to the context into which they are being introduced. To implement an IT project successfully, not only does the technology have to be understood, but also the problems that the system is designed to solve, the architectural and design elements, the organisational processes, the people, the setting in which they work and the wider environment, as discussed in Chapter One. It was evident from the interviews that if the DII Programme fails to deliver Release 2, then it will have failed to deliver the organisational change required by Defence.

When asked to describe success, the project team highlighted Benefits Certainty and Constraints Certainty: the need to deliver the requisite IT to Defence to enable organisational change and doing so without exceeding time, cost or scope: they do not want the DII Programme to become another MoD project failure. When asked which factors would cause the project to fail, their answers covered lack of Clarity and Perception, Competence and Capacity, Complexity Management and Constraints Certainty. Stakeholder Management was not seen as a key measure of success or failure. From the user viewpoint, DII is already struggling in terms of Constraints Certainty and Benefits Certainty but the results were more positive in terms of the overall improvement to IT services. The philosophy behind DII is, undoubtedly, good for Defence and the right thing to do. It will integrate Defence, make it more coherent and provide the basis for future development. However, in order to bring its user base with it, it has to deliver more than cabling and hardware; the applications are critical. Therefore, at present, DII sits on the cusp of failure.

Given this, what has been the impact of the identified CSFs on the management and performance of this project? It was evident from the interviews that these CSFs are understood. They were recognised by experienced, committed personnel who demonstrated a high degree of reflection about the project, its management and performance. However, the extent to which these interviews reflected the true state of the project is uncertain. Very few interviewees rated the CSFs as being anything other than 'Critical' or 'High' for both understanding and application. Despite this, further examination showed that the extent to which they were applied or managed within the Programme is variable with differing effect.

As the above discussion shows, there are real questions about Affordability, whether the Programme was ever affordable and whether it remains so in the light of the current financial crisis. This reflects the view of Kirkpatrick and the NAO, discussed in Chapter Five, that the MoD is over-optimistic about forecast costs. [250] Alternatives Certainty demonstrated a certain amount of 'group-think' with the system apparently designed to match the expectations of the project team, rather than its users. Technical rationality dominates, rather than managerial or professional, as discussed in Chapter Two. Change Readiness was dubious, particularly with regards to the lack of site surveys, reflecting the inadequate preparatory work undertaken, highlighted by the first Gateway Review, with resulting cost overruns and delays.[251] Complexity Management was similarly problematic with an underestimation of the technical risks and their consequences, ignoring or underestimating risk to give a delusion of accuracy in budgets and schedules, again identified by the NAO.[252] Constraints Certainty demonstrates immature and inadequate through life costs, whilst ignoring the financial and operational penalties of delay.[253] Therefore, although the CSFs are understood, their application in the Organisational Setting of the MoD appears to be guided by the culture of that organisation.

The NAO's report, *Helping Government to Learn*, discussed in Chapter Five, drew attention to the lack of priority given to learning in government departments, suggesting that no time is allocated within projects to capturing the lessons.[254] This was not the case in this project where appropriate lessons were both sought and applied. The Head of the NAO noted that "…projects and programmes are more likely to succeed and keep to time and budget where lessons have been learned and experience shared". However, the DII Programme shows categorically that, whilst there is merit in learning from others, care has to be taken in applying this learning. The initial delay and rising cost was largely due to the application of lessons learned in one context, which then proved non-transferable to the Defence context. This confirms the point made in Chapter Two that not all projects are the same and that they should, therefore, be managed in different ways, raising questions not only about learning lessons but the practical use of CSFs. However, learning lessons from experiences that occur within the project is critical. It is evident that, confronted by problems, both contractor and supplier have worked together to learn from their mistakes and to apply a better solution. The suggestion is that it is this internal learning of lessons that is more likely to lead to success, rather than simply applying generic solutions to highly specific problems.

Overall, the impact of the CSFs on the management and performance of the DII Programme seems to be debatable. However, in order to clarify the performance of the project, the literature review sought a means of measuring the benefit of applying CSFs to a project. The Formal Systems Method (FSM) was identified, which provides "a model of a robust system capable of purposeful activity *without failure*" (emphasis in original). [255] It encapsulates much of the research discussed in Chapter Two, sitting the project firmly in its context and environment, whilst showing the interrelationships. In order to determine whether DII is a robust system capable of delivering without failure, the project was tested against the FSM, as shown at Table 6.4.

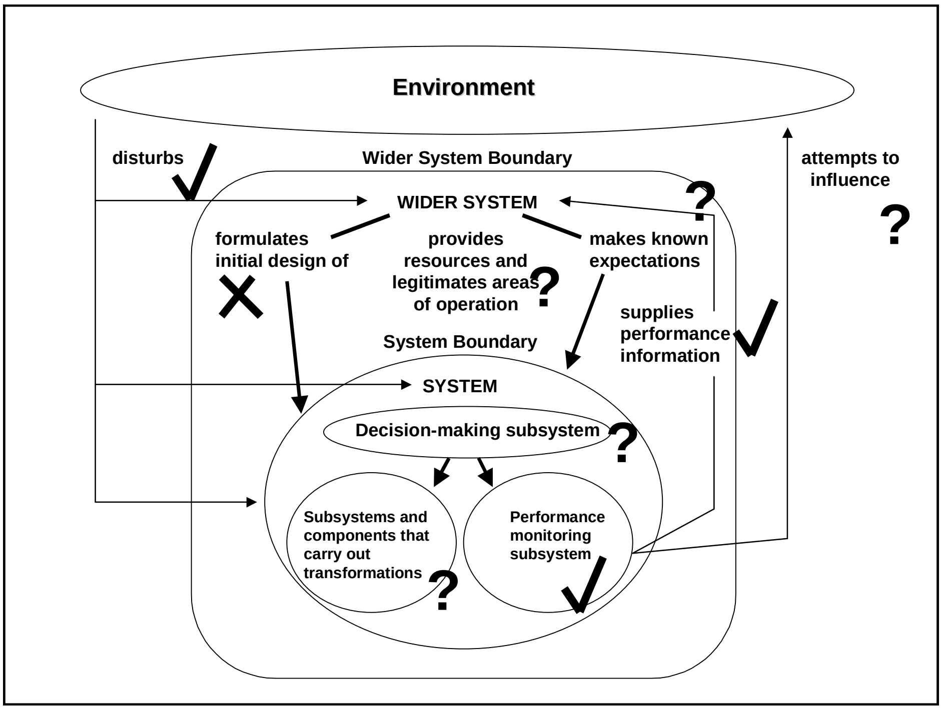
**Table 6.4. Discrepancies between the FSM and the DII Programme**

| | |
|---|---|
| **Environment (Programme, Policy and Political Context)** | Drive to outsourcing. Problems with finance due to Financial Crisis beyond the control of the system. |
| **Formulates Initial Design** | Initial design generated by the System (the DII Programme) |
| **Provides Resources and Legitimates Area of Operation** | Endorsement and support. Limited provision of financial resources. Continued affordability uncertain. Experienced personnel retained in post. No attempt to reduce team size in light of outsourcing. Change readiness an issue. |
| **Makes Known Expectations** | Driving Defence integration. Changes to security policy. Perceived lack of user input. Policy/directives ignored. Senior Management understanding of project issues. VfM concerns from users. |
| **Supplies Performance Information** | Clear governance structure and performance information provided. Lack of financial monitoring. No apparent concern about delays. |
| **Decision-Making Sub-System** | Experienced DII Head retained in post for eight years, delivering clear vision and implementation strategy. Urgency to act. Assumptions resulting in risk. Understanding of users debatable. Constraints of incremental contracting. Over-optimism about forecast costs. Inadequate through life costs to support decision-making. Ignores financial and operational penalties of delay. |
| **Subsystems that Carry Out Transformations** | Operated by ATLAS, closely controlled/overseen by DII Group. Lack of time allocated to project initiation. Competence and capacity issues. Initially ineffective processes but lessons learned. Underestimation of technical risks and their consequences. Difficult context for contractors. Cohesion of project team problematic. Contract management: communication, relationships and trust. Cost increases and delays. Inadequate preparatory work. |
| **Performance Monitoring Subsystem** | Benefits, CSFs, KPIs. Creates certain behaviours. |

**Source: Author**

This Table is translated to diagrammatic form at Figure 6.6 to clearly show an estimation of the management and performance of the DII Programme. This demonstrates that there are areas that could have been managed better and that the system could be performing better. This confirms the above conclusion that the overall success of the project is potentially at risk.

**Figure 6.6: DII Programme: An FSM Analysis**




**Source: Adapted by author from Fortune, J. and Peters, G., *Information Systems: Achieving Success by Avoiding Failure*, (Chichester, Wiley, 2005), page 121.**

## 6.6. Summary

Both the NAO and PAC gave the DII Programme a relatively positive report, concluding that it had taken on board many of the things that the MoD had been advised to do in the past. Although ambitious, the Programme has been well conceived with a good structure in place, they reported. It has a robust commercial structure, sound governance and decision-making structures along with good continuity of staff. Chapter Five confirmed that there has been sound planning within the DII Programme to provide a good basis for a successful outcome. This chapter has examined the Technical Solution, the IT project, firstly considering the development and implementation of the hardware and software before going on to assess the understanding and application of the identified CSFs. This has shown that both the DII Group and ATLAS appear to understand these CSFs and have worked to apply them within the project. In some instances, the effect of this has been strongly positive. However, in others, the application is questionable. It is evident that these CSFs are applied within a specific Organisational Setting, that this setting impacts on the project and, more particularly, on the way that the CSFs are understood and applied. The overall assessment of the management of this Programme using the FSM suggests that the project is not as robust as it should be in terms of its management and performance. This analysis has raised issues about the practical use of CSFs, the application of generic success factors to specific projects. The final chapter will discuss this further and assess the extent to which the research question is answered by this study and the aim met. It will, therefore, summarise the research, draw conclusions and make policy recommendations.

## References

[1] Brown, T., 'Modernisation or Failure? IT Development Programmes in the UK Public Sector', *Financial Accounting and Management IT*, Vol. 17, No. 4, November 2001, pages 363-381.
[2] Williams, M., 'Defining Network Enabled Capability', *Defence Management Journal*, pages 77-78.
[3] Interview with DII Group, 16th July 2009
[4] Interview with DII Group, 16th July 2009
[5] Brown, T., 'Modernisation or Failure? IT Development Programmes in the UK Public Sector', *Financial Accounting and Management IT*, Vol. 17, No. 4, November 2001, pages 363-381.
[6] Dubash, M., 'The Desktop Lifecycle: How Long is it Anyway?' *The Register*, 10th March 2011, http://www.theregister.co.uk/2011/03/10/desktop_lifecycle/, downloaded 4th April 2011.
[7] Great Britain, Institute for Government, *System Error: Fixing the Flaws in Government IT*, (Institute for Government, London, 2011), page 10.
[8] House of Commons, Work and Pensions Committee, *Management of information technology projects: making IT deliver for DWP customers*, HC 311, Third Report, Session 2003-04, (HMSO, London, 2004), pg.27.
[9] House of Commons, Work and Pensions Committee, *Management of information technology projects: making IT deliver for DWP customers*, HC 311, Third Report, Session 2003-04, (HMSO, London, 2004), pg.27.
[10] Interview with DII Group, 4th August 2009
[11] Pinto, J.K. and Covin, J.G., 'Critical Factors in Project Implementation: A Comparison Study of Construction and R&D Projects', *Technovation*, 1989, Vol.9, No.1, pages 49-51.
[12] McFarlan, F.W., 'Portfolio Approach to Information Systems', *Harvard Business Review*, 1981, Sept-Oct, pages 142-150.
[13] Ward, J. and Griffiths, P., *Strategic Planning for Information Systems*, (Wiley, Chichester, 1996), page 364.
[14] McFarlan, F.W., 'Portfolio Approach to Information Systems', *Harvard Business Review*, 1981, Sept-Oct, pages 142-150.
[15] Great Britain, National Audit Office, *Ministry of Defence: The Defence Information Infrastructure*, HC 788, Session 2007-2008, http://www.nao.org.uk/publications/0708/the_defence_information_infras.aspx, downloaded 15th January 2011.
[16] Great Britain, National Audit Office, *Ministry of Defence: The Defence Information Infrastructure*, HC 788, Session 2007-2008, http://www.nao.org.uk/publications/0708/the_defence_information_infras.aspx, downloaded 15th January 2011.
[17] Great Britain, National Audit Office, *Ministry of Defence: The Defence Information Infrastructure*, HC 788, Session 2007-2008, http://www.nao.org.uk/publications/0708/the_defence_information_infras.aspx, downloaded 15th January 2011.
[18] Interview with DII Group, 4th August 2009
[19] Great Britain, Ministry of Defence, Burton, E., *Report into the Loss of MoD Personal Data for Permanent Under SECRETary Ministry of Defence*, (London, Ministry of Defence, 2008), http://www.mod.uk/nr/rdonlyres/3e756d20-e762-4fc1-bab0-08c68fdc2383/0/burton_review_rpt20080430.pdf, downloaded 4th April 2011.
[20] Great Britain, National Audit Office, *Ministry of Defence: The Defence Information Infrastructure*, HC 788, Session 2007-2008, http://www.nao.org.uk/publications/0708/the_defence_information_infras.aspx, downloaded 15th January 2011.
[21] Great Britain, National Audit Office, *Ministry of Defence: The Defence Information Infrastructure*, HC 788, Session 2007-2008, http://www.nao.org.uk/publications/0708/the_defence_information_infras.aspx, downloaded 15th January 2011.
[22] Interview with ATLAS, 14th February 2011
[23] Great Britain, National Audit Office, *Ministry of Defence: The Defence Information Infrastructure*, HC 788, Session 2007-2008, http://www.nao.org.uk/publications/0708/the_defence_information_infras.aspx, downloaded 15th January 2011.
[24] Great Britain, National Audit Office, *Ministry of Defence: The Defence Information Infrastructure*, HC 788, Session 2007-2008, http://www.nao.org.uk/publications/0708/the_defence_information_infras.aspx, downloaded 15th January 2011.

[25] Interview with DII Group, 7th January 2011
[26] Interview with DII Group, 16th July 2009
[27] Great Britain, National Audit Office, *Ministry of Defence: The Defence Information Infrastructure*, HC 788, Session 2007-2008, http://www.nao.org.uk/publications/0708/the_defence_information_infras.aspx, downloaded 15th January 2011.
[28] Oldnall, M., 'Defence Information Infrastructure', *Presentation to the Masters in Defence Administration course*, (Shrivenham, Defence Academy, May 2006).
[29] Oldnall, M., 'Defence Information Infrastructure', *Presentation to the Masters in Defence Administration course*, (Shrivenham, Defence Academy, May 2006).
[30] Interview with DII Group, 17th August 2009
[31] Oldnall, M., 'Defence Information Infrastructure', *Presentation to the Masters in Defence Administration course*, (Shrivenham, Defence Academy, May 2006).
[32] Interview with DII Group, 17th August 2009
[33] Interview with DII Group, 17th August 2009
[34] Interview with DII Group, 5th August 2009
[35] Interview with DII Group, 4th August 2009
[36] Interview with DII Group, 17th August 2009
[37] Great Britain, National Audit Office, *Ministry of Defence: The Defence Information Infrastructure*, HC 788, Session 2007-2008, http://www.nao.org.uk/publications/0708/the_defence_information_infras.aspx, downloaded 15th January 2011.
[38] Great Britain, National Audit Office, *Ministry of Defence: The Defence Information Infrastructure*, HC 788, Session 2007-2008, http://www.nao.org.uk/publications/0708/the_defence_information_infras.aspx, downloaded 15th January 2011.
[39] Great Britain, National Audit Office, *Ministry of Defence: The Defence Information Infrastructure*, HC 788, Session 2007-2008, http://www.nao.org.uk/publications/0708/the_defence_information_infras.aspx, downloaded 15th January 2011.
[40] Interview with DII Group, 17th August 2009
[41] Interview with DII Group, 17th August 2009
[42] Great Britain, National Audit Office, *Ministry of Defence: The Defence Information Infrastructure*, HC 788, Session 2007-2008, http://www.nao.org.uk/publications/0708/the_defence_information_infras.aspx, downloaded 15th January 2011.
[43] Great Britain, National Audit Office, *Ministry of Defence: The Defence Information Infrastructure*, HC 788, Session 2007-2008, http://www.nao.org.uk/publications/0708/the_defence_information_infras.aspx, downloaded 15th January 2011.
[44] Great Britain, National Audit Office, *Ministry of Defence: The Defence Information Infrastructure*, HC 788, Session 2007-2008, http://www.nao.org.uk/publications/0708/the_defence_information_infras.aspx, downloaded 15th January 2011.
[45] Interview with ATLAS, 11th January 2011
[46] Interview with ATLAS, 16th December 2010
[47] Interview with DII Group, 5th August 2009
[48] Interview with DII Group, 5th August 2009
[49] Interview with DII Group, 7th January 2011
[50] Interview with ATLAS, 16th December 2010
[51] Interview with ATLAS, 16th December 2010
[52] Dvir, D., Ben David, A., Sadeh, A. and Shenhar, A.J., 'Critical Managerial Factors Affecting Defense Projects Success: A Comparison between Neural Network and Regression Analysis', *Engineering Applications of Artificial Intelligence*, 2006, Vol.19, No.5, pages 535-543.
[53] Interview with ATLAS, 14th February 2011
[54] Interview with DII Group, 7th January 2011
[55] Interview with DII Group, 5th August 2009
[56] Interview with DII Group, 5th August 2009
[57] Interview with DII Group, 16th July 2009
[58] Interview with DII Group, 16th July 2009
[59] Interview with DII Group, 5th August 2009
[60] Interview with DII Group, 16th July 2009

[61] Interview with DII Group, 5th August 2009
[62] Interview with DII Group, 5th August 2009
[63] Interview with DII Group, 5th August 2009
[64] Lyneis, J.M., Cooper, K.G. and Els, S.A., 'Strategic Management of Complex Projects: a Case Study using System Dynamics', *System Dynamics Review*, 2001, Vol. 17, No.3, pages 237-260.
[65] Interview with DII Group, 5th August 2009
[66] Interview with ATLAS, 16th December 2010
[67] Interview with ATLAS, 16th December 2010
[68] Interview with ATLAS, 16th December 2010
[69] Interview with DII Group, 5th August 2009
[70] Interview with DII Group, 5th August 2009
[71] Liu, L. and Yetton, P., 'The Contingent Effects on Project Performance of Conducting Project Reviews and Deploying Project Management Offices', *IEEE Transactions on Engineering Management*, 2007, Vol.54, No.4, pages 789-799.
[72] Pinto, J.K. and Covin, J.G., 'Critical Factors in Project Implementation: A Comparison Study of Construction and R&D Projects', *Technovation*, 1989, Vol.9, No.1, pages 49-51.
[73] Pinto, J.K. and Covin, J.G., ' Critical Factors in Project Implementation: A Comparison Study of Construction and R&D Projects', *Technovation*, 1989, Vol.9, No.1, pages 49-51.
[74] Interview with DII Group, 4th August 2009
[75] Interview with DII Group, 16th July 2009
[76] Interview with DII Group, 16th July 2009
[77] Great Britain, House of Commons, Public Accounts Committee, *Defence Information Infrastructure: First Report of Session 2008-09*, HC 100, (London, HMSO, 2009).
[78] Great Britain, Parliament, *Written Ministerial Statements: the Defence Information Infrastructure Contract*, 19 January 2010, http://www.parliament.the-stationery-office.co.uk/pa/cm200910/cmhansrd/cm100119/wmstext/100119m0001.htm, downloaded 4th April 2011.
[79] Interview with DII Group, 7th January 2011
[80] Dvir, D., Ben David, A., Sadeh, A. and Shenhar, A.J., 'Critical Managerial Factors Affecting Defense Projects Success: A Comparison between Neural Network and Regression Analysis', *Engineering Applications of Artificial Intelligence*, 2006, Vol.19, No.5, pages 535-543.
[81] Interview with DII Group, 7th January 2011
[82] Interview with DII Group, 5th August 2009
[83] Interview with ATLAS, 11th January 2011
[84] Interview with DII Group, 16th July 2009
[85] Interview with DII Group, 5th August 2009
[86] Liu, L. and Yetton, P., 'The Contingent Effects on Project Performance of Conducting Project Reviews and Deploying Project Management Offices', *IEEE Transactions on Engineering Management*, 2007, Vol.54, No.4, pages 789-799.
[87] Anon., Defence Infrastructure Gets Supplier, *KableNet.com*, 2 March 2005, downloaded 20th May 2005.
[88] Anon., Defence Infrastructure Gets Supplier, *KableNet.com*, 2 March 2005, downloaded 20th May 2005.
[89] Thomas, D., 'MoD Cuts £4bn IT Overhaul Shortlist to Three', *ComputerWeekly.com*, 18 December 2003, downloaded 20th January 2004.
[90] Fortune, J. and Peters, G., *Information Systems: Achieving Success by Avoiding Failure*, (Chichester, Wiley, 2005), page 53.
[91] Interview with DII Group, 5th August 2009
[92] Interview with DII Group, 5th August 2009
[93] Interview with DII Group, 5th August 2009
[94] Interview with DII Group, 5th August 2009
[95] Interview with DII Group, 7th January 2011
[96] Interview with DII Group, 16th July 2009
[97] Interview with DII Group, 5th August 2009
[98] Interview with DII Group, 16th July 2009
[99] Interview with DII Group, 5th August 2009
[100] Interview with DII Group, 5th August 2009
[101] Interview with DII Group, 5th August 2009

[102] Interview with DII Group, 16th July 2009
[103] Interview with DII Group, 16th July 2009
[104] Great Britain, National Audit Office, *Ministry of Defence: The Defence Information Infrastructure*, HC 788, Session 2007-2008, http://www.nao.org.uk/publications/0708/the_defence_information_infras.aspx, downloaded 15th January 2011.
[105] Great Britain, National Audit Office, *Ministry of Defence: The Defence Information Infrastructure*, HC 788, Session 2007-2008, http://www.nao.org.uk/publications/0708/the_defence_information_infras.aspx, downloaded 15th January 2011.
[106] Great Britain, National Audit Office, *Ministry of Defence: The Defence Information Infrastructure*, HC 788, Session 2007-2008, http://www.nao.org.uk/publications/0708/the_defence_information_infras.aspx, downloaded 15th January 2011.
[107] Interview with DII Group, 17th August 2009
[108] Interview with ATLAS, 14th February 2011
[109] Interview with DII Group, 17th August 2009
[110] Interview with ATLAS, 11th January 2011
[111] Brown, T., 'Modernisation or Failure? IT Development Programmes in the UK Public Sector', *Financial Accounting and Management IT*, Vol. 17, No. 4, November 2001, pages 363-381.
[112] Interview with ATLAS, 11th January 2011
[113] Interview with ATLAS, 11th January 2011
[114] Interview with DII Group, 7th January 2011
[115] Interview with DII Group, 7th January 2011
[116] Interview with ATLAS, 11th January 2011
[117] Interview with DII Group, 7th January 2011
[118] Dvir, D., Ben David, A., Sadeh, A. and Shenhar, A.J., 'Critical Managerial Factors Affecting Defense Projects Success: A Comparison between Neural Network and Regression Analysis', *Engineering Applications of Artificial Intelligence*, 2006, Vol.19, No.5, pages 535-543.
[119] Interview with ATLAS, 11th January 2011
[120] Interview with DII Group, 7th January 2011
[121] Interview with ATLAS, 16th December 2010
[122] Interview with DII Group, 17th August 2009
[123] Interview with DII Group, 7th January 2011
[124] Interview with ATLAS, 16th December 2010
[125] Limbrick, S., 'General Dynamics Launches Legal Battle with EDS', *Computer Weekly*, 8 January 2010, http://www.computerweekly.com/Articles/2010/01/08/239885/General-Dynamics-launches-legal-battle-with-EDS.htm, downloaded 4th April 2011.
[126] Interview with ATLAS, 16th December 2010
[127] Interview with DII Group, 7th January 2011
[128] Interview with ATLAS, 11th January 2011
[129] Interview with DII Group, 7th January 2011
[130] Interview with ATLAS, 16th December 2010
[131] Interview with ATLAS, 11th January 2011
[132] Interview with ATLAS, 14th February 2011
[133] Interview with ATLAS, 14th February 2011
[134] Brown, T., 'Modernisation or Failure? IT Development Programmes in the UK Public Sector', *Financial Accounting and Management IT*, Vol. 17, No. 4, November 2001, pages 363-381.
[135] Interview with DII Group, 7th January 2011
[136] Interview with DII Group, 17th August 2009
[137] Interview with DII Group, 17th August 2009
[138] Interview with DII Group, 7th January 2011
[139] Brown, T., 'Modernisation or Failure? IT Development Programmes in the UK Public Sector', *Financial Accounting and Management IT*, Vol. 17, No. 4, November 2001, pages 363-381.
[140] Interview with DII Group, 17th August 2009
[141] Interview with DII Group, 7th January 2011
[142] Interview with DII Group, 7th January 2011

143 Pinto, J.K., Slevin, D.P. and English, B., 'Trust in Projects: An Empirical Assessment of Owner/Contractor Relationships', *International Journal of Project Management*, 2009, Vol. 27, pages 638-648.
144 Interview with DII Group, 7th January 2011
145 Interview with DII Group, 17th August 2009
146 Interview with DII Group, 17th August 2009
147 Great Britain, Ministry of Defence, DE&S Information Systems and Services, *Defence Information Infrastructure: Joint Business Plan 2009/10*, (London, HMSO, 2009).
148 Great Britain, Ministry of Defence, DE&S Information Systems and Services, *Defence Information Infrastructure: Joint Business Plan 2009/10*, (London, HMSO, 2009).
149 Interview with DII Group, 7th January 2011
150 Interview with ATLAS, 11th January 2011
151 Interview with DII Group, 7th January 2011
152 Interview with DII Group, 7th January 2011
153 Pich, M.T., Loch, C.H. and de Meyer, A., 'On Uncertainty, Ambiguity and Complexity in Project Management', *Management Science*, 2002, Vol. 48, No. 8, pages 1008-1023.
154 Interview with DII Group, 17th August 2009
155 Interview with DII Group, 7th January 2011
156 Interview with DII Group, 16th July 2009
157 Interview with ATLAS, 14th February 2011
158 Interview with DII Group, 16th July 2009
159 Interview with DII Group, 16th July 2009
160 Interview with DII Group, 7th January 2011
161 Interview with DII Group, 16th July 2009
162 Interview with ATLAS, 14th February 2011
163 Interview with DII Group, 16th July 2009
164 Interview with ATLAS, 11th January 2011
165 Interview with DII Group, 16th July 2009
166 Interview with DII Group, 5th August 2009
167 Interview with DII Group, 5th August 2009
168 Interview with ATLAS, 11th January 2011
169 Interview with ATLAS, 11th January 2011
170 Interview with ATLAS, 11th January 2011
171 Interview with ATLAS, 11th January 2011
172 Interview with ATLAS, 14th February 2011
173 Interview with ATLAS, 11th January 2011
174 Dvir, D., Raz, T. and Shenhar, A.J., 'An Empirical Analysis Of The Relationship Between Project Planning And Project Success', *International Journal of Project Management*, 2003, Vol.21, No.2, Pages 89-95.
175 Interview with DII Group, 7th January 2011
176 Interview with ATLAS, 11th January 2011
177 Interview with ATLAS, 11th January 2011
178 Interview with DII Group, 7th January 2011
179 Interview with DII Group, 16th July 2009
180 Interview with DII Group, 7th January 2011
181 Interview with DII Group, 5th August 2009
182 Interview with ATLAS, 16th December 2010
183 Interview with ATLAS, 16th December 2010
184 Interview with DII Group, 5th August 2009
185 Great Britain, House of Commons, Public Accounts Committee, *Defence Information Infrastructure: First Report of Session 2008-09*, HC 100, (London, HMSO, 2009).
186 Interview with ATLAS, 14th February 2011
187 Interview with DII Group, 16th July 2009
188 Interview with DII Group, 7th January 2011
189 Interview with DII Group, 7th January 2011

[190] Interview with DII Group, 5th August 2009
[191] Interview with ATLAS, 14th February 2011
[192] Snow, A.P., Keil, M. and Wallace, L.,' 'The Effects of Optimistic and Pessimistic Biasing on Software Project Status Reporting', *Information and Management*, 2007, Vol. 44, pages 130-141.
[193] Oz, E. and Sosik, J.J., 'Why Information Systems Projects are Abandoned: A Leadership and Communication Theory and Exploratory Study', *Journal of Computer Information Systems*, 2000, vol. 41, No.12, pages 66-78.
[194] Interview with DII Group, 7th January 2011
[195] Interview with ATLAS, 14th February 2011
[196] Interview with DII Group, 5th August 2009
[197] Interview with DII Group, 5th August 2009
[198] Interview with DII Group, 5th August 2009
[199] Interview with ATLAS, 14th February 2011
[200] Interview with ATLAS, 14th February 2011
[201] Interview with ATLAS, 14th February 2011
[202] Interview with DII Group, 17th August 2009
[203] Interview with DII Group, 7th January 2011
[204] Great Britain, National Audit Office, *Ministry of Defence: The Defence Information Infrastructure*, HC 788, Session 2007-2008, http://www.nao.org.uk/publications/0708/the_defence_information_infras.aspx, downloaded 15th January 2011.
[205] Great Britain, National Audit Office, *Ministry of Defence: The Defence Information Infrastructure*, HC 788, Session 2007-2008, http://www.nao.org.uk/publications/0708/the_defence_information_infras.aspx, downloaded 15th January 2011.
[206] Interview with DII Group, 7th January 2011
[207] Great Britain, House of Commons, Public Accounts Committee, *Defence Information Infrastructure: First Report of Session 2008-09*, HC 100, (London, HMSO, 2009).
[208] Interview with ATLAS, 14th February 2011
[209] Interview with ATLAS, 14th February 2011
[210] Interview with ATLAS, 14th February 2011
[211] Interview with DII Group, 5th August 2009
[212] Interview with DII Group, 16th July 2009
[213] Interview with DII Group, 5th August 2009
[214] Interview with DII Group, 5th August 2009
[215] Interview with ATLAS, 11th January 2011
[216] Interview with DII Group, 5th August 2009
[217] Interview with ATLAS, 14th February 2011
[218] Pinto, J.K. and Slevin, D.P., 'Project Success: Definitions and Measurement Techniques', *Project Management Journal*, 1989, Vol. 19, No. 1, pages 67-75.
[219] Fitzgerald, G., and Russo, N., 'The Turnaround of the London Ambulance Service Computer-Aided Despatch System (LASCAD)', *European Journal of Information Systems*, 2005, Vol.14, pages 244-257.
[220] Interview with DII Group, 7th January 2011
[221] Interview with ATLAS, 11th January 2011
[222] Interview with DII Group, 16th July 2009
[223] Interview with DII Group, 5th August 2009
[224] Interview with DII Group, 5th August 2009
[225] Interview with DII Group, 5th August 2009
[226] Interview with DII Group, 5th August 2009
[227] Interview with ATLAS, 11th January 2011
[228] Interview with DII Group, 16th July 2009
[229] Interview with ATLAS, 14th February 2011
[230] Interview with ATLAS, 11th January 2011
[231] Interview with ATLAS, 14th February 2011
[232] Interview with ATLAS, 11th January 2011
[233] Interview with ATLAS, 11th January 2011
[234] Interview with ATLAS, 16th December 2010

[235] Pinto, J.K. and Slevin, D.P., 'Project Success: Definitions and Measurement Techniques', *Project Management Journal*, 1989, Vol. 19, No. 1, pages 67-75.
[236] Sauer, C., *Why Information Systems Fail: A Case Study Approach*, Waller, 1993.
[237] Dvir, D., Ben David, A., Sadeh, A. and Shenhar, A.J., 'Critical Managerial Factors Affecting Defense Projects Success: A Comparison between Neural Network and Regression Analysis', *Engineering Applications of Artificial Intelligence*, 2006, Vol.19, No.5, pages 535-543.
[238] DeLone, W.H. and McLean, E.R., 'The DeLone and McLean Model of Information Systems Success: a Ten-Year Update', *Journal of Management Information Systems*, 2003, Vol. 19, No.4, pages 9-30.
[239] Shenhar, A.J. and Levy, O., 'Mapping the Dimensions of Project Success', *Project Management Journal*, June 1997, Vol 28, No. 2, pages 5-14.
[240] Dix, A., Finlay, J., Abword, D. and Beale, R., *Human-Computer Interaction*, 3rd Ed., (Harlow, Pearson Education, 2004).
[241] Dix, A., Finlay, J., Abword, D. and Beale, R., *Human-Computer Interaction*, 3rd Ed., (Harlow, Pearson Education, 2004).
[242] Great Britain, House of Commons, Public Accounts Committee, *Defence Information Infrastructure: First Report of Session 2008-09*, HC 100, (London, HMSO, 2009).
[243] Markus, M.L. and Robey, D. 'The Organisational Validity of Management Information Systems', *Human Relations*, 1983, 36, pages 203-226.
[244] Heeks, R., Mundy, D. and Salazar, A., *Why Health Care Information Systems Succeed or Fail*, (Institute for Development Policy and Management, Manchester University, Manchester, 1999).
[245] Markus, M.L. and Robey, D. 'The Organisational Validity of Management Information Systems', *Human Relations*, 1983, 36, pages 203-226.
[246] Heeks, R., Mundy, D. and Salazar, A., *Why Health Care Information Systems Succeed or Fail*, (Institute for Development Policy and Management, Manchester University, Manchester, 1999).
[247] Heeks, R., Mundy, D. and Salazar, A., *Why Health Care Information Systems Succeed or Fail*, (Institute for Development Policy and Management, Manchester University, Manchester, 1999).
[248] Kappelman,L.A., McKeeman, R. and Zhang, L., 'Early Warning Signs of IT Project Failure: the Dominant Dozen.' *Information Systems Management*, 2006, pages 31-36.
[249] Klein, J.I. 'Parenthetic Learning in Organizations: Toward the Unlearning of the Unlearning Model', *Journal of Management Studies*, Vol. 26, No. 3, 1989, pages 291-308.
[250] Kirkpatrick, D., 'Lessons from the Report on MoD Major Projects', *RUSI Defence Systems*, June 2009, http://www.rusi.org/downloads/assets/Acquisition_Issues_Lessons_from_the_MoD_RDS_Summer_09.pdf, downloaded 10th January 2010.
[251] Kirkpatrick, D., 'Lessons from the Report on MoD Major Projects', *RUSI Defence Systems*, June 2009, http://www.rusi.org/downloads/assets/Acquisition_Issues_Lessons_from_the_MoD_RDS_Summer_09.pdf, downloaded 10th January 2010.
[252] Kirkpatrick, D., 'Lessons from the Report on MoD Major Projects', *RUSI Defence Systems*, June 2009, http://www.rusi.org/downloads/assets/Acquisition_Issues_Lessons_from_the_MoD_RDS_Summer_09.pdf, downloaded 10th January 2010.
[253] Kirkpatrick, D., 'Lessons from the Report on MoD Major Projects', *RUSI Defence Systems*, June 2009, http://www.rusi.org/downloads/assets/Acquisition_Issues_Lessons_from_the_MoD_RDS_Summer_09.pdf, downloaded 10th January 2010.
[254] Great Britain, National Audit Office, *Helping Government Learn*, (London, HMSO, 2009), http://www.nao.org.uk/publications/press_notice_home/0809/0809129.aspx, downloaded 20th January 2011.
[255] Fortune, J. and Peters, G., *Information Systems: Achieving Success by Avoiding Failure*, (Wiley, Chichester, 2005), page 121.

# Chapter Seven
# Conclusions and Policy Implications

## 7.1. Introduction

The research question posed at the beginning of this study was whether the lessons learned from previous complex Information Technology (IT) projects in government have been used to improve the performance of subsequent projects. 'Lessons learned' refers to lessons synthesised from ten reports published between 2000 and 2006; 'complex IT projects' refers to mega-projects or programmes where the most complex, costly or resource demanding elements involve IT; and 'government', used interchangeably with public sector, is that part of the state dealing with the production, delivery and allocation of goods and services by and for the government or its citizens, whether national, regional or local. The meaning of 'performance' in this context was derived from the literature review and was taken to be: reducing the risk of escalation to cost, time and scope; reducing the resource demands of cost, time and scope; meeting the expectations of the stakeholders, including the project team, in terms of value and usefulness; improving the scale or certainty of business benefits; improving the scale or certainty of the project's contribution to defined strategic goals; and avoidance of identified strategic environment factors known to undermine delivery or future performance.

This research question was underpinned by three subsidiary questions.

1. Are the lessons learned from previous complex IT projects in government correct and comprehensively considered? This required a point of comparison, which was the findings of the academic literature.
2. Have the lessons learned been differentiated by the type of project? This required identification of the different types of project and an assessment of the appropriateness of the lessons in relation to project type.
3. Has the relative importance of the lessons learned been adequately explored and identified? This required examination of how lessons vary across a project and product lifecycle.

These thought processes led to the aim of this study, which was to analyse the impact of identified Critical Success Factors (CSFs) on the management and subsequent performance of a major government IT project, taking as a case study the MoD's Defence Information Infrastructure (DII) Programme. The enabling objectives included exploration of the key CSFs defined in academic studies of project management in general and IT project management specifically, along with an assessment of their impact; the identification of the key CSFs defined in reports on public sector IT project failure and reviews of infrastructure projects; synthesis of the identified CSFs and comparison with those defined in the academic literature to ensure that they are correct and comprehensively considered; development of a detailed case study of the design and delivery of the DII programme; examination of the extent to which the CSFs have been incorporated into the management of the DII Programme; and assessment of the effectiveness of CSFs as a means of delivering project success.

The research was described and structured by a conceptual framework that resulted from a definition of an information system together with a description of the layers of complexity surrounding government IT initiatives: the Technical Solution sits at the core surrounded by the Business Process, Organisational Setting and Programme, Policy and Political Context. This chapter summarises this research, presents the findings, provides policy recommendations and discusses possible areas of future research.

## 7.2. Research Summary

The UK Government sees IT as a means of delivering its services more efficiently and effectively. To this end, it has enacted policy aimed at incorporating IT into its business, whilst commissioning complex IT mega-projects at significant cost to the taxpayer in order to fulfil that policy. With budgets greater than £50 million and inevitable public impact, the complexity and magnitude of these projects increases their risk of failure. Not surprisingly, therefore, government has a catalogue of very expensive IT mega-projects that have failed to deliver the anticipated benefit. However, not complacent about its poor record, it has made numerous attempts, along with academia and other reputable bodies, to understand why these projects fail and to identify those factors that need to be given specific attention by project managers to ensure successful delivery. In 2000, the McCartney Report, *Successful IT: Modernising Government in Action*, was published, identifying ten areas for improvement; in 2006, the National Audit Office (NAO) mirrored McCartney's focus with *Delivering Successful IT-Enabled Business Change*. Eight other major reports appeared in between, largely variations on a theme. Despite this effort, the failure rate of government IT mega-projects remains high, raising questions about whether the identified CSFs have been noted, understood and applied by project managers in government and, if so, to what effect. There is also an assumption that these CSFs have general applicability to all types of projects, whatever their funding, procurement, development or implementation model.

The Ministry of Defence (MoD), one of the largest and most diverse government departments, initiated its Defence Information Infrastructure (DII) Programme in 2001, destined to be a £5 billion, ten-year overhaul of Defence IT systems. With Defence IT based on disjointed and non-interoperable systems, DII will provide the foundations, the infrastructure, to support the flow and processing of information in Defence and, in doing so, will drive major business change, increasing coherence and integration. The contract to provide DII was awarded to the ATLAS Consortium, an organisation made up of five separate companies, in March 2005. DII is a complex mega-project being undertaken within the government context and, as such, provides an ideal case study to examine whether the CSFs have been understood and applied at the operational level. As DII enters the sixth year of its contract, the MoD is faced with a constrained and falling budget, in part due to its poor record of delivering complex technology projects. It is charged with being over-optimistic with its investment decisions, whilst failing to control costs and to deliver Value for Money (VfM). DII sits at the crux of these two problems: government IT project failure and MoD procurement failure. Developed and implemented within the shadow of these ten reports, the expectation is that some, if not all, of the CSFs should have been incorporated and embedded into its project management to good effect.

The MoD operates within the government context, which is organised vertically with an insular culture, whilst authority is dissipated across multiple decision makers with no central mandatory control. The overriding purpose of government is to create public value whilst meeting its mandate and fulfilling its mission. Certain layers of its business are no different to those of a private sector organisation: the IT project or the Technical Solution has to work within a Business Process and an Organisational Setting. However, the difference in government lies in its outer layer, the Programme, Policy and Political Context, delivering the political priorities of the Government but based on 'short-termism' and subject to a range of checks and balances, which ultimately impact the other three layers. It is questionable whether generic CSFs can provide the means of tackling failure in such a disparate and complex environment.

### 7.2.1. Summarising the Literature: Understanding Failure and Defining Success

A systematic literature review process was based around examination of four factors: Context, Intervention, Mechanism and Outcome. The examination of the government context revealed little empirical research on public sector IT project management. However, a series of relevant issues was extracted from the few articles identified. Changes in policy and political direction, along with the many levels of accountability, are likely to impact on IT projects, while their cultural decentralisation reinforces the insular nature of government. There is a propensity to undertake IT mega-projects based on leading edge technology despite the shortage of specialist inhouse IT project development staff while the resulting outsourcing of projects is hampered by the lack of available commercial knowledge. In addition, external personnel may struggle to understand the complexity of the government context making it difficult to deliver the requirement. These projects tend to be based on the traditional linear project lifecycle with pre-defined requirements and a pre-determined timetable, making it difficult to keep pace with rapid technology change. Overall, there is an identified need for improved organisational learning in government to counteract the problems with IT projects. Interestingly, these issues appear to be unique to the UK, suggesting that the failures may relate to specific problems with government processes in the UK, such as political hyperactivism and operating on a national rather than a regional scale.

'Intervention' refers to the application of CSFs to project management and was examined firstly in relation to generic project management. The evolution of thinking has identified the need to differentiate the project and the product lifecycle, whilst recognising that CSFs vary throughout this lifecycle, relating to the 'internal' factors (the project) early on, while 'external' factors (the product) become important later. In addition, different projects operate in different contexts and, therefore, require different approaches, leading to a move to apply contingency theory to project management followed by the more recent idea of strategic project management. Over time, research has moved from lists of CSFs to the production of multi-dimensional frameworks, emphasising the criticality of their interactions, as well as moving from a focus on time, cost and scope, the so-called 'iron triangle', to incorporate wider organisational and environmental factors as well as an increased focus on stakeholders.

IT projects are differentiated from other types of project by their complex and unpredictable products, which are closely tied to their organisational context. However, not only do IT projects differ from other types of project but there are also different types of IT project requiring different types of management. Understanding the type of project enables greater clarity in assessing the associated risks and in identifying the most relevant CSFs. Studies on IT project management have followed a similar route to the generic literature but have moved more rapidly towards organisational factors, an emphasis on the end-user and the development of frameworks that highlight the organisational validity and fit of the IT project, along with the influence of its context and wider environment. These models were closely examined to find a measure of the impact of CSFs on a project, thereby enabling their ultimate effect on the performance of the DII Programme to be assessed. The Formal Systems Method (FSM) encapsulates much of the previous research, clearly considering both the context and the environment, picking up on subjective issues, such as expectations and decision-making, whilst also showing the interrelationships. As such, it provides an ideal measure. Having reviewed the IT project management literature, the CSFs were extracted and compared to the CSFs identified in the generic project management literature. These proved to be broadly comparable, particularly in terms of the top three CSFs.

Discussion of the Mechanism critiqued definitions of 'project' and 'project management', and also considered the project lifecycle, questioning the utility of project reviews, particularly for IT projects, and noting the move to more dynamic development lifecycles along with attempts to incorporate organisational elements. The discussion then moved to the Outcome, firstly reviewing the effect of the Intervention through an examination of the study of risk management. Whilst at an immature stage, studies in this area are following the same route as the work on CSFs, moving from the identification of lists to the creation of frameworks. The top three risk factors were the mirror image of the top three CSFs for IT project management, further corroborating the CSFs identified in the literature. This section then considered how definitions of success have evolved, resulting in the creation of the definition and measure of ‘performance’, discussed above. Finally, some key themes relating to learning from experience were discussed, including the failure to learn and the commitment to troubled projects.

The literature review revealed two gaps: a lack of research on IT project management in the public sector and a lack of evidence that the identified CSFs are being understood and applied in practice. It also identified the FSM as a means of measuring the impact of the CSFs on the selected case study, the DII Programme. Finally, it satisfied the first objective of this study, which was the exploration of the key CSFs defined in academic studies of project management in general and IT project management specifically, along with an assessment of their impact.

### 7.2.2. Summarising the Research I: Identifying the Critical Success Factors

Based on an interpretivist philosophy, this research considers the world to be socially constructed and subjective, requiring human behaviour to be understood rather than explained. The purpose is causal or analytical in that it examines the effect of one variable (CSFs) on another (the DII Programme) to ascertain if there has been a specific change from existing norms. The process is based on a mixture of qualitative and quantitative methods and its logic is deductive. Finally, the outcome is applied research, designed to apply its findings to a specific existing problem.

The first stage of the research was to identify the CSFs from reports on IT project failure and information infrastructure projects, then to compare them with the CSFs identified in the literature in order to produce a synthesised list. The understanding and application of this list and its impact could then be examined through the case study. In 2000, McCartney produced his authoritative report, followed by nine reports that generally reiterated his themes. Following the trail of McCartney demonstrated that policy is simply a suggested course of action, rather than mandated regulation. This theme recurred in the subsequent reports, raising questions about how to ensure that government departments and agencies comply with these CSFs. McCartney's principal legacies are the Senior Responsible Owner (SRO) appointment and Gateway Reviews but the report also initiated a number of mechanisms to improve skills and knowledge in government. In addition, it highlighted the importance of delivering benefits, initiating smaller more manageable projects and improving relations with suppliers.

Three key themes emerged from this analysis. Firstly, knowledge, understanding and skills are a major issue in the government context and underpin a range of the other identified CSFs. Secondly, governance is critical: the means to success are known; the issue is compliance with those means. Thirdly, the contract needs to be managed, raising further questions about skills and the relationship with the supplier, given a clash of cultures. The themes derived from these general IT failure reports were then compared with those in the five information infrastructure projects with no additional themes identified. The infrastructure reports highlighted poor project management, problems with procurement and supplier relations, as well as skills and competence. They also identified problems resulting from changes to the project team and failing to engage the stakeholders. This process satisfied the second objective, which was the identification of the key CSFs defined in reports on public sector IT project failure and reviews of infrastructure projects.

The themes were then refined to produce a list of twelve CSFs, clearly identifying the required activity, rather than simply being a broad generic term. These are shown again at Table 7.1. They were then verified against the literature to positively answer the first subsidiary research question: are the lessons learned from previous complex IT projects in government correct and comprehensively considered? This also satisfied the third objective, which was synthesis of the identified CSFs and comparison with those defined in the academic literature to ensure that they are correct and comprehensively considered.

**Table 7.1: Identified CSFs**

| |
|---|
| **Affordability** |
| *An assessment of whether proposals can be paid for in terms of resources, cash-flows and funding* |
| **Alternatives Certainty** |
| *Consideration of alternative approaches capable of fulfilling the objectives creates project confidence and commitment with the key stakeholders i.e. Do Nothing, Do minimum, Defer, Outsource, Consolidate* |
| **Benefits Certainty** |
| *Clear identification and definition of the business need for the project and the required performance improvement outcomes along with how these will be managed in terms of measures, owners, targets and strategic alignment* |
| **Change Readiness** |
| *The current state of the organisations involved in the project and their perceived ability to absorb, adapt to, and assimilate change* |
| **Clarity and Perception** |
| *Clarity of the rationale, scope and scale of the project and shared understanding by key stakeholders across broad communities involved* |
| **Competence and Capacity** |
| *The requirement for individuals associated with the project to be able to properly perform specific jobs through a combination of knowledge, skills and behaviour, along with the capacity, in terms of the availability of the right people with the right skills, to execute and effectively deliver the option* |
| **Complexity Management** |
| *The level of likely risk and the scale, novelty, diversity, interdependency and volatility of a project* |
| **Consistency and Coherence** |
| *Integration of the selected option with established systems, processes and policies* |
| **Constraints Certainty** |
| *An estimate of costs, resource requirements and timescales along with project planning, design and implementation* |
| **Scalability and Flexibility** |
| *Consideration of the versatility of a future option and its anticipated survivability in a future and unpredictable environment, requiring an understanding of the scalability (both up and down) and of the degree of flexibility* |
| **Stakeholder Management** |
| *The systematic identification, analysis and planning of actions to communicate with, negotiate with and influence all those who have an interest or role in the project or those who are impacted by the project.* |
| **Value for Money** |
| *The project offers the optimum economy, effectiveness and efficiency in delivering the product along with a qualitative and quantitative judgement over the manner in which resources are utilised and managed and any reputational risk that has ensued to both public sector and supplier* |

**Source: Author**

The next stage of this study was to assess whether the CSFs have been understood and applied and, if so, whether they have improved the performance of a complex IT project within the government context. A case study was selected as the research methodology, incorporating a number of methods, including interviews and surveys, satisfying the fourth objective of developing a detailed case study.

### 7.2.3. Summarising the Research II: The DII Programme Case Study

The conceptual framework structured the approach to the case study of the DII Programme, which began by unpeeling the layers surrounding the Technical Solution, the IT project under review: the Programme, Policy and Political Context; the Organisational Setting; and the Business Process. The Programme, Policy and Political Context has been the source of a number of initiatives aimed at providing more effective government procurement and project management. Four key themes arose from this discussion, three relating to CSFs identified previously: the need for common practices and processes along with some means of ensuring compliance (Consistency and Coherence); the need for an improvement in government's skills and knowledge in the areas of commercial management, financial management, project and risk management, and IT capability (Competence and Capacity); ensuring economy, efficiency and effectiveness in terms of both procurement and project management (Value for Money); and a much greater emphasis on the need to manage contracts. These are potentially undeliverable without also tackling two overarching themes: the need for increased governance, much stronger authority in terms of directed and required compliance, and the lack of priority given to the learning of lessons in government.

Within the Organisational Setting, the MoD has translated these policy initiatives in order to deliver changes in practice within its own specific context. The description of the structure and organisation of the MoD shows a department with strong lines of authority facing strong drivers for change. Its systems appear to be well considered and logical, providing the basis for a successful organisation operating within the boundaries of public expenditure planning, control and accountability. However, it is suffering serious problems with its procurement and project management. Therefore, while there is evidence that the MoD is translating policy to the Defence context, there seems to be little evidence that it is having any impact on the 'Business Process'.

The final stage of the discussion examined this Business Process, exploring the urgent need to improve the state of Defence information leading to the setting up of the DII Programme. The DII Group was formally established in 2000, began designing the structure and processes to deliver a single information infrastructure and, over time, obtained senior management support and funding. The decision was then taken to outsource the project to a consortium, dividing it into three stages: DII(Current), DII(Convergent) and DII(Future), known as DII(F). DII(F) was then divided into three increments, which were broken into separate elements. The software was to be delivered in two batches: Release 1 (basic functionality) and Release 2 (full functionality). Delayed by three months, the contract was finally let in March 2005 to the ATLAS consortium, made up of five separate companies, led by EDS, which later merged with Hewlett Packard (HP). Despite the delayed contract, it was agreed to keep to the original timetable, which meant that the three-month start-up period was lost and ATLAS had to recruit and build its organisation at the same time as initiating the DII Programme.

Despite the assertion that the activity undertaken within the Programme, Policy and Political Context and the Organisational Setting layers has had little effect on the Business Process, this initial examination of the DII Programme suggests that there has been sound planning, providing a good basis for a successful outcome. The next stage of the case study, again structured by the conceptual framework, was to examine the Technical Solution at the centre of these layers, to ascertain whether the identified CSFs have been understood and applied, and, if so, to estimate their impact. In order to answer the second subsidiary research question, the first step in examining the Technical Solution was to find out if the project had been categorised by type and whether the CSFs had been differentiated accordingly. Although the utility of this process was recognised, the DII Programme had not been classified this way. DII was identified as Strategic, meaning that it will deliver sustainable competitive advantage or, in MoD terms, best value and operational capability.

The examination of the Technical Solution then focused on the software development and the implementation of DII(F). Both were identified as being of low technical risk, yet both presented problems. The processes for each had been used previously for the infrastructure project at DWP. Both failed in the MoD context and were rethought, resulting in delays, inconvenience to users, the retention of legacy systems and associated cost. ATLAS underestimated the technical difficulty of the software development and the required manpower, a situation further exacerbated by the security accreditation process and a new policy on security requirements. This resulted in delays to the delivery of a version of DII(F) that could handle SECRET material, demonstrating that changes in policy can cause critical problems, particularly to an IT system under development. The delays to Release 2 are significant, resulting in delivery via smaller work packages with the final one due in 2013, seven years late. This means that the MoD and armed services will only receive two years of benefit from DII(F) working at full functionality, rather than nine, raising significant questions about its VfM.

The implementation process for the hardware and software was based on a series of assumptions about sites within Defence, which then needed substantial work to bring them to the required standard. However, in the midst of this, the DII Programme managed to ensure delivery of the Joint Personnel Administration (JPA) application, thereby enabling the biggest single benefit for the project. In both cases, the DII Group and ATLAS worked together on devising solutions that better fitted the Organisational Setting. Despite this, further problems have been encountered as the Programme has progressed and further challenges lie ahead as it moves into the deployed and maritime environments.

Having considered the Technical Solution and identified issues, the next stage was to consider the understanding and application of the CSFs within the Programme. Firstly, the DII Group and ATLAS interviewees were asked about lessons learned. It was apparent that the DII Programme had actively sought and applied appropriate lessons, despite the view from the Programme, Policy and Political Context that no priority or time was given to learning lessons within projects. The lessons from the reports have permeated the project via specific policy and processes or as a result of oversight and assessment by external bodies. Lessons were also gleaned from similar projects and applied accordingly. However, as it has developed over time the DII Programme has become unique, thereby making it self-reliant in terms of finding solutions to problems.

Asked to assess their understanding and application of CSFs within the Programme, the interviewees rated Consistency and Coherence, Benefits Certainty and Alternatives Certainty as most critical in terms of both understanding and application. However, in terms of having a strongly positive effect on the Programme, the two former CSFs were joined by Stakeholder Management along with Scalability and Flexibility, rather than Alternatives Certainty. These results enabled the range of CSFs identified as part of this study to be compared. Looking at CSFs from the project management literature, IT project management literature, general IT and infrastructure reports, as well as the DII Programme case study, there was little correspondence, supporting the assertion that there are specific types of project in specific contexts and that not all projects are the same.

The next phase of this research was to examine whether the relative importance of the CSFs has been adequately explored and identified. The findings broadly support the assertions in the literature of an internal focus during planning, moving to the product during development and implementation. Affordability, Alternatives Certainty, Benefits Certainty and Value for Money were critical at the planning stage while Competence and Capacity, Complexity Management, Constraints Certainty, and Scale and Flexibility were considered critical to obtaining the relevant resources. During the development and implementation, the stress is on Change Readiness, Clarity and Perception and Stakeholder Management, but there are ongoing issues with Affordability, Competence and Capacity, Complexity Management, and Scalability and Flexibility. This answered the third subsidiary question, showing that CSFs vary across the project and product lifecycle. Generally, it is the more technical factors that are critical upfront, such as finance, scope and time, along with business benefit, moving to organisational and social factors as the project progresses into implementation.

The understanding and application of the CSFs was then explored further with the interviewees. In accordance with the interpretive stance taken by this research, the evidence is subjective, based on opinion stemming from the way that each interviewee interprets the world. These opinions were cross-referenced and compared with fact. It is evident that the DII Programme has struggled with technical issues that were considered to be low risk. These can be traced back to people and process issues. However, they also relate to the context into which they are being introduced and the need to understand not only related architectural and design problems within that context but also the organisational processes, the people, the setting and the wider environment. If the DII Programme fails to deliver Release 2, then it will have failed to deliver the organisational change required by Defence.

The interviewees identified the measures of success for DII in terms of Benefits Certainty and Constraints Certainty: the need to deliver the requisite IT to Defence, enabling organisational change, without exceeding time, cost or scope. It was considered that the project might fail if lack of attention is given to Clarity and Perception, Competence and Capacity, Complexity Management and Constraints Certainty. Stakeholder Management was not seen as a key measure of success or a component of failure. However, from the user viewpoint, DII is failing with regards to Constraints Certainty and Benefits Certainty although there is a more positive view of DII(F) in terms of it delivering an overall improvement to IT services (Clarity and Perception). Creating an information infrastructure for Defence is a necessity in terms of integration, increasing coherence and implementing innovative changes in working practices and business solutions. Not least, it will provide the basis for future development. However, in order to convince its users of its utility, the delivery of full functionality is critical.

The fifth objective was to examine the extent to which the CSFs have been incorporated into the management of the DII Programme. It was evident that they were recognised and they appeared to have been understood by the interviewees. However, the extent to which they have been applied within the Programme is variable with differing effect. There are questions about the application of Affordability, whether the Programme was ever affordable and whether it remains so, reflecting the view that the MoD is over-optimistic with its forecast costs. Alternatives Certainty demonstrated ‘group-think’ with technical rationality dominating, rather than managerial or professional, which may explain the expectation failure on behalf of the users. There was inadequate Change Readiness in terms of the preparatory work undertaken, with resulting cost overruns and delays. Complexity Management demonstrated an underestimation of risk, whilst Constraints Certainty showed inadequate through life costs and, apparently, little regard for the financial and operational impact of delay. It is evident that the Organisational Setting and its Business Process impact on the Technical Solution. The CSFs are interpreted according to the culture and ways of working within the MoD, which effects the way in which they are then applied. Therefore, the impact that CSFs have had on the management of the DII Programme is debatable.

Turning to an assessment of the performance, the selected means of measuring the benefit of applying CSFs to a project was the Formal Systems Method (FSM), which encapsulates much of the research identified in the literature review and provides an ideal system against which to measure reality. If a project is managed in such a way that all of the operations and their interactions within this model are in place then it should perform, thereby delivering a successful product. In other words, it is a robust system that should operate without failure. Tested against this model on the basis of the evidence derived from the case study, it appears DII(F) could be managed better and, therefore, could be performing better, suggesting that the overall success of the project is potentially at risk.

The research question asked whether the lessons learned from previous complex IT projects in government have been used to improve the performance of subsequent projects. Performance was defined through the scholarly literature to provide eight measures of success. These showed that the DII Programme has not reduced costs, timescales or resource demands or reduced the risk of them escalating. Cost and timescales have increased while resource has remained largely static since the project was initiated. The scale or certainty of business benefits has not been maintained, largely due to the delays with software, although it is well tracked. The scale or certainty of the project's contribution to defined strategic goals is also threatened by the problems surrounding Release 2, which enables major organisational benefit from this project, thereby delivering best value and operational capability. Finally, there has been some degree of avoidance of identified doctrinal, procedural and/or strategic environment factors known to undermine delivery or future performance, although the project has been hampered by changes to the security policy and the effects of the Financial Crisis in the wider environment.

Therefore, the answer to the research question is that the lessons learned from previous complex IT projects in government have been used to some degree but have not improved the performance of the DII Programme. In other words, the understanding and application of CSFs to the management of this project will not necessarily result in improved performance or, in other words, a successful outcome. This fulfils the final objective of assessing the effectiveness of CSFs as a means of delivering project success and meets the aim of this study, which was to analyse the impact of identified CSFs on the management and subsequent performance of a major government IT project, taking as a case study the MoD's Defence Information Infrastructure. This leads to the following conclusions and policy recommendations.

## 7.3. Conclusions and Policy Recommendations

The overarching conclusion of this study is that, in terms of the management of the DII Programme, the impact of the identified CSFs is variable but, where they are not applied, there is an adverse effect on its performance. This suggests a causal relationship.

More generally, whilst not applying generic CSFs to project management is likely to lead to failure, it appears that identifying them is not the solution to the problems experienced with major government IT projects, unique projects operating in highly specific and complex contexts; more contingent solutions should be sought. This overarching conclusion leads to eight more focused conclusions along with related policy recommendations.

### 7.3.1. Lessons Learned and Identified CSFs

Since the 1960s, many scholars have spent time trying to identify a limited number of factors that will lead to success. In this study, success was defined in terms of 'performance', which was broken down into six key areas. Recently, the UK government has put more emphasis on the need to learn lessons and the lack of priority given to this, identifying the requirement for a central mandatory system of assurance to systematically propagate lessons learned. The case study demonstrated, however, that lessons have to be applied with care and that it is dangerous to assume that they are easily transferable (Chapter Six, Sections 6.2.1 and 6.2.2). It also showed that, as these IT mega-projects mature, the chance of finding a reference source becomes more unlikely (Chapter Six, Section 6.3.1). Therefore, the major learning is from experiences that occur within the project, raising the critical issue of being able to learn from mistakes within these major government projects and then to apply a better solution. This form of learning is more likely to lead to success, rather than simply applying generic solutions to highly specific problems.

However, project teams are often driven to hide mistakes and to present an optimistic view to senior management in order to avoid inevitable financial and resource penalties (Chapter Six, Section 6.3.4 (Constraints Certainty)). In addition, they are subject to a great deal of scrutiny and accountability, not least by the media, making government a difficult environment in which to learn lessons. However, there appears to be an emerging awareness in government that these projects are highly complex, that complexity brings risk from numerous sources and that this risk is often unpredictable (Chapter 5, Section 5.2).

In terms of then translating these lessons into CSFs, it is evident that there is little unanimity about CSFs. Whilst there was some cross-reference in some cases, it was impossible to categorically identify the critical factors for success, sifting across a range of sources. CSFs were shown to vary throughout the project and product lifecycle; some are within the control of the project team, while others may not be; the factors leading to success are multi-dimensional and interlinked; a combination of multiple factors vary in importance through the lifecycle; and, finally, not all projects are the same and they should, therefore, be managed in different ways using different CSFs, demonstrating that they are highly context specific. It is questionable whether the same approach can be adopted, whatever the funding, procurement, development or implementation model for a project, with simply some fine tuning to reflect variety, scale and complexity.

This draws into dispute the whole basis of the CSF as a project management tool, particularly with regard to the emphasis on 'success'. Even if the project is fully aligned to the CSFs, they will not necessarily guarantee its success. The notion that the management of 'a few key areas' will result in a successful outcome, along with the idea that this is applicable to all projects in all contexts, is too simplistic a view for an increasingly complex world with increasingly complex projects. It is impossible to identify CSFs that have general applicability across a range of different projects in a disparate and complex environment. It is evident that project managers need to understand CSFs, but they also need to be considered critically in the context of the specific project being managed, which justifies the recent application of contingency theory to project management. Overall, 'Critical Success Factors' is a misnomer.

They are key areas that might improve the management of the project, adding to its resilience and enabling it to cope with risk and threats, but they cannot assure success.

**Conclusion 1:** Whilst CSFs have utility in terms of strengthening the resilience of the project management, they cannot guarantee success in a major government IT project.

**Policy Recommendation 1:** There needs to be greater recognition of the complexity of these projects, which makes them unpredictable, encouraging more tolerance of error and allowing learning to take place and to be applied openly.

### 7.3.2. Public Sector IT Project Management

The vertical structure and insular culture of government, often referred to as a federated system, means that any pan-government initiative can only be achieved through persuasion and by attempting to build a common sense of purpose. The McCartney Report demonstrated that policy is simply a suggested course of action, rather than mandated regulations, further evidenced by the recurrent themes being highlighted with regard to project management and procurement. It is evidently very easy for government departments and agencies to erect barriers to change, whilst it is also evident that central government policy and departmental policy is often ignored without repercussion (Chapter Four, Section 4.2.3). There is an identified need for greater governance in government along with a more centralised approach to IT and its management (Chapter 5, Section 5.2).

However, given the above discussion about the application of generic CSFs to unique projects, it may be that a command and control approach along with a higher degree of standardisation is not the answer. It is likely that central expertise in procurement and management is not used because it is not applicable to specific contexts and requires more variation. It may be that more checks on departments carrying out IT projects will result in more constraints on action, rather than improved performance, and a continuing presentation of only the good news in order to ensure funding and resources. With influence based on informal relationships rather than authority, it may be that the focus from the centre should be on giving its departments and agencies the capabilities to operate in a complex and shifting environment, whilst also considering greater authority to intervene from the centre on a highly selective basis when projects go awry.

Whilst there is some evidence that good practice has been spread, more could be done to ensure that government has the right capabilities, as well as providing the right environment, for learning to take place. If government is to manage complex IT mega-projects in a complex environment, then it needs to ensure that it has the right number of personnel with the right level of skills and knowledge to make success more likely. This means ensuring that there is an understanding and clarity about the organisation's purpose, so that project teams understand the system output and then design a system to meet that demand, ensuring that decision-making is integrated with the project while removing controls so that the project team can respond in the right way to the changing environment. In other words, building a self-organising system capable of dealing with unforeseen challenges, able to adjust, correct and augment its own capabilities to meet the needs of the environment. As the demands of the project change, therefore, the system can change and evolve. Any organisation in today's economy has to continuously adapt to rapidly changing environments.

**Conclusion 2:** There is an evident association between the culture of the Programme, Policy and Political Layer and the Technical Solution. The impact of the one on the other needs further investigation in order to understand the issues relating to procurement and project management in the government environment.

**Policy Recommendation 2:** Further academic study is required on the nature of government and its impact on IT project management.

**Conclusion 3:** Although increased governance and control from the centre appears a solution to IT project failure, it potentially forces generic solutions on to unique problems, further constraining action and potentially resulting in less reliable reporting in order to protect funding and resources.

**Policy Recommendation 3:** Rather than focusing on specific and narrow bands of skills, government needs to consider encouraging and providing broader, more adaptable capabilities to enable its personnel to manage complex projects in an increasingly complex and changing environment.

### 7.3.3. MoD IT Project Management

The Public Accounts Committee facetiously expressed its disappointment at the level of the DII Programme’s cost and time overruns, demonstrating that, by government measures, it is not a failure (Chapter Six, Section 6.3.4 (Constraints Certainty)). Indeed, given its complexity and over-ambitious timetable, it is surprising that it has not faced more issues, particarly in the light of the project initiation process. A number of lines of evidence in the case study suggest that this was not given sufficient attention.

As an IT mega-project designed to transform Defence, this study identified DII(F) as a Strategic project for Defence, a major investment decision. However, as it was not categorised in this way, there was apparently no identification of its key CSFs. Therefore, despite its intent of delivering strategic outcomes that would create change throughout the whole of Defence, it was not treated as a key strategic project initially, demonstrated by the lack of resources allocated and the fight for top level support (Chapter Five, Section 5.4.2). Over time, this support has dwindled. However, it is likely to become important again as the Programme increasingly concerns itself with the wider business change (Chapter Six, Section 6.3.4 (Clarity and Perception)).

A number of assumptions were made regarding the implementation and the project proceeded on the basis of known risk. However, it might have been more cost-effective in the long run to exert greater control over these risks by spending more time on the site surveys. It would certainly have prevented delays further down the line. However, this was seen to be unattractive to senior management in terms of resource, suggesting that the impetus to begin a project overrides careful preparation. Similar issues are likely to be faced as the project moves to the maritime and deployed environment (Chapter Six, Section 6.2.2). In addition, time should have been allowed for the project team to engage with the supplier and for the supplier to recruit and create an organisation of almost 2000 personnel (Chapter Six, Section

6.3.4 (Constraints Certainty)). As it was, the Programme began life with an inbuilt time delay.

These factors underline the claims in government reports that the MoD has an over-ambitious procurement methodology, a lack of clarity of thought about the basics and a tendancy to ignore the fundamentals of project planning, such as funding and resource provision, before the project is initiated (Chapter Five, Section 5.3.2). Overall, the project was never given a firm foundation of resources and was initiated on an over-optimistic basis.

**Conclusion 4:** There is strong evidence from this case study that it is beneficial in the long term to spend more time on the project initiation phase and to be prepared to expend resource on preparation rather than rushing into development. This is potentially a cultural problem within MoD procurement.

**Policy Recommendation 4:** The MoD should spend more time on the project initiation phase of a project as investment in the initial preparation is likely to save expenditure later in the project lifecycle.

**Conclusion 5:** There was an apparent lack of top level engagement with this project initially, particularly in terms of recognising it as a Strategic project and allocating the necessary resource.

**Policy Recommendation 5:** There should be more central involvement with projects, particularly at initiation stage, and, if a project is considered both viable and beneficial, then it should be given the required resource and support. In other words, top level oversight of projects should be more professional.

### 7.3.4. Contract Management: Conclusions and Policy Recommendations

A key finding from this research concerned the importance of contract management. This was highlighted in the reports analysed in Chapter Five and was a key point to emerge from the case study. It is evident that the contractor cannot abdicate responsibility for the contract or the supplier once it is let, but actually takes on a more critical role in terms of contract management to ensure that the supplier can work to their optimum (Chapter Six, Section 6.3.4 (Competence and Capacity). However, at operational level, the appropriate skill set was lacking and, in some areas, there was a limited view of the extent of contract management, focusing on oversight of the contract, rather than a broader view related to building relationships and trust. It was evident that different areas of the Programme had very different relationships with the supplier (Chapter Six, Section 6.3.4 (Competence and Capacity). Ultimately, the management of the contract and the associated relationships revolve around human behaviour and the attitudes of the individuals involved, which helps to build greater commitment from suppliers. As with any relationship, open lines of communication are critical to the resolution of problems and this relies on trust.

At the core of the contract is the contractor/supplier relationship, which potentially impedes the building of relationships and, therefore, the associated communication and trust. Ultimately and inevitably, the purpose of a private sector company is to deliver a return to its shareholders. Obviously, this cannot be achieved by delivering a bad service so there is an onus on the supplier to meet the requirements of the contract and, potentially, to obtain further business as a result (Chapter Six, Section 6.3.4 (Competence and Capacity). In spite of all the attempts to create a different relationship, the main focus for the supplier is revenue, suggesting that any control that the contractor has over supplier performance is based on finance. If action or delivery is required, then financial levers should be used. In fact, given the lack of financial hardship to ATLAS over delivery delays to date, this may be the only way to ensure the delivery of Release 2 (Chapter Six, Section 6.3.4 (Competence and Capacity). However, the DII Group has chosen not to use these levers, partly due to the effect that it might have on the working relationship but also due to the anticipated perceptions of the resource providers (Chapter Six, Section 6.3.4 (Value for Money).

**Conclusion 6**: There is an evident disconnect between the need to build relationships, communication and trust between contractor and supplier and the commercial realities of a contractual situation.

**Policy Recommendation 6:** There needs to be further academic research into the issues of contract management and contractual relationships, specifically with regard to IT project management in the public sector.

**Conclusion 7**: It takes time to build trust in a contractual situation but it is critical as it provides the basis for sound working relationships and communication. However, in this instance, there was an apparent lack of awareness of the need to manage the contract once it had been awarded, other than in ensuring delivery of requirements, and a lack of competence to do so.

**Policy Recommendation 7:** The MoD should allocate appropriate skills and resources to ensure more proactive management of contracts and improved interaction with suppliers.

**Conclusion 8:** With the success of this project dependent on the delivery of Release 2, it seems that the MoD will have to exert further pressure on ATLAS to ensure its delivery. However, it is prevented from doing so by the effect that it might have on the relationship and also the message that it would send to the resource providers.

**Policy Recommendation 8:** The MoD should make better use of financial incentives and disincentives to improve the performance of its suppliers, whilst tackling the perceived cultural and organisational constraints to doing so.

### 7.4. Limitations, Reflections and Future Research

This study has been limited by a number of factors. Firstly, some key report material providing primary data about government IT and produced by organisations like Kable and Standish was not accessible due to its cost and lack of availability for loan. Secondly, the size of the DII Programme as a case study made it a major task to investigate as a solo researcher. Its complexity means that it has been impossible to gain a full picture. Therefore, it should be noted that these findings are based on a relatively limited evidence source, given the size of the project team and the extent of the user base. Despite this, a wealth of data was collected, which had to be carefully edited for the purposes of presentation in this thesis. Every effort has been made to ensure the validity and reliability of the data presented. Thirdly, the DII Group and ATLAS were extremely helpful in giving their co-operation to this project. However, this meant that interviews were arranged via a DII Group sponsor who selected the interviewees. This may have impacted on the objectivity of the views expressed here. Associated with this and discussed in full in Chapter Three, dependence on a single case can be problematic. The original intent was to cross-compare with another government IT mega-project, but this would have been unfeasible in terms of time and resources. Therefore, these results are unique to the DII Programme. However, it has been possible to generate some theory out of these findings. Finally, some of the data collected proved to be sensitive and likely to attract commercial or management-in-confidence caveats. Therefore, it has either been presented in a very general way or excluded from the discussion.

Many of these limitations relate to the research process. By the end of the study, with knowledge gained and increased insight, it is likely that the primary research would have been approached in a different way. For example, different questions might have been posed in order to elicit more in-depth responses. Despite this, the research process has proved rigorous, providing a wealth of reliable data. However, issues regarding truth and potential bias were confronted. The fact that it is a 'live' project makes many of the issues very sensitive for interviewees and the reporting of them difficult. Linked to the issues surrounding the 'conspiracy of optimism' and the tendency not to report bad news, there were occasions when it was uncertain that the truth of the DII Programme was being presented. However, this is inevitable in all research projects of this type. Effort was made to overcome this by cross-referencing interviews and relating them to factual information in the public domain. In addition, there were certain key members of the Programme with whom a level of trust was achieved and, therefore, more open discussions could be had. The final issue relating to the research was the problem of causation. How could it be proved that the application of CSFs was causing improved management and performance? It may be that there is a third factor that is controlling them both or it could be simply correlation without causality. Overall, the cause and effect relationship appeared to be disturbed by the Organisational Setting.

In terms of further research, as discussed above, this thesis has focused on one case study. As highlighted in the conclusions, there is potential for further study into the nature of government and its impact on IT project management, along with contract management and contractual relationships. It would also be worthwhile to carry out further case study work on other government IT mega-projects in order to see if the same conclusion can be drawn regarding the impact of context on the use of CSFs.

## 7.5. Contribution to Knowledge

As discussed in Chapter One, this research adds to the body of work that attempts to close the gap between what is known about project failure and the application of this knowledge. It also contributes to the relatively limited study of public sector IT project management, identified as a very different and difficult context, which makes the provision of such generic solutions as CSFs problematic. The study has attempted to fill a gap by assessing whether CSFs, particularly those generated by government and related bodies, have been noted and adopted by public sector IT project managers and, as a result, have improved the performance of the projects in question: not only do the lessons have to be identified, they also have to be learned, which means understanding and applying them. In addition, it has compared the factors identified by studies on general project management with those identified by studies on IT project management, which are generally treated as interchangeable, whilst also comparing the theoretical CSFs identified in the scholarly literature with those identified in government reports. In doing so, this thesis contributes to knowledge on four fronts: comparing factors identified by studies on general project management with those identified by studies on IT project management; comparing of theoretical CSFs identified in the scholarly literature with those identified in government reports; assessing whether this theory is being applied in practice to public sector project management and to what effect; and, finally, examining the value of CSFs to public sector IT projects.

# APPENDIX 1:
# TEMPLATE FOR CRITICAL ANALYSIS OF A TEXT

**Text:**

**1. What review question am I asking of this text?**
(e.g. What is my research question? Why select this text? Does the Critical Analysis of this text fit into my investigation with a wider focus? What is my constructive purpose in undertaking a Critical Analysis of this text?)

**2. What type of literature is this?**
(e.g. Theoretical, research, practice, policy? Are there links with other types of literature?)

**3. What sort of intellectual project for study is being undertaken?**

a) How clear is it which project the authors are undertaking? (e.g. Knowledge-for-understanding, knowledge-for-critical evaluation, knowledge-for-action, instrumentalism, reflexive action?)

b) How is the project reflected in the authors' mode of working? (e.g. A social science or a practical orientation? Choice of methodology and methods? An interest in understanding or in improving practice?)

c) What value stance is adopted towards the practice or policy investigated? (e.g. Relatively impartial, critical, positive, unclear? What assumptions are made about the possibility of improvement? Whose practice or policy is the focus of interest?)

d) How does the sort of project being undertaken affect the research questions addressed? (e.g. Investigating what happens? What is wrong? How well does a particular policy or intervention work in practice?)

e) How does the sort of project being undertaken affect the place of theory? (e.g. Is the investigation informed by theory? Generating theory? Atheoretical? Developing social science theory or a practical theory?)

f) How does the authors' target audience affect the reporting of research? (e.g. Do they assume academic knowledge of methods? Criticise policy? Offer recommendations for action?)

**4. What is being claimed?**

a) What are the main kinds of knowledge claim that the authors are making? (e.g. Theoretical knowledge, research knowledge, practice knowledge?)

b) What is the content of the main claims to knowledge and of the overall argument? (e.g. What, in a sentence, is being argued? What are the three to five most significant claims that encompass much of the detail? Are there key prescriptions for improving policy or practice?)

| |
|---|
| |

c) How clear are the authors' claims and overall argument? (e.g. Stated in an abstract, introduction or conclusion? Unclear?)

| |
|---|
| |

d) With what degree of certainty do the authors make their claims? (e.g. Do they indicate tentativeness? Qualify their claims by acknowledging limitations of their evidence? Acknowledge others' counter-evidence? Acknowledge that the situation may have changed since data collection?)

| |
|---|
| |

e) How generalized are the authors' claims – to what range of phenomena are they claimed to apply? (e.g. The specific context from which the claims were derived? Other similar contexts? A national system? A culture? Universal? Implicit? Unspecified?)

| |
|---|
| |

f) How consistent are the authors' claims with each other? (e.g. Do all claims fit together in supporting an argument? Do any claims contradict each other?)

| |
|---|
| |

**5. To what extent is there backing for claims?**

a) How transparent is it what, if any, sources are used to back the claims? (e.g. Is there any statement of the basis for assertions? Are sources unspecified?)

| |
|---|
| |

b) What, if any, range of sources is used to back the claims? (e.g. First hand experience? The authors' own practice knowledge or research? Literature about others' practice knowledge or research? Literature about reviews of practice knowledge or research? Literature about others' polemic?)

| |
|---|
| |

c) If claims are at least partly based on the authors' own research, how robust is the evidence? (e.g. Is the range of sources adequate? Are there methodological limitations or flaws in the methods employed? Do they include cross-checking or 'triangulation' of accounts? What is the sample size and is it large enough to support the claims being made? Is there an adequately detailed account of data collection and analysis? Is a summary given of all data reported?)

| |
|---|
| |

d) Are sources of backing for claims consistent with degree of certainty and the degree of generalisation? (e.g. Is there sufficient evidence to support claims made with a high degree of certainty? Is there sufficient evidence from other contexts to support claims entailing extensive generalization?)

| |
|---|
| |

**6. How adequate is any theoretical orientation to back claims?**

a) How explicit are the authors about any theoretical orientation or conceptual framework? (e.g. Is there a conceptual framework guiding data collection? Is a conceptual framework selected after data collection to guide analysis? Is there a largely implicit theoretical orientation?)

| |
|---|
| |

b) What assumptions does any explicit or implicit theoretical orientation make that may affect the authors' claims? (e.g. Does a perspective focus attention on some aspects and under-emphasise others? If more than one perspective is used, how coherently do the different perspectives relate to each other?)

c) What are the key concepts underpinning any explicit or implicit theoretical orientation? (e.g. Are they listed? Are they stipulatively defined? Are concepts mutually compatible? Is use of concepts consistent? Is the use of concepts congruent with others' use of the same concepts?)

**7. To what extent does any value stance adopted affect claims?**

a) How explicit are the authors about any value stance connected with the phenomena? (e.g. A relatively impartial, critical, or positive stance? Is this stance informed by a particular ideology? Is it adopted before or after data collection?)

b) How may any explicit or implicit value stance adopted by the authors affect their claims? (e.g. Have they pre-judged the phenomena discussed? Are they biased? Is it legitimate for the authors to adopt their particular value stance? Have they over-emphasised some aspects of the phenomenon while under-emphasising others?)

**8. To what extent are claims supported or challenged by others' work?**

a) Do the authors relate their claims to others' work? (e.g. Do the authors refer to others' published evidence, theoretical orientations or value stances to support their claims? Do they acknowledge others' counter-evidence?)

b) If the authors use evidence from others' work to support their claims, how robust is it? (e.g. As for 5c)

c) Is there any evidence from others' work that challenges the authors' claims, and if so, how robust is it? (e.g. Is there relevant research or practice literature? Check any as for 5c)

**9. To what extent are claims consistent with my experience?**

**10. What is my summary evaluation of the text in relation to my review question or issue?**

a) How convincing are the authors' claims, and why?

b) How, if at all, could the authors have provided stronger backing for their claims?

**Source: Wallace, M. and Wray, A., *Critical Reading and Writing for Postgraduates*, (London, Sage, 2006).**

# APPENDIX 2:
# A NEW FRAMEWORK FOR DETERMINING CRITICAL SUCCESS/FAILURE FACTORS IN PROJECTS:
## Expanded Version of CSFs

| | | |
|---|---|---|
| Belassi, W. and Tukel, O.I., 'A New Framework for Determining Critical Success/Failure Factors in Projects', *International Journal of Project Management*, 1996, Vol. 14, No.3, pages 141-152. | Factors relating to the project manager:<br>Ability to delegate authority, trade-off and coordinate<br>Perception of role and responsibilities<br>Competence and commitment<br>Project team members<br>Technical background<br>Communication skills<br>Trouble-shooting<br>Commitment<br>Factors related to the project<br>Size and value<br>Uniqueness of project activities<br>Density of a project<br>Lifecycle<br>Urgency<br>Factors related to the organisation<br>Top management support<br>Project organisational structure<br>Functional managers' support<br>Project champion<br>Client consultation and acceptance<br>Project manager's performance on the job<br>Effective planning and scheduling<br>Effective coordination and communication<br>Effective use of managerial skills<br>Effective control and monitoring<br>Effective use of technology<br>Project preliminary estimates<br>Availability of resources<br>Human<br>Financial<br>Raw materials<br>Facilities<br>Factors related to the external environment<br>Political environment<br>Economical environment<br>Social environment<br>Technological environment<br>Nature<br>Client<br>Competition<br>Sub-contractors | Links to Morris and Hough, 1987 and Pinto and Slevin, 1989.<br>Based on a literature review that identified seven theoretical studies and nine empirical studies.<br>Success or failure is due to a combination of many factors at different stages of the project lifecycle.<br>Moves to a CSF framework.<br>CSFs vary depending on the industry under scrutiny but top management support is vital whichever sector. |

# APPENDIX 3:
# INTERVIEW AGENDA

**Research Interest**

To examine the impact of Critical Success Factors (CSFs) on the MoD's DII programme.

(Have lessons learned from previous complex IT projects been used to improve the performance of the DII programme?)

**Research Objectives**

To identify CSFs identified in academic studies and reports on public sector IT project failure;

To define 'success' in terms of the DII programme;

To explore the CSFs that have contributed to the ongoing success or failure of the programme;

To assess the effectiveness of CSFs as a means of delivering IT project success.

**Approach**

The research is divided into two stages.

Stage One examines the academic theory and government-identified CSFs pertaining to IT projects.

Stage Two is a case study of the progress of the DII programme and its perceived success.  This is assessed against the model derived at Stage Two.

**Purpose of Interview**

The purpose of this interview is to gather:

1. Your views on whether the lessons learned from the success and failure of IT projects in government has informed the DII programme.

2. Your definition of 'success' in terms of the outcome of the DII programme.

3. Your assessment of the organisational factors relating to the success or failure of the DII programme (programme type, strategic environment and others).

**Confidentiality and Ethics**

You have kindly given your voluntary informed consent to partake in this research. If at any point you wish to withdraw from the investigation, all record of contact with you will be deleted. Everything that will be said and discussed during this interview will be treated in confidence and will be used ONLY for the purpose of this research. The results of the research are shared with the examining panel at Cranfield University, who are themselves bound by a confidentiality agreement. If you require, your name will not be disclosed to the examining panel or stated in the thesis in relation to the information gathered during this interview. You will be given access to the final write-up of the analysis.

**Interview Structure: Overview**

The following is an indication of the areas that I would like to explore the following:

1. Taking a general perspective, your experience of the issues and problems encountered in implementing a complex major IT programme.

2. Your perceptions of what is meant by ‘success’ in the context of IT projects/programmes in government and in terms of the DII programme in particular.

3. Your view of the three factors that have contributed to the success of the DII programme and the three factors most likely to lead to failure.

4. Your identification of DII’s key stakeholders.

5. Your evaluation of the extent to which CSFs have driven the right behaviours amongst the stakeholders.

# APPENDIX 4:
# INFORMATION INFRASTRUCTURE PROJECTS

| | The Implementation of the National Probation Service Information Systems Strategy (Home Office), NAO 2001 | New IT Systems for Magistrates' Courts: the Libra Project, NAO 2003 | Delivering Digital Tactical Communications through the Bowman CIP Programme (Ministry of Defence), NAO 2006 | The National Programme for IT in the NHS (Department of Health), NAO 2006 | Information Technology: DoD Needs to Ensure that Navy Marine Corps Intranet Program is Meeting Goals and Satisfying Customers, GAO 2006 |
|---|---|---|---|---|---|
| **Background** | The UK Probation Service supports the work of the courts and other justice agencies by providing reports on offenders, running bail hostels and supervising offenders. There were 54 autonomous regional probation services until April 2001 when the service was reorganized into 42 local areas to match police regions. Each had its own IT strategy and local, stand-alone IT systems. | Administered by 42 Magistrates' Courts Committees, the Magistrates' Courts were using different systems and different working practices, preventing the sharing of information and the use of common databases. The Government intended to integrate the management of the Magistrates' Courts with the other criminal, civil and family courts in England and Wales to produce a single courts' organisation. The target date was April 2005 and Libra, the new IT infrastructure, was considered essential to this. | The Army urgently needed to replace the Clansman battlefield radios with Bowman to provide secure, reliable voice communications. Bowman delivered the hardware and the Combat Infrastructure Project (CIP) additional hardware and information handling capacity, integrating these functions into armoured vehicles. Both were to operate on a military 'tactical internet' with a portable infrastructure. | Disparate IT systems in the NHS prevented communication and sharing of information. The National Programme for IT is creating a national infrastructure to make medical records and X-rays available, to enable transmission of prescriptions and electronic appointment booking. It is a combination of national projects and local projects run by four Local Service Providers. | Independent networks were to be replaced with a single network for about 550 Navy and Marine Corps sites in the United States and Japan. These ranged from small offices to large shipyards and air depots. The contractor would supply and own the desktop hardware and software and provide services, varying in performance depending on whether they were rated standard, high-end or mission-critical. |
| **Project Aim** | To provide a national information infrastructure and a Case Recording and Management System (CRAMS) across all of the probation services in England and Wales. | To provide a national IT infrastructure with links to other criminal justice agencies and a standard national application to support court work. | To improve military communications; to enable faster planning; and to allow communication across the armed forces. | To reform information use; to improve services and the quality of care; and to provide direction for IT development and the use of advanced IT. | To provide information superiority and to foster innovative ways of operating through an interoperable and shared network. |
| **Chronology** | | | | | |
| **1988** | | | Project initiated with an implementation date of December 1995. | | |

<table>
<tr><td>1989</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>1990</td><td>.</td><td rowspan="7">Two attempts were made to procure an infrastructure but failed due to poor project management, problems in working with a disparate set of suppliers and the extending timescales. In 1996, the Department began procurement of a PFI contract for Libra. 19 expressions of interest were received.</td><td></td><td></td><td></td></tr>
<tr><td>1991</td><td></td><td></td><td></td><td></td></tr>
<tr><td>1992</td><td></td><td></td><td></td><td></td></tr>
<tr><td>1993</td><td>The project was initiated.</td><td></td><td></td><td></td></tr>
<tr><td>1994</td><td>An agreement was signed with Bull Information Systems to install the infrastructure, CRAMS and provide a managed service by March 1999.</td><td></td><td></td><td></td></tr>
<tr><td>1995</td><td></td><td rowspan="5">The MoD pursued a non-competitive solution with the Archer consortium (BAE Systems, Racal and ITT) with an implementation date that moved from March 2002 to March 2004.</td><td></td><td></td></tr>
<tr><td>1996</td><td></td><td></td><td></td></tr>
<tr><td>1997</td><td></td><td>Two detailed proposals were received from ICL and EDS.</td><td></td><td></td></tr>
<tr><td>1998</td><td></td><td>EDS did not bid. ICL increased their bid and signed a PFI contract for £184 million over 10.5 years.</td><td></td><td></td></tr>
<tr><td>1999</td><td>Work on CRAMS was halted in favour of a successor called Copernicus.</td><td>Again, ICL renegotiated the contract as its financial forecast for the project showed a deficit.</td><td></td><td></td></tr>
<tr><td>2000</td><td>By March, 36 of the 54 services had received a complete CRAMS rollout, a year late. Ten services refused to implement it and only 16 were using it in earnest. By the end of the year, 47 of the 54 services were connected to the infrastructure.</td><td>A revised contract was signed</td><td>The Archer Consortium contract was terminated and the MoD launched a new competition, which was conducted at speed.</td><td></td><td>A five-year contract worth $9.3 billion was awarded to EDS. The acquisition approach and implementation plan were weak and introduced unnecessary risk. There was no plan in place to deal with the requirements or the impact on staff.</td></tr>
<tr><td>2001</td><td>The agreement with Bull expired.</td><td>The contract was renegotiated as a new ICL management team said it was undeliverable. ICL failed to deliver the core application to the first site and was in breach of contract. The Court Service took over responsibility for the project.</td><td>The MoD appointed General Dynamics (GD) for a single Bowman CIP programme costing £2.4 billion, having already spent five years, £397 million and written off £51 million.</td><td></td><td></td></tr>
</table>

| | | | | | |
|---|---|---|---|---|---|
| **2002** | | The Department failed to reach agreement with ICL to continue the contract but signed a variation. ICL would deliver only the national IT infrastructure and office automation. | MoD added further requirements to Bowman due to Networked Enabled Capability (NEC). A Training Needs Analysis showed that 50 more computer-equipped classrooms were required. | The Programme was launched and the first Director General for NHS IT appointed with a unit set up to procure and deliver the IT systems. | Implementation issues and transition costs for shipyards and air depots were making it difficult for them to plan and budget. 54% of users were satisfied with NMCI. |
| **2003** | | The Department signed a contract with STL to provide the core software application.<br>A systems integrator was also appointed to roll out and run the application. | Bodies of Suppliers and Departmental officials were established to link up Bowman CIP with complementary projects. | Contracts were negotiated and let. | Having relied on a dated inventory of legacy applications, there was a substantial under-estimate, causing a major delay. |
| **2004** | | | Bowman's In-Service Date was achieved with 27 provisos. Ten of the CIP requirements still had significant shortfalls. The programme was over-ambitious and needed to be revised. | A number of systems were delivered on time. A set of five software releases replaced the National Data Spine releases with revised delivery dates that were subsequently met. | The rate of improvement in end user satisfaction dropped off. |
| **2005** | | | CIP was integrated with Bowman used in Iraq. MoD and GD agree a recast programme with an increased cost and timescale. | The NHS IT unit became an agency of the Department of Health. The remaining parts of the National Data Spine were ten months late but met the revised timescales. Choose and Book was a year behind schedule with take up slower than expected. The March 2006 target for N3 was achieved three months early. Release 5 was deployed but part of BT's payment was withheld due to defects. | The percentage of satisfied end users rose to about 80% in September 2005. |

| | | | | | |
|---|---|---|---|---|---|
| **2006** | | | The MoD established a programme office to coordinate the delivery of the networks and programmes supporting NEC, incorporating Bowman CIP. CIP was declared In-Service from December 2005 with 32 provisos. The revised programme was approved. Funding was raised by £121 million and the timescale extended by two years to mid 2007. | Expenditure was lower than planned due to slower delivery of some systems and successful operation of contracts. Use of Choose and Book was growing at around 40 per cent a month. 167,946 staff were registered for NHSmail with 80,183 active users. 1,034 GP sites were live with 296 using the Prescription Service. Of the 148 live community, 11 pharmacies were using the system. | The Navy reported that about 303,000 seats were operational at about 550 sites. $3.7bn had been spent. The percentage of end users that the Navy considers to be satisfied was below the Navy-wide target of 85%. |
| **2007** | | | | The number of Spine releases was limited to two a year. | |
| **2008** | | | Bowman was rolled out across the Armed Forces until approximately 2026. | | |
| **2009** | | | Two contracts worth £231 million were awarded to GD to upgrade Bowman. | | |
| **CSFs** | | | | | |
| **Business Change** | The Home Office did not ensure that the development of CRAMS kept pace with changing business needs. There was no overall strategy for communicating with stakeholders leading to increased resistance to its implementation. | The Project did not develop a best business process model before developing the IT solution. Business processes should be redesigned and aligned before standardised IT systems are implemented across a number of disparate bodies. | | | |
| **Leadership and Responsibility** | The Central Committee running the IT strategy had no means of promoting acceptance and ownership by local services, who decided themselves whether or not to use the system. | The Department expected the Committees to adapt their processes to the system but they were determined to operate independently. It did not have the authority to impose business change and did not want to attempt further change due to the amalgamation. | The Assistant Chief of the General Staff had oversight of the project and was assumed to be the SRO. However, he did not have time to undertake this role. | There was strong ministerial and senior management support and commitment along with continuity of leadership. | |

| | | | | | |
|---|---|---|---|---|---|
| **Leadership and Responsibility cont.** | There was no project assurance function within the management structure and a lack of continuity in the leadership of the programme management team, which was insufficiently resourced. There were seven programme directors during the project with only two having had experience of major IT projects. | It did not use its reserve powers to force the Committees to take specified goods and services. There were many changes at a senior level within the project management team. | The Directorate did not have the direct budgetary responsibility or the resources to act as a programme office.<br>The managerial and budgetary structures needed to be overseen by a fully empowered SRO at the right level and with sufficient time. | National leadership of engagement with NHS organisations and staff in implementing and making best use of the systems changed a number of times and resource constraints limited the scale of early engagement efforts. | |
| **Project Management** | Formal project management methods were not embedded and fell into disuse. The requirement for CRAMS to produce reports was not adequately specified nor was a subsequent requirement from the Home Office for standard reports using specialist software. Poor specification of expected outputs, weaknesses in service monitoring and inadequate control by the Home Office contributed to the higher than expected cost of the programme. In terms of day-to-day project management, responsibilities were not always clear, and communication between the Home Office and the services was not always effective. | The Department consulted with a large number of staff from the Committees to define the requirements but a single view was difficult to achieve. Requirements were clarified or changed during the course of the project. | The aggressive timescale for such a hi-tech programme meant project managers had to cope with complexity and change as well as managing the time and resources. The trebling of the required training facilities added £24 million and £204 million in total operating costs over 25 years. Thirty high level Key User Requirements were defined supported by numerous detailed requirements, which should have been tracked and managed. Lack of attention to user needs led to around 300 changes and 2000 concessions. | Best practice structures were in place but changes in scope after signing the contract left some suppliers struggling to meet delivery dates and requests from users for more extensive pilot tests. This resulted in the delivery timetable being reviewed.<br>Several additional tasks were delivered that had not been in the original requirement. There needed to be a robust engineering-based and achievable timetable for delivery. | Customer satisfaction improvement efforts were not guided by effective planning. |

| | | | | | |
|---|---|---|---|---|---|
| **Risk Management** | The Home Office underestimated the technical risks and did not prevent the roll out of poor quality software. Consultants reported that the user interface contained defects that compromised the ability of users to perform their work and users found CRAMS difficult to operate. This was evident from an early stage, along with other technical problems and faults not resolved by initial testing. Around 27 probation services used alternative IT systems to record or manage their cases. This resulted in case records being held in a number of different formats, creating problems for the transfer of cases. | The technical assessment of the bid was done in-house. The Department should have made further inquiries into the technical competence of ICL and should have verified the financial model on which the tender was based. ICL based its bid on the MASS software but within three months of signing the contract had decided to proceed with its own software development instead. Lack of bids should be taken as a warning sign. | Costs, timescales and technical challenges were underestimated in the business case, resulting in the need for extra funding. The radios were delivered rapidly but extensive trial and development of CIP caused a delay to delivery. The size of the new radio had been considered a problem since the 1990s but its development continued. The challenge of installing Bowman in the land vehicle fleet was underestimated, including the variation within the 20,000 vehicles. This caused technical challenges, taking time and resources. Risks were not well tracked and mitigated. The SRO did not share a risk register with the supplier. | The scope, vision, scale and complexity of the Programme was wider and more extensive than any ongoing or planned healthcare IT development project in the world with associated risks. | |
| **Modular and Incremental Development** | | | | To reduce risk, the Programme used an incremental approach. | |
| **Benefit Realisation** | Forty-two of the services thought that the system had delivered improved communications but other benefits were not actively monitored, including business change. This made it impossible to quantify the business benefits. Costs and achievements were not monitored against projections in the original business case. | | The programme was approved on the basis of significant benefits. However, there was only limited, formal tracking. Strong benefits realisation and tracking would have helped managers to make better decisions when trading benefits against time and cost. | Benefits were costed where possible, but the aim was to improve services not reduce costs. The Treasury accepted this. Considerable efforts were made to specify the high level benefits. | The Navy defined strategic goals for its NMCI programme and developed a plan for measuring and reporting on the achievement of these goals. However, this plan was not implemented as they chose instead to focus on defining and measuring contractually specified SLAs. |

| | | | | | |
|---|---|---|---|---|---|
| **Procurement and Supplier Relations** | The performance of Bull was not managed effectively. Monitoring of service levels against the enabling agreement was sporadic; and performance against the service level agreement, not agreed until 1998, was not monitored systematically. Changes in the management team made it difficult for Bull to know which manager to contact about contractual issues. | With only one formal bidder, there was a lack of competitive tension. ICL was chosen despite the problems that it was having with the Benefits Payment Card project. The procurement took over two years, rather than 14 months, partly due to the time needed to get full involvement and agreement of the users. In 2001, ICL appointed a senior management team who concluded that the requirements were insufficiently detailed, wasting a year of work by the Magistrates' Courts Committee and Department staff. | Such a complex programme needed to be procured in a flexible, responsive way and to have systems to measure the customer/supplier relationship, including shared and maintained listings of assumptions and understandings. There was over-optimism about the supplier's ability to mature the design while developing and integrating the new battlefield system. When re-competed, the requirements were immature and GD did not have enough time to fully understand the Army's use of the system. | Contracts were placed very quickly, after securing large reductions in prices. Financial and delivery risk was transferred to the suppliers, who are not paid until services are delivered and working, giving strong incentives to deliver on time, and mechanisms such as tight change control procedures are in place. When problems have arisen, action has been taken to address deficiencies in suppliers' performance. | While EDS had largely met many of the service level agreements, it had not met others consistently. |
| **Cross-Cutting Initiatives** | | Higher level programme management was required to understand the complex integration challenges that span multiple projects | There were limited arrangements to manage Bowman CIP inter-dependencies with other projects and programmes. | The system integration was highly complex and took longer than the suppliers initially planned. A National Integration Centre was established to de-risk this process and to accredit compliant systems. The heterogeneous nature of the NHS has resulted in suppliers having to tailor their solutions to each organisation, making roll out much harder. | |
| **People and Skills** | There were frequent changes of staff in the programme management team. | A user board was established to represent the many organisations involved. | End user requirements and expectations could have been managed better. Technology implementation needed to be managed alongside training and support. | Engagement with users did not start until the procurement reached a sufficient stage of maturity. Better communication might have eased some of the significant concerns. | NMCI Customer Groups' satisfaction levels varied, but overall customer satisfaction was low. |

| | | | | | |
|---|---|---|---|---|---|
| **People and Skills cont.** | Technical experts and specialists within the team tended to be consultants working on short-term assignments. | The Department appointed legal, financial and contract advisers but no IT advisers; rather they employed external specialists as part of the team. | Training costs were under-estimated with no provision for more advanced and specific training. | Training was urgently required as the lack of IT skills was considered a risk to implementation. | |
| **Learning Lessons** | National Probation Service needs to pay full regard to recent recommendations made by the Committee of Public Accounts and the Cabinet Office relating to the management of IT projects. | | | The programme needed to evaluate the experience of other organisations with similar IT projects to help identify and quantify efficiency improvements. Many of the key lessons of prior public IT failures were adopted. | |

# APPENDIX 5:
# INITIATIVES TO IMPROVE DEFENCE PROCUREMENT AND PROJECT MANAGEMENT

| Year | Report/Initiative | Headlines |
|---|---|---|
| 1998 | Smart Acquisition (SA)[1]<br><br>First launched as the Smart Procurement Initiative (SPI) in 1997 with a mission to deliver defence equipment 'faster, cheaper, better'. | SA had seven principles:<br><br>1. A whole-life approach, typified by applying Through Life Costing techniques (Complexity Management) ;<br>2. Integrated Project Teams (IPTs) with clearly identified customers (Competence and Capacity) ;<br>3. A better, more open relationship with industry (Clarity and Perception);<br>4. More investment during early project phases (Affordability);<br>5. Effective trade-offs between system performance, through-life costs and time (Constraints Certainty);<br>6. New procurement approaches, including incremental acquisition (Complexity Management); and<br>7. A streamlined process for project approvals (Affordability). |
| 2005 | NAO: Driving the Successful Delivery of Major Defence Projects: Effective Project Control.[2]<br><br>Following 20 years of critical reports, the NAO itself analysed ways of making defence procurement faster, cheaper and better, setting out best practice for project controls and conditions to provide the right environment for project success. | • Establishing and sustaining the right cultural environment - open, trusting and honest relations between contractor and supplier; an open corporate environment (Clarity and Perception).<br>• Creating clear structures and boundaries – effective organisational structures, responsibilities and lines of authority (Clarity and Perception); project management, commercial, financial and technical skills available (Competence and Capacity); thorough review and understanding of project delivery plan, objectives, assumptions, risks and opportunities (Constraints Certainty); set performance, time and cost boundaries when all risks are understood/formal investment approval gates (Constraints Certainty); ability to make trade-offs/change management mechanism (Constraints Certainty).<br>• Measuring progress and making decisions focused on successful project delivery (Constraints Certainty): analysis of credible, timely and relevant metrics monitoring progress against the performance, time and cost baseline (Constraints Certainty); arrangements for transparency and accuracy (Clarity and Perception); contract as key component of project control (Constraints Certainty; Stakeholder Management); project-to-project peer reviews and Learning From Experience (Competence and Capacity).<br>• Reporting to enable strategic decisions - consistent reporting system for all projects feeding into analysis for senior management (Clarity and Perception); formalised, regular system of senior management review to give assurance of delivery (Benefits Certainty); independent, non-advocate reviews (Benefits Certainty); ongoing measurement of supplier performance to learn lessons (Competence and Capacity). |
| 2005 | MoD: Defence Industrial Strategy[3]<br><br>This confirmed the use of Smart Acquisition but put the emphasis on through life considerations. | Set specific initiatives to achieve:<br><br>• The primacy of through-life considerations (Complexity Management);<br>• The coherence of defence spread across research, development, procurement and support (Consistency and Coherence);<br>• The successful management of acquisition. |

| | | |
|---|---|---|
| | | (Competence and Capacity)<br><br>It sought industry's commitment to:<br><br>• plan more effectively and jointly for the long term (Complexity Management);<br>• embrace the vision of Through Life Capability Management (TLCM) (Complexity Management);<br>• meet requirements cost-effectively (Value for Money);<br>• invest in growing and maintaining a high-quality systems engineering capability within the UK (Competence and Capacity);<br>• promote greater interaction and collaboration between MoD, prime contractors, Small and Medium Enterprises (SMEs) and the universities to stimulate innovation in science, technology and engineering (Competence and Capacity);<br>• encourage trust, openness, transparency and communication with MoD at all levels (Clarity and Perception);<br>• embrace open systems architecture principles and incremental acquisition approaches throughout the supply chain (Complexity Management; Scalability and Flexibility);<br>• work jointly to foster better understanding of each others' objectives and business processes, including a greater commitment to joint education, staff development and interchange opportunities (Clarity and Perception; Competence and Capacity). |
| 2006 | Enabling Acquisition Change (the McKane Report)[4]<br><br>Building on previous initiatives, this report was commissioned to advise on changes to structures, process, culture and behaviours in order to facilitate good Through Life Capability Management (TLCM). | Culture, Behaviour, Skills and Training<br><br>• Improved skills are key to improving the MoD's TLCM performance (Competence and Capacity);<br>• Ensure that the skills agenda is given prominence in the programme of implementing the recommended changes (Competence and Capacity).<br><br>Planning Process Issues<br><br>• A 10 year plan for all defence costs and assumptions detailing the costs of new equipment, equipment support and non-equipment investment plus the costs of other DLoDs over the first four years and in aggregate over years 5-10 (Affordability);<br>• Building on the Cost of Defence analysis of the defence budget, a capability-based view of defence plans should be developed, as a complementary tool to assist strategic planning by the Defence Management Board (Complexity Management);<br>• The cost of supporting in-service equipment over the Short Term Plan (STP) period should be programmed by the Front Line Commands. The Equipment Capability Customer (ECC) should programme support costs for all new equipment and in-service equipment beyond the STP years and any other net additional cost, such as infrastructure, associated with new capability above a materiality threshold (Affordability);<br>• The Department should maintain a clear focus on committing sufficient resources to the early stages of new projects (Affordability);<br>• The apparent imbalance between Capital Departmental Expenditure Limits (DEL) and Resource DEL should be addressed (Affordability);<br>• Directors of Equipment Capability (DECs) and Integrated Project Team (IPT) Leaders should be able to exchange Capital DEL for Resource DEL if required to adequately de-risk a project (Affordability);<br>• The MoD should develop options to eliminate negative |

| | | |
|---|---|---|
| | | contingencies from the Equipment Plan; ensure, in the short term, that the Equipment Plan overall matches approval levels, by retaining a centrally held contingency, and continue to explore other options; introduce an uncommitted element into the Equipment Plan in order to respond to the increasing premium placed on agility and room for manoeuvre (Affordability).<br><br>Customer Roles and Responsibilities and the Role of the Senior Responsible Owner<br><br>• The different roles and responsibilities of the various stakeholders, who together perform the MoD's role as a customer of industry, be clarified by the adoption of new nomenclature: 'customer' for the MoD as a whole; 'sponsor' for Deputy Chief of the Defence Staff (DCDS) Equipment Capability (EC)'s organisation; and 'user' for the Single Service Chiefs of Staff and the Front Line Commands ('Joint User' for Vice Chief of Defence Staff (VCDS) and Permanent Joint Headquarters (PJHQ) (Stakeholder Management).<br>• The MoD's instructions to be amended to reflect these changes and to reinforce the IPTL as the commercial interface between the MoD and industry (Stakeholder Management).<br>• Renewed efforts should be made to: reinvigorate and standardise the operation of the Capability Working Groups; review the effectiveness and application of Customer Supplier Agreements, Through Life Management Plans and Through Life Maturity Models (Complexity Management).<br>• Every major new capability in the MoD's forward plans should be assigned a 2-star Senior Responsible Officer (SRO) residing in the ECC (Clarity and Perception).<br>• Consideration should be given to establishing Board level championship of the most significant new capabilities (Clarity and Perception).<br><br>An Integrated Procurement and Support Organisation<br><br>• The establishment of an integrated procurement and support organisation (Complexity Management);<br>• The new organisation should continue to identify areas where there are prospects of securing better value for money from buying in services from the private sector (Value for Money).<br><br>Approvals and Scrutiny<br><br>• A strong commercial team should be built around the Defence Commercial Director to spread good commercial practice, developing a consistent and effective due diligence function (Competence and Capacity);<br>• Contract documents for all Category A projects should be subject to comprehensive legal due diligence and independent technical advice (Competence and Capacity);<br>• Increase the overall commercial awareness of all those involved in acquisition to form a fundamental element of the training and qualification of procurement practitioners (Competence and Capacity);<br>• Detailed consideration should be given to the benefits of a one-stop shop and consolidated advice to the Investment Appraisal Board (IAB) on business cases |

| | | |
|---|---|---|
| | | (Competence and Capacity);<br>• Responsibility for approval of projects below Category B (i.e. Cat C & D) should be delegated to the Customer and Supplier. Delegations would need to flow from Permanent Under Secretary (PUS) to Top Level Budget holders (TLBs), who would determine the levels at which approvals could take place. Assurance about the quality of decision taking would be obtained through independent post-project review (Benefits Certainty; Affordability);<br>• The Main Gate business cases for Category A projects should contain an independent cost estimate (Affordability);<br>• Main Gate approvals should cover support costs, acknowledging that in some cases this will only cover the early years (Affordability);<br>• Approvals Thresholds should be reviewed in discussion with the Treasury as soon as practicable (Affordability).<br><br>Governance<br><br>• The Defence Management Board (DMB) should be involved in the Initial and Main Gate decision for the highest value and strategic investment decisions, making recommendations to Ministers (Affordability; Benefits Certainty);<br>• The Defence Commercial Director should become a full member of the IAB when appointed, acting as a neutral, commercially aware authority (Competence and Capacity);<br>• The head of the new integrated procurement and support organisation should be 'in attendance' at IAB meetings, rather than acting as a full member. He would provide assurance to the Board on the procurement and support arrangements (Benefits Certainty);<br>• Consideration to be given to appointing the Finance Director to the IAB from 1 April 2007 in place of 2nd PUS (Competence and Capacity);<br>• The Department should seek to appoint one or more Non-Executive Directors to the IAB (Competence and Capacity);<br>• The Defence Commercial Director should also become a member of the National Defence Industries Council allowing formal engagement with Industry at the strategic level (Clarity and Perception);<br>• The Defence Commercial Director should become the owner of the Procurement Process, also taking responsibility for the Commodity Procurement sub-process (Clarity and Perception).<br><br>Incentives and Targets<br><br>• The adoption of a target set which reinforces through life delivery by setting targets for the delivery of a defined level of project performance and its cost-effective sustainment through life (Constraints Certainty);<br>• The development of a set of Acquisition System performance metrics, allowing management to address systemic acquisition issues and focus on TLCM (Constraints Certainty).<br><br>Research and Development<br><br>• The Directors Equipment Capability (DECs) need to specify research goals (Clarity and Perception);<br>• The new integrated acquisition organisation needs to |

| | | |
|---|---|---|
| | | assist the Research Acquisition Organisation to develop a detailed research plan, to agree exploitation mechanisms and to ensure pull through of research (Benefits Certainty);<br>• There is a single research Output which supports technology development (Competence and Capacity);<br>• There should be an explicit link between each DIS sector strategy and the strategy for commissioning and exploiting research (Consistency and Coherence);<br>• Work is undertaken to explore whether sufficient head-room could be created within the Department's R&D spend to make a Defense Advanced Research Projects Agency (DARPA) Model a starter (Competence and Capacity).<br><br>Implementation<br><br>• The appointment of a senior official as programme manager charged with co-ordinating and driving overall implementation. He or she will require Board level SRO support (Competence and Capacity). |
| 2007 | MoD: Defence Technology Strategy[5]<br><br>The Defence Industrial Strategy reviewed the MoD's approach to R&D. The Defence Technology Strategy (DTS) outlines its priorities for R&D, funding, skills, improved processes, opportunities and areas for international research collaboration. | • Sets out science and technology priorities (Competence and Capacity);<br>• Improved delivery process to speed up R&D exploitation (Complexity Management);<br>• Recommends a joint MoD/Industry framework for investment (Clarity and Perception);<br>• Working closely through DSTL (Defence Science and Technology Laboratories) with the universities to support defence science and technology (Competence and Capacity);<br>• A well documented supply chain that stimulates and exploits innovation (Complexity Management);<br>• Investment in science and engineering skills of relevance to defence technologies (Competence and Capacity). |
| 2009 | Review of Acquisition for the Secretary of State for Defence (The Gray Report)[6]<br><br>The then Defence Secretary commissioned Bernard Gray to assess the MoD's approach to reforming its procurement process and to make recommendations for further improvements. | Strategic Defence Review to be held in the first session of a new Parliament<br><br>a) The requirement for such reviews should be enshrined in statute (Consistency and Coherence);<br>b) The output of the reviews should be fully costed and audited (Affordability);<br>c) These costings to include 10 year defence and 20 year equipment budgets (Affordability);<br>d) The results of the review, including costings, to be published to Parliament (Complexity Management);<br>e) The PUS, as Accounting Officer, as a key enabler to a realistic defence budget, to be held accountable for overall costings in the strongest possible terms, ideally legally (Clarity and Perception).<br><br>A rolling 10 year budget should be agreed for the MoD<br><br>a) Budget to be enshrined in law, in line with the French example (Affordability);<br>b) To encompass manpower, estates, equipment and support funding (Affordability).<br><br>An Executive Committee of the Defence Board should be formed to be accountable for an affordable Equipment Programme<br><br>a) The Committee is charged with creating and managing an affordable Equipment Plan (EP) to be submitted to the Defence Board & Ministers (Affordability); |

| | | |
|---|---|---|
| | | b) Membership of this Committee to be the PUS (Chair), Chief of Defence Staff (CDS), Director General (DG) Finance, 2nd PUS, Vice Chief of Defence Staff (VCDS) and no other. No alternates (Clarity and Perception);<br>c) DCDS (Capability) to be responsible for drawing together the plan, in consultation with the DG Strategy and the nominated representative of the DG Finance (Clarity and Perception);<br>d) The Committee to meet at least quarterly, and to submit its EP to the Defence Board as part of the annual planning process (Clarity and Perception);<br>e) The costing of the EP and its affordability against the 10 year defence budget should be the responsibility of the MoD DG Finance (Affordability; Clarity and Perception);<br>f) All known liabilities to be included within the costed plan (Constraints Certainty);<br>g) These costings, and the veracity of the estimates, to be subject to independent audit by a major accounting firm. This audit to be published, with the MoD having to pass a “going concern” test of plan against budget (Competence and Capacity);<br>h) The Defence Board could only accept or reject the EP proposed by the Committee as a whole. No ‘cherry picking’ (Clarity and Perception);<br>i) Ministers, the Services, industry and others would be expected to offer direction or views in the process of the formation of the plan, rather than after its creation, to ensure a balanced and affordable plan was produced (Affordability);<br>j) The PUS, as Accounting Officer, would be accountable to Parliament annually for the affordability and accuracy of the plan. The PUS to become the true “owner” of the equipment plan, enabling the PUS sufficient authority (Affordability).<br><br>Clarify roles and create a real customer-supplier relationship between the capability sponsor (MoD centre) and project delivery (DE&S)<br><br>a) DCDS (Capability) to be responsible for the creation and control of requirements, and required to control the budget of the agreed EP as a single point of MoD contact with Defence Equipment and Support (DE&S) for equipment (Clarity and Perception);<br>b) Clear ownership of each project/requirement to be allocated to a single individual within DCDS (Capability) team, including business case formulation (Clarity and Perception);<br>c) DE&S to be responsible for programme management and delivery against agreed requirements specification and budget (Constraints Certainty);<br>d) Changes to requirements, programme delays, etc. to be specifically and realistically costed and included in the next iteration of the plan. If any increases threaten affordability (as is likely), cuts must be made elsewhere (Affordability);<br>e) Cost of DE&S resources on projects should be tracked and charged (Constraints Certainty).<br><br>Revise aspects of the Approval process to improve decision making<br><br>a) IAB to report to Executive Committee on control of equipment approvals. IAB charged with consideration of the affordability of total programme, not just single projects. Chair of IAB to be taken on by MoD DG Finance (Affordability); |

| | | |
|---|---|---|
| | | b) Current Initial Gate/Main Gate approval process to be retained (Benefits Certainty);<br>c) Scrutiny community to be expanded/up-skilled to provide early advice to IPT Leaders on the preparation of business cases (Benefits Certainty; Competence and Capacity);<br>d) Mandatory use of parametric data, independent cost estimations and other "should cost" tools to be used as basis of preparation of business cases (Affordability);<br>e) Projects pre-Main Gate should be included in the plan at 90th percentile cost (Affordability);<br>f) No business case should be accepted, nor requirement included in the overall plan, other than on the basis of costs derived as above (Affordability).<br><br>Further cost reductions within in-service support should be pursued vigorously and the aspirations of TLCM should be reappraised<br><br>a) Significant further external work should be commissioned as a matter of urgency into the costs and function of in-service equipments (Affordability; Benefits Certainty);<br>b) Once a new Strategic Defence Review has determined the future force structure for the MoD there should be much more use of contracting for availability to be included in initial equipment acquisition to align incentives between manufacturers and MoD (Consistency and Coherence);<br>c) Role of TLCM and Programme Boards to be re-considered. Current structure overly complex and lacking data for decisions (Complexity Management);<br>d) TLCM to focus in first instance on financial Modelling of acquisition vs. support costs. Financial Models to be acquired to Model these variables (cf. British Airways), DG Commercial to control, reporting to MoD DG Finance (Affordability).<br><br>Improve the ability of DE&S to deliver efficiently on new equipment and support<br><br>a) Scope of DE&S to be rationalised to focus on programme management of acquisition of new equipment and support of in-service equipment. Other functions to be hived off into separate entities. Management structure of DE&S to be revised. Two joint Chief Operating Officer (COO) 3* positions created to handle IPT workload. Chief of Materiel (CoM) role to be abolished. Chief of Defence Materiel (CDM) to be a very senior civilian Programme Management position, recruited externally. Chief of Staff and Chief of Corporate Services roles to be merged (Complexity Management);<br>b) Develop better skills in the workforce. Significantly increase programme and project management skills within DE&S at all levels of the organisation. Increase central technical staffs resource available to individual projects as needed. No person, civil or military, to be appointed to a post of 1* or above without extensive programme management experience (Competence and Capacity);<br>c) Ensure greater independence from the customer. Hard charging interfaces to be created between DE&S and DCDS (Capability) for future equipment programme, and any change requests, and Front |

| | | |
|---|---|---|
| | | Line Commands for in-service support. Full reporting on output delivered for budget input required. Level of resources and skills of independent cost estimators to be substantially increased. CDM and the joint COO 3* posts to have full control over appointment of 2* Cluster heads and 1* team leaders, with this control cascading down through DE&S. Military personnel may be seconded to teams to provide advice on user needs without programme management experience, but may not occupy line management positions in this guise (Competence and Capacity; Affordability);<br>d) Institute a regime of strict financial discipline. Levels of resources and influence of Finance Function to be substantially increased. DE&S Financial Director (FD) to be recognised as de-facto and de-jure second in command to CDM with a strong dotted line to MoD DG Finance. Carrying forward into new Financial Year (FY) of planned activity in excess of annual budgets (currently running at over 10% of DE&S spend) to be banned (Affordability);<br>e) Improve accountability for project performance. Assurance process to be reduced and potentially removed as duplicative of Scrutiny role. Consistent programme and project management tools to be used across DE&S to ensure transparency of management information and easy migration of staff across teams. IPT leaders and above to be retained in post for a minimum 4-year double tour. Military officers seeking to serve as line managers must also follow this rule. Empowerment of cluster heads, and then IPT leaders, to be re-instated, as envisioned in Smart Acquisition (Benefits Certainty; Competence and Capacity; Constraints Certainty; Clarity and Perception).<br><br>Change the status of DE&S<br><br>a) Status of DE&S to be considered. At the very minimum it should become a Trading Fund. If a credible plan for delivery of objectives set out in Recommendation 7 within government ownership cannot be brought forward within 12 months, DE&S to be contractorised as a formal Go-Co (Change Readiness; Clarity and Perception). |
| 2009 | An Independent Review into the Broader Issues Surrounding the Loss of the RAF Nimrod MR2 Aircraft XV230 in Afghanistan in 2006 (the Haddon-Cave Report)[7]<br><br>Whilst the focus of this report was the issue of airworthiness, the headline statement was 'a failure of leadership, culture and priorities'. Part IV, Chapters 13 (Cuts, Change, Dilution and Distraction (1998-2006)) and 14 (Procurement) consider the organisational setting and it is these issues that are reported here. | The Nimrod Integrated Project Team (IPT)<br><br>• Inappropriately delegated project management; poor project management (Constraints Certainty);<br>• A failure to act as an 'intelligent customer' (Value for Money);<br>• Failure to read carefully the reports of the supplier, BAE Systems, or check their work (Competence and Capacity; Value for Money);<br>• Failure to follow the inhouse Safety Management Plan (Competence and Capacity);<br>• Failure to appoint an Independent Safety Advisor to audit the Nimrod Safety Case (Competence and Capacity);<br>• The signing-off of BAE Systems' work when it was manifestly inappropriate to do so (Competence and Capacity);<br>• In short, Haddon-Cave considered the Nimrod IPT to be "sloppy and complacent and outsourced its thinking" (Competence and Capacity). |

| | | |
|---|---|---|
| | | The supplier, BAE Systems<br><br>• Poorly planned, poorly managed and poorly executed work, resulting in a seriously defective end product (Competence and Capacity);<br>• The contractor was given the impression that the task had been properly completed and there were only vague recommendations that 'further work' was required, raising question marks about the prevailing ethical culture at BAE Systems (Competence and Capacity).<br><br>Organisational Changes<br><br>• A shift from organisation along purely 'functional' to project oriented lines (Change Readiness);<br>• The 'rolling up' of organisations to create larger and larger 'purple' and 'throughlife' management structures (Change Readiness);<br>• 'Outsourcing' to industry (Competence and Capacity);<br>• "A sustained period of deep organisational trauma between 1998 and 2006", beginning with the 1998 Strategic Defence Review. Financial pressures and *cuts* drove a cascade of multifarious organisational *changes,* which led to a *dilution* of the airworthiness regime and culture within the MoD, and *distraction* from safety and airworthiness issues as the top priority (Change Readiness; Competence and Capacity).<br>• A shift in culture and priorities in the MoD towards 'business' and financial targets, at the expense of functional values such as safety and airworthiness (Competence and Capacity);<br>• The Defence Logistics Organisation, in particular, came under huge pressure. Its primary focus became delivering 'change' and the 'change programme' and achieving the 'Strategic Goal' of a 20% reduction in output costs in five years and other financial savings (Change Readiness);<br>• The history of Procurement in the MoD as one of years of major delays and cost overruns (Affordability; Value for Money);<br>• Poor procurement practices have helped create 'bow waves' of deferred financial problems, the knock-on effects of which have been visited on In-Service Support, with concomitant change, confusion, dilution, and distraction as occurred in the post-Strategic Defence Review period 1998-2006 (Affordability; Competence and Capacity). |
| 2010 | National Audit Office: Defence: Strategic Financial Management of the Defence Budget[8]<br><br>This report considered whether the MoD's approach to financial management was sufficient to fulfil the objectives of the Strategic Defence and Security Review of 2010. Central to this was the issue of reducing the shortfall and restoring balance to future defence spending while ensuring the ability to maintain this balance in the future. | Findings<br><br>The MoD faces a number of challenges due to the nature of the defence environment<br>• It has been operating above the level of activity for which it is routinely resourced and additional funding for Iraq and Afghanistan will be withdrawn when these operations end.<br>• The growth in the input costs of defence has been more than general inflation.<br>• The Defence plans require a longer horizon than Government spending plans and are relatively inflexible.<br>• There are a number of other influences in the Defence environment which have affected the MoD's plans over time.<br><br>The MoD could use financial management more effectively to address those factors that are within its control<br>• The outcome of the annual planning rounds |

| | | |
|---|---|---|
| | | contributed to significant in-year budgetary pressure.<br>• Although the MoD uses the planning round to set strategic priorities, it has not routinely prioritised individual elements of its spending programme.<br>• It would find it easier to prioritise and find efficiencies if it had better visibility of its costs.<br>• It could place greater focus on the extent to which its assets are used efficiently.<br>• The MoD has some of the financial management capabilities it needs but could use them more effectively.<br><br>Over-committed plans have significant consequences<br>• At the end of the last two spending rounds, the MoD's over-committed plans have led to budgetary pressure in the new financial year. This has led to additional savings being necessary.<br>• Delaying projects leads to significant increases in costs.<br><br>The MoD has started to take action to improve financial planning<br>• The Strategy for Defence published in October 2009 helped to set out key priorities by identifying success in Afghanistan as the main effort.<br>• The introduction of new governance arrangements, planning tools and systems to improve strategic financial management.<br><br>Recommendations<br><br>The MoD should use the Strategic Defence and Security Review to rebalance its programme and take action to keep it in balance for the future. (Affordability; Constraints Certainty)<br><br>It should:<br>-underpin the Strategic Defence and Security Review with an explicit financial strategy;<br>-set out the relative priorities of expenditure;<br>-regularly review performance against financial plans;<br>-reprioritise funds to keep the programme in balance without using delays and de-scoping projects as the default approach to reducing expenditure (Affordability; Constraints Certainty).<br><br>The financial strategy should be reflected in financial plans.<br><br>The MoD should ensure that the plans:<br>-articulate and review spending priorities annually;<br>-revisit at least annually the assumptions that underpin the financial plans;<br>-contain adequate financial provision for risk and to counter optimism bias;<br>-consider changes to the assets held and not just the HM Treasury control regime (Benefits Certainty; Constraints Certainty).<br><br>The MoD should use the financial capability it has to best effect and enhance its capability further.<br><br>It should:<br>-use professionally skilled finance staff to develop the long term financial strategy and associated risk management strategy (Competence and Capacity);<br>-drive out the culture of optimism bias that fails to recognise the full cost of projects (Constraints Certainty);<br>-enhance visibility and understanding of the cost of delivering outputs and cross-cutting activities (Clarity and Perception; Competence and Capacity). |

**Source: Author**

References

[1] Great Britain, Ministry of Defence, *Smart Acquisition*, MoD Website, December 2009, http://webarchive.nationalarchives.gov.uk/+/http://www.MoD.uk/DefenceInternet/AboutDefence/Organisation/KeyFactsAboutDefence/SmartAcquisition.htm, downloaded 4th April 2011.

[2] Great Britain, National Audit Office, *Driving the Successful Delivery of Major Defence Projects: Effective Project Control*, HC 30 2005-2006, (London, HMSO, 2005), http://www.nao.org.uk/publications/0506/effective_project_control.aspx, downloaded 10th January 2011.

[3] Great Britain, Ministry of Defence, *Defence Technology Strategy for the Demands of the 21st Century*, (London, HMSO, 2006), page 2.

[4] Great Britain, Ministry of Defence, *Enabling Acquisition Change: An Examination of the Ministry of Defence's Ability to Undertake Through Life Capability Management*, (London, HMSO, 2006), http://www.MoD.uk/NR/rdonlyres/10D1F054-A940-4EC6-AA21-D295FFEB6E8A/0/MoD_brochure_hr.pdf, downloaded 15th January 2011.

[5] Great Britain, Ministry of Defence, *Defence Technology Strategy for the Demands of the 21st Century*, (London, HMSO, 2006).

[6] Great Brtain, Ministry of Defence, *Review of Acquisition for the Secretary of State for Defence: An Independent Report by Bernard Gray*, (London, MoD, 2009), http://www.MoD.uk/NR/rdonlyres/78821960-14A0-429E-A90A-FA2A8C292C84/0/ReviewAcquisitionGrayreport.pdf, downloaded 4th April 2011.

[7] Great Britain, House of Commons, Haddon-Cave, C., *An Independent Review into the Broader Issues Surrounding the Loss of the RAF Nimrod MR2 Aircraft XV230 in Afghanistan in 2006*, HC1025, (London, HMSO, 2009).

[8] Great Britain, National Audit Office, *Defence: Strategic Financial Management of the Defence Budget*, (London, HMSO, 2010), http://www.nao.org.uk/publications/press_notice_home/1011/1011290.aspx, downloaded 22nd January 2011.

## APPENDIX 6:
## NAO’S KEY QUESTIONS FOR DEPARTMENTS UNDERTAKING MAJOR IT-ENABLED BUSINESS CHANGE

| Question | Analysis of the DII Programme’s Performance |
|---|---|
| 1. Is the board able to make informed judgments about the MoD’s capacity to manage change? | Key decisions taken about the Programme take into consideration other defence business change programmes that impact on or are enabled by DII. Dependency of the JPA Programme was recognised and managed.<br>Considerable work to understand the required scope of DII and action to manage risks including centralising control of legacy systems and rationalising applications.<br>Not enough work to understand the physical environment. The Fixed Rollout Methodology proved inappropriate. |
| 2. Does the MoD have in place a decision-making structure that will ensure strong and effective leadership of the IT-enabled business change? | The Programme created robust governance structures at the outset with members drawn from the MoD and Atlas. They incorporated all of the important internal stakeholders. The Programme has secured the engagement of senior management both within the MoD and Atlas. |
| 3. What incentives exist to drive performance? | The MoD has structured the DII contract so that ATLAS recoups the majority of its investment through performance-based payments. The decision that the consortium would receive the majority of the payment for work only when terminals had been installed has protected the MoD from paying for services before they have been delivered, when delays have occurred because of contractor error.<br>The MoD is using an incremental approach that has been refined as the Programme has progressed. This has been used to drive contractor performance and to manage risk. |
| 4. Does the MoD have the necessary programme management skills? | Both the IPTL and the SRO have well-resourced teams of staff. Many have undergone formal training to acquire programme management skills.<br>After letting the contract, the MoD kept the team of people responsible for the contract in post for much longer than usual. Key individuals in the MoD have considerable experience of IT programmes and the acquisition of major defence equipment. |
| 5. What is the natural division of duties between the Programme and Project Management Centre of Excellence and the Chief Information Officer? | The SRO for the Programme is also the MoD’s CIO. |
| 6. How will the MoD establish and promote an open and constructive relationship with suppliers? | Governance structures contain members drawn from both the MoD and Atlas. At the highest levels within the MoD and Atlas’s constituent companies, senior management have been well engaged in the DII Programme.<br>The MoD’s and the contractor’s senior management have done much to instill a partnering ethos throughout their organisations. The development of partnering methods is assessed through a maturity model. |
| 7. How clear is the MoD about the business process that it is seeking to change or develop? | The MoD had a sound rationale and a convincing business case for the Programme in terms of improved military operational effectiveness, more effective and efficient running of the business, and particularly through the business change programmes that DII supports. |

**Source: Great Britain, National Audit Office, *Ministry of Defence: Defence Information Infrastructure*, (London, HMSO, 2008).**

# APPENDIX 7:
# SURVEY

## 1. Background to the Research

This research is examining whether the lessons from previous IT projects in government have been applied to current projects and, if so, whether they have improved the outcomes.

I am currently studying the Defence Information Infrastructure (DII) Programme and have access to the inhouse User Survey but am keen to ask some slightly different questions. Therefore, this questionnaire is only relevant to you if you are a DII user. If you are, then I would be grateful if you could take the time to complete this questionnaire, which has been designed to be quick and easy. It is only nine questions long and should take no more than ten minutes to complete.

Your anonymity is assured. The results of this survey will not be used for any other purpose and will be deleted on completion of this research.

If you wish to comment further, then space has been allowed on the form or you can contact me directly via email or telephone to discuss your views in greater detail: a.maddison@cranfield.ac.uk/01793-785035.

I would be grateful if you could forward this link to any friends and colleagues who would be willing to add their views to this survey.

Annie Maddison
Cranfield University

## Section 1: Background Information

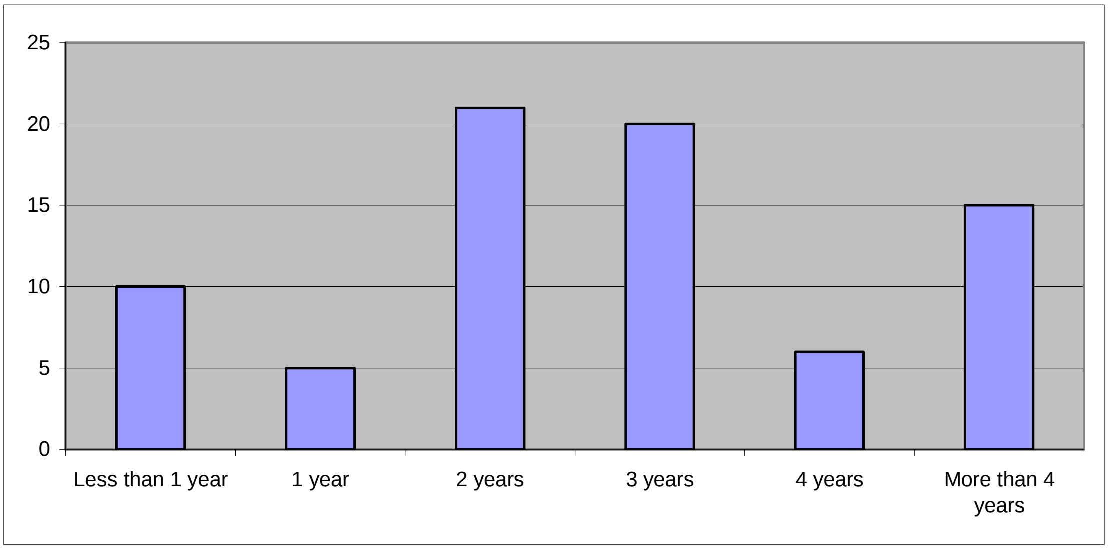
### Q1: Please enter your work location here and any additional comment that you wish to make.

| Location | Responses |
|---|---|
| Afghanistan | 1 |
| Blandford Camp | 3 |
| Celle, Germany | 1 |
| Corsham | 16 |
| Cyprus | 9 |
| DE&S Abbeywood | 13 |
| DE&S, Foreign Liaison Office, US | 1 |
| Defence Academy, Shrivenham | 8 |
| Ensleigh, Bath | 1 |
| Foxhill, Bath | 1 |
| Haverfordwest | 1 |
| Herford, Germany | 1 |
| HMS Forward | 1 |
| Main Building, London | 1 |
| Navy Command HQ | 1 |
| Old War Office, London | 1 |
| Pentagon, US | 1 |
| RAF Waddington | 16 |
| RSME Chatham/Minley | 1 |
| Yeovilton | 1 |
| **Total** | **79** |
| Skipped Question | 5 |

**Source: Author**

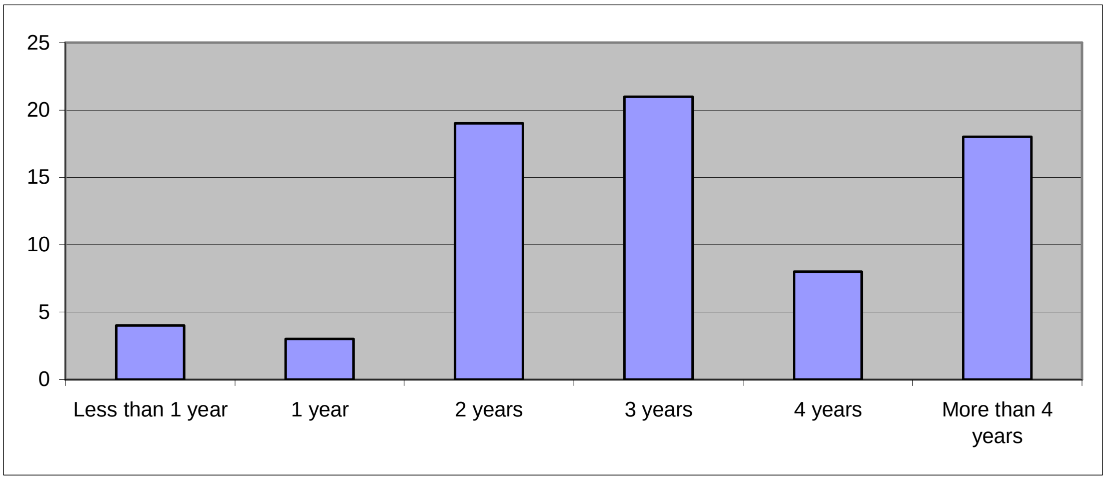
### Q2: With regard to DII, how long has it been available at your work location?

| | |
|---|---|
| Less than 1 year | 10 (13%) |
| 1 year | 5 (6.5%) |
| 2 years | 21 (27.3%) |
| 3 years | 20 (26%) |
| 4 years | 6 (7.8%) |
| More than 4 years | 15 (19.5%) |
| **Total** | **77** |
| Skipped Question | 7 |




**With regard to DII, how long have you been using it?**

| | |
|---|---|
| Less than 1 year | 8 (9.9%) |
| 1 year | 3 (3.7%) |
| 2 years | 20 (24.7%) |
| 3 years | 23 (28.4%) |
| 4 years | 9 (11.1%) |
| More than 4 years | 18 (22.2%) |
| **Total** | **81** |
| Skipped Question | 3 |



## Comments (Optional)

| |
|---|
| Have not had DII as long as colleagues as based overseas - had to write business case to be allowed DII laptop! |
| In previous Units. |
| Whether working in-office or from home using the DII(F) multi-point connectivity logging in is very slow. Moreover, the logging on procedure when working from home requires FIVE log-on security steps (B-Crypt key insertion, password, 4 number password + 6 number RSA Security ID fob random generated number, personal DII profile ID, followed finally by personal password = Well over the top! |
| I first used DII whilst serving with my Regiment in 2007 (in Germany). |
| DII F available in my last location for about 2 years, of which I was there for the first 9 months or so. I have also been a user of DII-C and DII-D in 2005 and 2006. |
| I do not know how long it has been available. I have only used it 3 or 4 times to gain access to JPA. I do not have my own terminal. |
| I am unsure how long Cranfield has had had DII access but I have had it in every job since 2004 except for an 18 month period where I used TAFMIS. |
| Have been able to use it at a variety of sites in the southwest. |
| Real pain with DII is time to log on and inability to connect peripheral devices i.e. PDAs. Industry manage it but not the MoD. |
| Not 100% sure on how long DII has been in NCHQ. |
| In early adopter group. |
| Migrated from DII/C to DII/F. |
| This is to my knowledge. I am a contractor. |
| Move to a new build is the reason for apparent contradiction in response. |
| Not available at current work location. Closest UK site is the British Embassy which expects to receive limited DII later this year. |
| Moved to present post a year ago. |
| Don’t know. |
| DII was at my last location in Celle, Germany. We are going to get DII here in Cyprus this year, though it is behind schedule! |
| We had DII in Germany and are currently awaiting an installation of DII in Cyprus. |
| Waiting for it to be rolled out in Cyprus. |
| There is no DII facility at this location yet as we are still using Cyprusnet. |
| DII is currently not available in my unit. It is supposed to be rolled out within the next couple of months. |
| Haven't got DII yet but have used before. |
| Not available as yet. |

## Q3: How would you rate your IT Skills?

| | |
|---|---|
| Novice<br>(I never use computers) | 0 |
| Adequate<br>(I can carry out my job adequately using a computer but I would benefit from learning additional computer skills) | 9 (10.7%) |
| Experienced<br>(I am a confident user for all routine tasks required) | 42 (50%) |
| Expert<br>(I am a confident user and am asked by others to help them when they have difficulties) | 33 (39.3%) |
| **Total** | **84** |

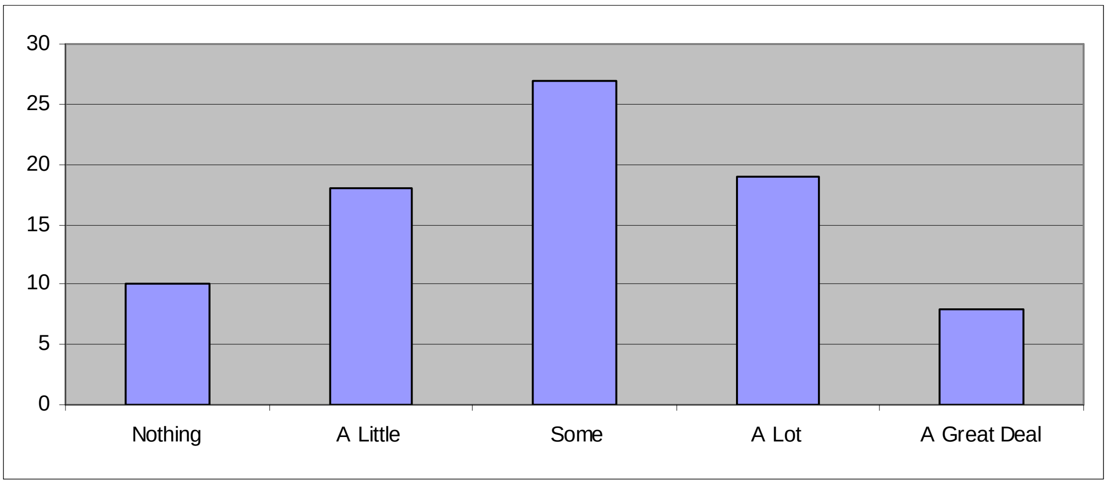
**Comments (Optional)**

| |
|---|
| DII is restrictive with regards to what you can do with your computer. The PC is capable of more than what we are restricted to use it for. |
| I am studying the IMT MSc, could there be any better qualification to prove expertise in IT skills? |
| Work in Software Support. |
| I am a Management Consultant who specialises in web technologies. |
| Masters Degree in Information Systems plus over ten years experience in technical and programme management roles. |
| IT Lead within my unit and Local Security Officer/Authorised Demander on DII. |
| Better in some applications than others but a regular user. |
| Designed a Sharepoint site for the Battalion Info Manager. |

## Section 2: The DII Programme: Evaluation of Use

### Q4: How much did you know about DII before its implementation?

| | |
|---|---|
| Nothing | 10 (12.2%) |
| A Little<br>(I knew what it was) | 18 (22%) |
| Some<br>(I knew what it was and what it was going to do) | 27 (32.9%) |
| A Lot<br>(I knew about the plans for its development and implementation) | 19 (23.2%) |
| A Great Deal<br>(I knew about the background and strategy for the Programme as well as the plan for its development and implementation) | 8 (9.8%) |
| **Total** | **82** |
| Skipped | 2 |



**Comments (Optional)**

| |
|---|
| I knew that it would replace our stations network with something else. |
| Whilst information was published on the Intranet, I noted its availability and decided to access the information on the basis of Need and When to know. |
| I was the Signal Officer and therefore had been to centralised NEC meetings. |
| I was a minor part of the implementation team in my last unit (assistant security officer). |
| Worked in DII IPT at the time. |
| On project team. |
| Helped put in DII in Main Building. |
| Prior to migration at my previous unit and my role as Business Unit Point of Contact (BUPOC), I made a point of reading as much as I could on the subject. |
| Part of the DII team to implement increment 2a and 3a. |
| I worked as part of the implementation team. |
| I used DII with my current unit when we were based in Celle, Germany from Jan-Aug 2010. |

**Q5: With regard to DII,**

**Does it give you access to all the hardware/software that you need to do your job?**

**Yes** 57 (71.3%)
**No** 23 (28.8%) (Total: 80; Skipped: 4)

**Comments (Optional)**

| |
|---|
| But it was a battle to get the hardware and speed of service required. |
| Seems it all comes down to cost... and how much ATLAS can get away with charging! |
| The reason for No is that the work environment requires Microsoft Access although in use now is to be rescinded causing major work issues. Also DII does not have drivers for legacy Smartboards and issues with colour printers. |
| Only if you have been give permission to use the software. Getting permissions can be difficult. |
| I do not have my own terminal so it does not give me access to everything I need when I need it. |
| I think the roll out of shared areas has been far too slow and the software is often limiting. |
| I don't know if it has other capabilities that could help me. Document and records management is hopeless. |
| No access to Internet. |
| Like to be able to synchronise PDA/Mobile phone. Internet restrictions are archaic. |
| A decent file registry and archive system would be useful. |

**Have you received sufficient training to use it (i.e. enough to mean that you can use it without assistance)?**

**Yes** 60 (75%)
**No** 20 (25%) (Total: 80; Skipped: 4)

## Comments (Optional)

| |
|---|
| Received no training - probably because 'off site'. |
| All knowledge gained leading to its effective use has been gained by help received from friend or has been self-learned. |
| Training... not really, although it is hardly on a par with the science of rocketry. |
| Problem with this question is that it doesn't take into account the abilities of the user. For example as a Hons Degree in Computing holder I can determine how to do things better than others. |
| I am aware it is down to me to seek further training as required. I am content I can use DII to the extent that is necessary for me to do my job. |
| I have not received any training to use DII. |
| I have not been trained to publish to the web pages. |
| I received no formal training, but just muddled through. |
| Training has been sufficient for me, but I consider myself to be on the high-side of IT-capable. Information management training and automation could be considerably better – the current situation would be tolerable if we had a decent search function. |
| Whilst I can confidently use it I received no training in DII and believe that I am not aware of how to do some functions that have been self-taught via trial and error. |
| No continuation training offered for new initiatives such as MOSS. |
| I have had sufficient training but I fear most users without my background struggle through a lack of training. |
| One of the challenges experienced when I first used DII was that the user guide is an electronic document based on the Defence web. As a first time user this presents a mild difficulty in accessing the system and understanding the security and encryption settings due to the requirement to log in through the security process before accessing the guides and learning material. |
| The MOSS (Microsoft Office SharePoint Server) training is a bit light, but everything else I'm happy with. |
| DII programme did not provide any training direct. All my training was gathered from previous exposure to legacy systems and it is my primary Trade. |
| Can use it but there has never been any training. |
| No training given. |

## Q6: How would you rate DII compared to the IT that you used previously in terms of:

| | The support that you have received? | Its usefulness compared to your previous IT provision? (It makes my job easier and it makes me more effective and efficient) | Ease of use? |
|---|---|---|---|
| Worse | 24 (30.4%) | 12 (16%) | 5 (6.3%) |
| Same | 23 (29.1%) | 28 (37.3%) | 39 (49.4%) |
| Better | 27 (34.2%) | 30 (40%) | 34 (43%) |
| Excellent | 5 (6.3%) | 5 (6.7%) | 3 (3.8%) |
| **Total** | **81** | | |
| Skipped | 3 | | |

## Comments (Optional)

| |
|---|
| DII more useful as incorporates new capabilities such as JPA. Ease of use same as primarily driven by Microsoft Office. |
| DII(F) lost capability over DII(C) particularly with regards to data management. |
| Relatively comparable, but all systems that I have used have offered poor support and ease of use. |
| I previously had Land CSSR or none! |
| We had our own LAN that was tuned to our needs. |
| Support used to be in-house. If there was a problem which was difficult to resolve over the telephone someone would present themselves at your workstation within minutes... at no extra charge. |
| Frustratingly if DII had been implemented correctly (SAMs Networking in 21 Days) then this system would help me work better, instead I am having to work around its issues. |
| Smart screens previously supported are no longer supported due to lack of drivers. |
| Regarding support, having people on the ground will always get a faster response to problems. |
| The design and utility is very good with the caveat that the user needs to give time to familiarise his/herself on its layout and structure. The extent of familiarisation / detailed application usage training needs to be tailored to the individual. |
| There were some limitations due to restrictions with its civilian internet services when I was the Media Officer. |
| DII - F was no significant change from the existing Land CSSR except the ability to log on when deployed to other units locations. DII Secret was a step change in capability over the existing system as it gave greater connectivity to non military and non UK based partners. |
| My only criticism is that the bandwidth is barely enough for a network of this size and consequently it runs slowly sometimes. |
| TAFMIS was better thought out (possibly the result of a more mature system) and provided easier file sharing and collaboration. Prior to DII I was expected to use my own laptop for work and send memos instead of emails. |
| Help desk (SPOC) can usually resolve problems quickly. |
| The search function is woeful – I know an autonomy-based search is around the corner but we've had to put up with an under-powered search since the implementation of DII. |
| The old network was windows NT4 with no flexibility. |
| Several issues around closing and opening new accounts takes too long and not in the suppliers interest to disestablish dormant accounts that they are getting paid for. |
| Compared to CHOTS! |
| Loss of local IT support organisation has removed flexibility. It also erodes our collective intelligent customer role. |
| Previous systems have been UNICOM as a field commander. That was pretty rubbish ... although you could get the vital things done if you bothered to learn the keystrokes. Most people didn't and could not send mail outside of their own unit. |
| The global access and use have enormous benefits but speed is generally slower than required. |
| Still missing a lot of functionality through collaborative working and numerous applications. |
| Support is not necessarily better in that CHOTS support was very good, however it is much more efficient - most being carried out remotely and quickly. |
| I had my own IT staff who enabled me to do whatever I required. I had an Electronic Documents and Records Management System that was disabled leaving my records in a mess. |
| Having gone back to a legacy system in Cyprus it is very clear how much better DII is than Cyprus net. |
| Having only used DII for 7 months I didn't really get to use it that much or properly investigate its full potential. |

## Q7: Do you think the system is:

| | High quality?<br>(DII offers everything that I need to do my job and the cost of DII is reasonable given what it offers to me in my day-to-day work) | Responsive?<br>(Does what I want when I want to) | Reliable enough for you to do your job (most of the time)?<br>(Does not fail when I want to use it) |
|---|---|---|---|
| Totally disagree | 11 (13.8%) | 8 (9.9%) | 5 (6.3%) |
| Disagree | 22 (27.5%) | 24 (29.6%) | 16 (20%) |
| Neither Agree/Disagree | 28 (35%) | 26 (32.1%) | 25 (31.3%) |
| Agree | 16 (20%) | 21 (25.9%) | 32 (40%) |
| Totally Agree | 3 (3.8%) | 2 (2.5%) | 2 (2.5%) |
| **Total** | **81** | | |
| Skipped | 3 | | |

### Comments (Optional)

| |
|---|
| I have encountered some connectivity issues - Remote Access. |
| DII (F) is 10 times more expensive that our local LAN system. |
| In the main the system works, although it can be slow at times and the search engine is very poor. |
| I do not know the cost of DIIF so I cannot comment on whether it is value for money or not. Its speed and reliability seem to have reduced. |
| I have heard conjecture with regards to the cost of DII but I am not aware of the actual costs. |
| - It is certainly not a high quality system from this user's perspective! -I am not in a position to comment on cost. -Does it do want I want it to do? = Eventually, often very slowly, and sometimes erratically! -If MOD masters are content with delays in work being completed because of DII lack of connectivity to servers, or the slow working of the system, which slows users work rhythm, the system is usually adequate for this user! |
| Annoying that applications have to be reinstalled when logging on to another work station. |
| The poor thought in some of the rules makes this a frustrating system to use given its potential. |
| Whilst the service is usually reliable it does not do everything I require it to do. |
| Network is slow. Cannot put free software packages on without having to pay for a license to assist with our job. |
| DII has extreme cost implications which as an end User are not acceptable considering how Public Sector working is changing requiring different usage of original installed IT. |
| DII is highly expensive for what it offers. As it only offers the most basic of computer needs. A word document of average size can take approx 5 mins to open. The printers now always print an error page before they finally print. A known problem that they are trying to resolve but has been on going for the past 2 months. |
| Unit cost of hardware/software very expensive when compared to other providers. |
| Early day reliability faults have been significantly reduced. |
| I have failed to get access to it on a couple of occasions. |
| It’s generally available although there are significant bugs in the system that have cost time to fix. It is slow to respond when used in non-Headquarters roles due to the centralised servers, dispersed locations and lack of bandwidth. It is fairly average in its provision of basic office functionality. |
| We pay a fortune the provision of accounts. There must be hundreds of accounts that have not been closed so the MoD pays for them. Inactive accounts should be closed down. |
| I'm not aware of the costs associated with DII. |
| I have no idea of the VFM of DII as I have nothing to compare it against but some of the charges do seem extortionate. |
| Very slow for some things - initial log-on especially. |
| Very expensive. |

| |
|---|
| DII suffers from many network/power issues and user experience depends on their location. In general responsiveness is poor and downtime far beyond that which is acceptable. |
| Initial installation came with performance issues (speed) especially when trying to access old data (not yet migrated) through 'Reachback' connectivity. |
| It is a little bit sluggish, due in part to the amount of security and background tasks, but is reliable. |
| I feel that the cost for DII is far too expensive. |
| I think that DII is expensive for general use but does have good functionality, it is also frequently pretty slow, however most of the time it does perform adequately. |
| The use of CD re-writing is imperative for my job but it does not have this function. |
| DII is still a very slow system – is adequate for the job but in some aspects only just.  I have used better systems in NI and Cyprus. |
| The system is slow most of time because too many people using the server at the same time. |

## Section 3: The DII Programme: Assessment

### Q8: With regard to DII, in your view:

| | **Yes** | **No** | **Total** | **Skipped** |
|---|---|---|---|---|
| Were users fully consulted during development i.e. when decisions were being taken about the system? | 16 (20.8%) | 61 (79.2%) | 77 | **7** |
| Were users fully consulted during implementation i.e. when the system was being set up in your workplace? | 27 (34.6%) | 51 (65.4%) | 78 | 6 |
| Was the implementation successful i.e. was there minimum disruption? | 46 (62.2%) | 28 (37.8%) | 74 | 10 |
| Does it meet the requirements of its users? | 54 (70.1%) | 23 (29.9%) | 77 | 7 |
| Were users involved at all stages of the project? | 14 (19.2%) | 59 (80.8%) | 73 | 11 |
| Is it a project to deliver new technology? | 32 (42.7%) | 43 (57.3%) | 75 | 9 |
| Is it a project to improve services? | 58 (78.4%) | 16 (21.6%) | 74 | 10 |

## Comments (Optional)

| |
|---|
| Meets the requirement - just. |
| Does it meet the requirements of users = After a fashion! -Is it a project to deliver new technology? = I don't know about "new technology" but can be used to deliver varied functionality depending on the security clearance of its various Increments. |
| No business needs analysis was carried out at this site. A policy of '1 size fits all' was employed. |
| My opinion, it seems someone is making a lot of money and providing nothing more for it. |
| I had to use a profile set up for a different post, if not I would be unable to use it for 6 months while money was being found. The basic level of users is not suitable for the software development work that my section does. In addition if the general network goes down our section goes down. A step back from our old position of having our own network. Where are the bridges routers and network segmentation (again SAMS Networking in 21 Days, duh)? |
| It is difficult to comment on whether users were involved in the project as the time lines between planning the implementation and the actual delivery were longer than the normal length of military assignments. Hence few personnel were actually still in the unit during implementation who were around during initial planning. The unit’s role had changed significantly during the intervening period. |
| New tech with respect to the MoD - Yes. Up-To-Date Tech- No, but there are some good reasons for this. |
| Some of these answers are not really yes/no! e.g. individual users were not all consulted (300000 of them!) representatives for groups of users (e.g. TLB representatives (x 12) were. |
| Teething problem caused massive disruption to my team everything from not rollback to spelling usernames wrong and loss of profiles. In some cases migration can take up to 12 weeks, totally unacceptable.... |
| DII is a huge IT implementation in anybody's terms - there was only so much that could be done with regard to engaging with users. |
| Definitely a cost saving exercise that will deliver benefit through easier communication, i.e. ability to have a common, maintainable estate wide address book. Delivery of support to users still catching up with equipment. Training appears lacking especially for Authorised Demanders, the people who enable local changes, as many simple maintenance jobs/checks are not being carried out. |
| Limited consultation. In some cases this has removed some functionality in an attempt to provide a homogenous one size fits all solution for Defence. |
| A focus on service rather than technology has been and continues to be a key weakness in DII strategy. The notion that a detailed requirement for what is at the end of the day largely just an office system can be usefully and reliably created by some consultants (and I am a consultant) and then stuck to is not very sensible. The reality is that for 90% or more of what is required can be met by Microsoft Office products (including SharePoint) and the requirement then boils down to 'give us the Office suite and harden it to suit our special security needs' rather than deliver the technology Microsoft has already invested billions of dollars in. We have gone down the route of dreaming up a requirement (which is less well thought through than Microsoft’s) and then given this to an inherently and predictably schizophrenic consortium to build. Predictable flaws in this requirement are then fodder for discord between MOD and ALTAS, the root of much wastage in time and money. Strategically of course the real question is whether to Microsoft or Not to Microsoft. Looking at the lay of the land over the long term my money is on Not to Microsoft. HM Government should look to harness its own flavour of a Unix based operating system and working with the open source fraternity to build and control its own digital assets. Both programs and data are digital assets and DII should lead the way in the nation’s long term interests in this area. |
| The all-in-one, singing from the same songsheet product. Let down slightly by delays and a poor user perception. |
| From my personal experience of DII is that it provided an office automation tool with email connectivity across the MoD. The Information Management and Exploitation is somewhat different as there is no IM collaboration toolset within organisation to utilise. I know that DII are implementing MOSS later this year, which will be interesting to see the data migration plan and policy. |
| No involvement. It was just delivered; we lost lots of data on the transition and a lot of false promises to have this data returned. |
| I think it offers potential future improvements - information sharing, joint working and an EDRMS. Has good functionality and ability to download number of applications (providing they are already on DII) is good. |
| I have never seen the benefits argument for DII. It can't deliver new technology; several of its applications are obsolete. The removal to manipulate files on removable storage was a pain that was never forecast. |

## Q9: Would you consider DII to be a success in terms of:

| | Agree | Neither Agree/Disagree | Disagree | Total | Skipped |
|---|---|---|---|---|---|
| Staying within budget? | 8 (10.4%) | 32 (41.6%) | 37 (48.1%) | 77 | 7 |
| Being delivered within the time stated? | 4 (5.1%) | 24 (30.4%) | 51 (64.5%) | 79 | 5 |
| Delivering organisational benefits? | 40 (51.7%) | 25 (31.6%) | 14 (17.7%) | 79 | 5 |
| Giving high user satisfaction? | 17 (21.6%) | 30 (38%) | 32 (40.5%) | 79 | 5 |
| Delivering new technology? | 30 (38%) | 27 (34.2%) | 22 (27.9%) | 79 | 5 |
| Improving IT services? | 45 (56.3%) | 19 (23.8%) | 16 (20.1%) | 80 | 4 |
| Making your working life easier? | 33 (42.3%) | 29 (37.2%) | 16 (20.5%) | 78 | 6 |
| Being a project to improve MoD efficiency? | 43 (53.8%) | 20 (25%) | 17 (21.3%) | 80 | 4 |

## Comments (Optional)

| |
|---|
| Believe IT in general improves efficiency although it has increased workload at the desk officer level - e.g. removal of typing pools and commcens. |
| Any IT system that provides basic Office software and comms would improve what was there before. Not a high benchmark. I do not know whether the programme stayed within budget or whether it has been delivered in time or not. |
| It has the potential to make life easier and MOD more efficient but we should stop limiting the capability of new software because we are worried the users will not use it properly (start treating the users as adults not children). |
| The system can be slow and the search engine poor, but overall the system works and has the potential to improve IT across the MoD. Enhancements with Microsoft office 2010 will also help. |
| It does improve MOD efficiency and delivers organisational benefits by connecting all areas of the department. However the speed and reliability of the system appears to have reduced. |
| -Global connectivity is undoubtedly a benefit to MOD, as is the actuality of MOD achieving savings by delivery training to users electronically, and of forcing on users the requirement for users to do much of their own personal administration online. -Global connectivity also does improve efficiency of rapid communication. -Enabling means of flowing new functionality to users is also a plus. |
| The restrictions and issues that this new network has brought have not improved things any more than everybody with suitable training and software on the old systems. |
| When compared with our previous system… |
| Number of computers within the office was decreased but overall cost per year is more. Within the last 3 years none of the computers have been upgraded. |
| The technology used is poor. For instance why no ie8. All the advice given by the IT industry is to use the latest browser with the latest updates. Why are we using a 6 year old browser and a 9 year old OS? |
| Once in place it is a very useful tool. |
| I don't know whether it has stayed within budget. |

| |
|---|
| The increased budget cost is due to added functionality. Delivery on time has failed due to human negligence and not system based faults. |
| DII is only a small step in the right direction. Future technologies should improve efficiency, but it is mostly about the culture and not the technology. |
| Once implemented most of it works well (e.g. logon anywhere is a boon and saves taking a laptop around) BUT some facilities still missing - e.g. records management and deployed capability. |
| Improvement at a cost. |
| The idea behind the project is laudable but the delivery and a poor perception of both the delivering consortium and the MOD procurement process has seen a level of user resistance to the process that is based on the aforementioned perceptions rather than the technology. |
| For reasons stated in question above and the advent of new shared working sites like MOSS I think that DII has been an improvement. |
| Intuitive responses. I have never seen the business case, so don't know what its objectives were. |
| The MOD is still plagued by inefficiency. |
| I was not there when it was being set up. |

### Section 4: The DII Programme: Comments

## Please add any additional comments here:

| |
|---|
| The DII Programme has been a big endeavor with many benefits being achieved. However, it could have been better executed had the Statement of User Requirement been better articulated. The advice and comments of various MOD SMEs been heeded during the Development phase of each Programme Increment (each a discreet project). MOD met users' expectations for each Increment with the necessary funding to make them possible. |
| No Business Needs Analysis carried out so what did it have to do with the users? |
| Why are we stuck using the most vulnerable version of Internet Explorer? Why is our Office suite 7 years out of date? File naming conventions make it really difficult to find/organise files. |
| DII, considering its cost and support has been a total failure. The system is slower than the previous system which we thought was already slow. The setup of accounts has taken up to six months for some personnel and as the use of DII is an essential part of their work this is completely unacceptable. Even the inability of not being able to send an email to more that 30 people is a major drawback of the system as this should be basic functionality. |
| DII has been a prime example of how not to "Network the Enterprise" (one of the Degree subjects). What we have given away in terms of resources and what we have gotten in return would make excellent headlines for the Sun, the person who authorised this billion pound white elephant should hang their head in shame for the money spent I expected to be running something akin to the CTU setup in the show 24. |
| DII could be good but because the contract to set it up was drawn up by non-users/experts, we have a system set up that doesn't appear to be easily changeable or updateable. Oh and why does it cost so much? |
| DII is operationally effective; in my opinion is was/ is let down by poor project management and leadership. The project was inward looking and failed to consider the wider system and environment it was to be deployed in. It suffered from two significant additional frictions. First, it was introduced at the same time as a number of other significant IT systems and business processes; JPA, JAMES, BLENHIEM. Second, it has occurred during a period of unparalleled operational commitment in Iraq and Afghanistan. This has been the MOD's focus and main effort; I think this has led to insufficient time and attention from Senior Management in considering Strategic Projects such as DII. |
| In my experience, Users have an adjustment phase where they compare the old with the new and feel DII is not meeting their requirements. After a short period the benefits of DII are realised and Users accept that it is a better system. This is mostly due to a lack of training about DII. |

| |
|---|
| Admittedly, specialist users may have had to take a step back to go two forward but for the vast majority of users who use DII for comms, data storage and office automation there was a seamless improvement on legacy systems. In my experience all historical data was successfully migrated, I had what I had the day before DII and I could take advantage of better services albeit slowly at times. My only other point is why you have to on DIIF put in your user details and password every time you use the EGS gateway to internet instead of being allowed to save the details. When you have to log onto your DII acct in the first place and SyOps dictate that when you are away from your desk you CTL ALT DEL I can't see what risk it is mitigating? Is someone worried that whilst sat at my desk logged in someone else may conduct inappropriate activity on the internet and that I may fail to notice this going on in front of my very eyes..?!? |
| My perspective on DII has been largely garrison based (i.e. used in an Infantry Battalion not a Headquarters) therefore DII was the first networked IT system installed. Anything is better than nothing. In general it provides the majority of required functionality but whether it could have been done better for less is open to debate. |
| DII whilst frustrating at times does seem to be a step in the right direction. It is very hard to judge it as I have nothing to compare it against apart from previous MOD systems against which just about anything would be an improvement. |
| Overall there are some good and bad points to DII. It is definitely an improvement, but still has a way to go. My biggest criticism is its lack of flexibility and adaptability, though these are more down to MoD culture and the contracts that were signed with ATLAS rather than failings with the technology. |
| DII is not great but its predecessors were much worse and not interoperable. However, DII is conceived and managed as a system and not as a means of providing services to the consumer. As such the attitude towards DII in service support is keep the system going. Regrettably the system and the service being consumed are different and the user gets benefit/value from a service not a system. This will change if we can get MOD ISS to think in terms of services and not just procuring systems and kit. |
| Now most of Defence who need it, have it, a single system is a real boon in terms of training and access from multiple locations. Some irritations (slow service, sometimes indifferent help-desk responses) are annoying - but not critical. |
| I agree with the principles of having a single Network but I believe the MoD should have retained ownership and skills in house and onsite to deal with issues. The contract is set in favour of the supplier, which is single source. The risks are still held in the MoD and there is no compensation to individual business units for downtime. |
| You are quite right to ask these questions: the DII survey was designed to avoid them (in my view). Two biggest issues for me are responsiveness (i.e. speed) and stability (DII can, at times, lose its connection to the shared drive without warning and then the IT hangs meaning a hard reboot and a total loss of work since last save). Using DII on a 3G card is almost useless as it is too slow, although occasionally it does seem to have good speed. The restrictions on Internet access are too strict (I cannot access the Cranfield Webmail for example). The help desk performance monitoring is suspect as reported faults have been closed off without notice (I think this is now being addressed). However, if you were to telephone the help desk for them to tell you that you have the wrong help desk that still gets recorded as a 'fault' with a turnaround time of seconds. |
| All we have done is replace one ageing system with a new one that does exactly the same. Office automation and email. Access to everything else is either extremely difficult and takes too long or there is no funding or no appetite to complete. The system is fast enough however if you wish to use an application to carry out your work it can take months to get the package delivered to your desktop. I can only use the system whilst at my desk. With the amount of meetings etc with civilian company that do not have access it is impossible to take crucial information with me due to security restrictions, cost etc. |
| The ways of working should have been developed first, not the technology. |
| DII is a much improved system to the legacy systems. It is a shame it has taken so long to roll out. The biggest problem in Cyprus is infrastructure and a lack of thought when planning infrastructure. |
| DII was supposed to be rolled out between Dec 2010 and Mar 2011 in Cyprus. It's now 18-Mar-2011 and we're still waiting. More MOD inefficiency? |
| As yet we do not have DII but having used it previously in prior employment I would say that it went down far too often. |

# BIBLIOGRAPHY

## BOOKS


Altshuler, A. and Luberoff, D., *Mega-Projects: the Changing Politics of Urban Public Investment*, (Washington, DC, Brookings Institution, 2003).

Association of Project Management, *Body of Knowledge*, Version 2, (Princes Risborough, APM, 1995).

Aveyard, H., *Doing a Literature Review in Health and Social Care*, (Maidenhead, Open University Press, 2007).

Avison, D. and Fitzgerald, G., *Information Systems Development Methodologies, Techniques and Tools.* (McGraw-Hill, 2003).

Berger, R. M. and Patchener, M. A., *Implementing the Research Plan*, (London, Sage, 1988).

Beynon-Davies, P., *Information Systems: An Introduction to Informatics in Organisations*, (Basingstoke, Palgrave, 2002).

Bignel, V. and Fortune, J., *Understanding Systems Failures*, (Manchester: Manchester University Press, 1984).

Block, R., *The Politics of Projects*, (New York, NY, Yourdon Press, 1983).

Blumberg, B., Cooper, D.R. and Schindler, P.S., *Business Research Methods*, (Maidenhead, McGraw-Hill, 2005).

Boddy, D., Boonstra, A. and Kennedy, G., *Managing Information Systems: An Organisational Perspective*, (Harlow, Financial Times Prentice Hall, 2002).

Boehm, B.W., *Software Risk Management*, (Los Alamos, CA., IEEE Computer Society Press, 1989).

British Standard Institute, *Project Management – Part 2: Vocabulary*, (London, BSI, 2000).

Brooks, F.P., *The Mythical Man Month*, (Addison-Wesley, 1995).

Bryman, A. and Bell, E., *Business Research Methods*, (Oxford, OUP, 2003).

Burns, T. and Stalker, G.M., *The Management of Innovation*, (Oxford, OUP, 1994).

Checkland, P., *Systems Thinking, Systems Practice*, (Chichester, Wiley, 1981).

Collins, T. and Bicknell, D., *Crash: Ten Easy Ways to Avoid a Computer Disaster*, (London, Simon and Schuster, 1997).

Collis, J. and Hussey, R., *Business Research: a Practical Guide for Undergraduate and Postgraduate Students*, 2$^{nd}$ Edition, (Basingstoke, Palgrave Macmillan, 2003).

Davenport, T., *Process Innovation: Reengineering Work through Information Technology*, (Boston, Harvard Business School, 1993).

Dhillon, G., *The Clinical Information System: A Case of Misleading Design Decisions*, Case 1-98-IT06, (Hershey, PA, Idea Group Publishing, 1998).

Dix, A., Finlay, J., Abword, D. and Beale, R., *Human-Computer Interaction*, 3$^{rd}$ Ed., (Harlow, Pearson Education, 2004).

Easterby-Smith, M., Thorpe, R. and Lowe, A., *Management Research: an Introduction*, (London, Sage, 1991).

Ferlie, E., *The New Public Management in Action*, (Oxford, Oxford University Press, 1996).

Flowers, S., *Software Failure: Management Failure*, (Wiley, 1996).

Flynn, N., *Public Sector Management*, 4$^{th}$ Edition, (Harlow, Pearson Education, 2002).

Flyvberg, B., Bruzelius, N. and Rothengatter, W., *Mega-Projects and Risk: An Anatomy of Ambition,* (Cambridge, Cambridge University Press, 2003).
Fortune, J., *Projects and their Genesis*. (Oxford, OUP, 1987).
Fortune, J., *Systems Paradigms,* (Milton Keynes, Open University Press, 1993).
Fortune, J. and Peters, G., *Information Systems: Achieving Success by Avoiding Failure*, (Chichester, Wiley, 2005).
Fortune, J. and Peters, G., *Learning from Failure,* (Chichester, Wiley, 1995).
Kervin, J.B., *Methods for Business Research,* (New York, HarperCollins, 1992).
Kerzner, H., *Project Management*, (Van Nostrand Reinhold, 1989).
King, G., Keohane, R. O. and Verba, S., *Designing Social Inquiry: Scientific Inference in Qualitative Research,* (Princeton, NJ, Princeton University Press, 1994).
Laudon, K.C. and Laudon, J.P., *Essentials of Management Information Systems*, (Upper Saddle River, NJ, Prentice Hall, 2002).
Lawrence, P. R. and Lorsch, J. W., *Organization and Environment: Managing Differentiation and Integration*, (Boston, MA, Harvard University, 1967).
Lee, R.M., *Doing Research on Sensitive Topics,* (London, Sage, 1993).
Markus, M.L., *Systems in Organisations: Bugs and Features*, (London, Pitman,1984).
Meredith, J.R. and Mantel Jr., S.J., *Project Management: A Managerial Approach*, 3rd edition, (New York, Wiley, 1995).
Miles, M.B. and Huberman, A.M., *Qualitative Data Analysis: A Sourcebook of New Methods*, (Newbury Park, CA, Sage, 1984).
Moore, M., *Creating Public Value: Strategic Management in Government*, (Cambridge, MA, Harvard University Press, 1995).
Morris, P.W.G. and Hough, G.H., *The Anatomy of Major Projects: a Study of the Reality of Project Management,* Vol. 2000, 1, (Chichester: Wiley, 1987).
Naughton, J. and Peters, G., *Systems and Failures,*(Oxford, OUP, 1976).
O'Connor, J. and McDermott, I., *The Art of Systems Thinking: Essential Skills for Creativity and Problem Solving,* (London, Thorsons, 1997).
Pearlson, K.E. and Saunders, C.S., *Managing and Using Information Systems: A Strategic Approach,* (New York, Wiley, 2004).
Pfeffer, J., *Managing with Power*. (Boston, MA, Harvard Business School Press, 1992).
Pressman, J.L. and Wildavsky, A., *Implementation*, 3rd Edition, (Berkeley, CA, University of California Press, 1984).
Project Management Institute, *A Guide to the Project Management Body of Knowledge(PMBOK@Guide)*, 4th Edition, (PMI, 2008).
Robson, C., *Real World Research,* (Oxford, Blackwell, 1993).
Sauer, C., *Why Information Systems Fail: A Case Study Approach,* (Henley-on-Thames, Alfred Waller, 1993).
Saunders, M., Lewis, P. and Thornhill, A., *Research Methods for Business Students*, 4th Edition, (Harlow, FT Prentice Hall, 2007).
Schutz, A., *Collected Papers, I: The Problem of Social Reality,* (The Hague, Martinus Nijhof, 1962).
Shenhar, A.J. and Dvir, D., *Reinventing Project Management: The Diamond Approach to Successful Growth and Innovation,* (Boston, MA, Harvard Business School Press, 2007).
Stake, R.E., *The Art of Case Study Research,* (Thousand Oaks, CA, Sage, 1995).
Turner, J.R., *The Handbook of Project-based Management,* (McGraw-Hill, 1993).

Wallace, M. and Wray, A., *Critical Reading and Writing for Postgraduates,* (London, Sage, 2006).
Walsham, G., *Interpreting Information Systems in Organisations*, (Chichester, Wiley, 1993).
Ward, J. and Peppard, J., *Strategic Planning for Information Systems.* 3rd Edition, (Chichester, Wiley, 2002).
Yardley, D., *Successful IT Project Delivery: Learning the Lessons of Project Failure*, (London, Addison-Wesley, 2002).
Yeates, D., *Project Management for Information Systems*, (Pitman, 1991).
Yin, R.K., *Case Study Research, Design and Methods*, 3rd Ed., (Beverley Hills, CA, Sage, 2003).

**CHAPTERS IN BOOKS**

Baker, B.N., Murphy, D.C. and Fisher, D., 'Factors Affecting Project Success', In: Cleland, D.I. and King, W.R. (Eds), *Project Management Handbook,* (New York, Van Nostrand Reinhold, 1988).
Denyer, D. and Tranfield, D., ‘Producing a Systematic Review’, In: Buchanan, D.A. and Bryman, A. (Eds), *The Sage Handbook of Organisational Research Methods,* (Los Angeles, Sage, 2009), pages 671-689.
Healey, M.J. and Rawlinson, M.B., ‘Interviewing Techniques in Business and Management Research’, in Wass, V.J. and Wells, P.E. (Eds), *Principles and Practice in Business and Management Research,* (Aldershot, Dartmouth, 1994), pages 123-145.
Leavitt, H.J., ‘Applied Organizational Change in Industry: Structural, Technological and Humanistic Approaches’, in March, J.G. (Ed.), *Handbook of Organizations,* (Chicago, Rand McNally, 1965).
Morris, P.W.G., ‘Project Management: Lessons from IT and Non-IT Projects’, In: Earl, M.J. (Ed.), *Information Management, the Organisational Dimension,* (Oxford, OUP, 1996).
Shenhar, A.J. and Dvir, D., 'How Projects Differ and What to Do About It', In: Pinto, J. and Morris, P. (Eds), *Handbook of Managing Projects,* (New York,Wiley, 2004).

**CONFERENCE PROCEEDINGS**

Ashley, D.B., 'New Trends in Risk Management', *Internet's 10th International Expert Seminar on New Approaches in Project Management*, 1986. March 10-12, Zurich.
Beath, C.M., 'Strategies for Managing MIS: a Transaction Cost Approach', *Proceedings of the Fourth International Conference on Information Systems,* (Houston, ACM/SIGBDP, 1983), pages 415-427.
Cleland, D.I. 'Measuring Success: the Owner's Viewpoint', *Proceedings of the 18th Annual Seminar/Symposium*, (Montreal, Canada, Upper Darby, PA: Project Management Institute, 1986), page 6.
Dodd, W. and Fortune, J. ‘An Electronic Patient Record Project in the United Kingdom: Can it Succeed?’ In: *Medinfo ’95*, Greenes, R.A., Peterson, H.E. and Protti, D.J. (Eds), (Edmonton, Canada, Healthcare Computing and Communications, 1995), pages 301-304.

Dunleavy, P., Margetts, H., Bastow, S. and Tinkler, J., ‘Government IT Performance and the Power of the IT industry: a Cross-National Study’, paper presented at the *Annual American Political Science Association Conference*, Chicago 1st September 2004. Panel 25-2, *Digital Policy Issues: Inequality, E-government*, 4th Sept. http://www.apsanet.org.

Elvin, R., ‘Managing Information Systems Projects: The Need for a New Approach’, *Proceedings of the 4th UK Academy of Information Systems Conference*, York, (London, McGraw-Hill, 1999), pages 159-165.

Finkelstein, A. and Dowell, J., 'A Comedy of Errors: the London Ambulance Service Case Study', *Proceedings of the 8th International Workshop on Software Specification and Design*, 1996, pages 2-4.

Guah, M.W. and Currie, W.L., ‘Managing Vendor Contracts in Public Sector IT: A Case Study on the UK National Health Service’, *European Conference on Information Systems (ECIS)*, 7-9 June 2007, St Gallen, Switzerland, http://is2.lse.ac.uk/asp/aspecis/20070063.pdf, downloaded 4th April 2011.

Latendresse, P. and Chen, J.C.H., 'The Information Age and Why IT Projects Must Not Fail', 2003, Paper presented at the *2003 Southwest Decision Sciences Institute Conference* SWDSI2003, pages 221-225.

Seddon, P.B. and Kiew, M-Y., ‘A Partial Test and Development of the DeLone and McLean Model of IS Success’, In: DeGross, J.I., Huff, S.L. and Munro, M.C. (Eds), *Proceedings of the International Conference on Information Systems*, (Association for Information Systems, Atlanta, GA, 1994), pages 99-110.

Simmons, K. and Korrapati, R., 'A Study to Examine Factors that Contribute to Software Project Success', Allied Academies International Conference, *Academy of Information and Management Sciences. Proceedings*, 2004, Vol. 8, No. 2, Pages 47-50.

Urquhart, C., ‘Systematic Reviewing, Meta-Analysis and Meta-Synthesis for Evidence-Based Library and Information Science’, *Proceedings of the Seventh International Conference on Conceptions of Library and Information Science: Unity in Diversity, Information Research,* September 2010, Vol. 15, No. 3. http://informationr.net/ir/15-3/colis7/colis708.html. Downloaded 14th October 2010.

**GOVERNMENT REPORTS**

DII IPT, *Defence Information Infrastructure: One Information Infrastructure,* (Copenacre, DII IPT, 2004).

Great Britain, Cabinet Office, *E-Government: A Strategic Framework for Public Services in the Information Age,* (London, Central IT Unit, 2000).

Great Britain, Cabinet Office, *Successful IT: Modernising Government in Action,* (London, HMSO, 1999).

Great Britain, Cabinet Office, Office of Government Commerce, *Government Procurement Code of Good Practice for Customers and Suppliers*, No Date, http://www.ogc.gov.uk/documents/cp0080_Gov_Procurement_Code_Good_Practice.pdf, downloaded 8th December, 2010.

Great Britain, Cabinet Office, Office of Government Commerce*, Major Projects Review Group*, 13 July 2009, http://www.ogc.gov.uk/programmes___projects_major_projects_review_group.asp, downloaded 7th April 2011.

Great Britain, Cabinet Office, Office of Government Commerce, *'Making a Difference': Reducing Bureaucracy in Central Civil Government Procurement*, (London, HMSO, 2003).

Great Britain. Cabinet Office. Office of Government Commerce. *Programmes and Project Delivery: Joint Statement of Intent*. January 2009, www.ogc.gov.uk/documents/ppd_it_projects_joint_statement.pdf, downloaded 5th October 2010.

Great Britain, Cabinet Office, Office of Government Commerce, *Senior IT Forum*, http://www.ogc.gov.uk/procurement_initiatives_senior_it.asp, downloaded 26th November 2010.

Great Britain, Cabinet Office, Office of Government Commerce, *The Centre of Excellence: a Pocket Guide*, (London, HMSO, 2005), page 5. www.ogc.gov.uk/documents/TheCentreOfExcellencePocketbook.pdf, downloaded 19th November 2007.

Great Britain, Civil Service, 'Improving Delivery', *Policy Hub*, 15 February 2008, http://www.nationalschool.gov.uk/policyhub/improving_delivery/, downloaded 20th January 2011.

Great Britain, HM Government, *Financial Management in Government Departments*, Command Paper 9058, (London, HMSO, 1983).

Great Britain, HM Treasury, *Operational Efficiency Programme: Final Report*, (London, HMSO, 2009), http://www.bis.gov.uk/assets/biscore/shex/files/oep_final_report_210409_pu728.pdf, downloaded 11th February 2011.

Great Britain, HM Treasury, *Review of Civil Procurement in Central Government*, (London, HMSO, 1999), http://www.ogc.gov.uk/documents/reveiw_of_civil_procurment.doc, downloaded 20th January 2011.

Great Britain, HM Treasury, *Spending Review Whitepaper: New Public Spending Plans 2001 – 2004: Chapter 12: Ministry of Defence*, http://www.hm-treasury.gov.uk/spending_review/spending_review_2000/spending_review_report/spend_sr00_repchap12.cfm, downloaded 26th October 2007.

Great Britain, HM Treasury, *Transforming Government Procurement*, (London, HMSO, 2007), http://www.hm-treasury.gov.uk/d/government_procurement_pu147.pdf, downloaded 20th January 2011.

Great Britain, House of Commons, Haddon-Cave, C., *An Independent Review into the Broader Issues Surrounding the Loss of the RAF Nimrod MR2 Aircraft XV230 in Afghanistan in 2006*, HC1025, (London, HMSO, 2009).

Great Britain, House of Commons, Public Accounts Committee, *Defence Information Infrastructure*: *First Report of Session 2008-09*, HC100, (London, HMSO, 2009).

Great Britain, House of Commons, Public Accounts Committee, *Improving the Delivery of Government IT Projects*. (London, HMSO, 1999).

Great Britain, House of Commons, Public Accounts Committee, *Ministry of Defence: Delivering Digital Tactical Communications through the Bowman CIP Programme*, Fourteenth Report of Session 2006-2007, HC 358, (London, HMSO, 2007).

Great Britain, House of Commons, Public Accounts Committee, *The Impact of the Office of Government Commerce's Initiative on the Delivery of Major IT-Enabled Projects*, HC 555, (London, HMSO, 2005), http://www.publications.parliament.uk/pa/cm200405/cmselect/cmpubacc/555/555.pdf, downloaded 23rd January 2011.

Great Britain, House of Commons, Work and Pensions Committee, *Management of Information Technology Projects: Making IT Deliver for DWP Customers*, HC 311, Third Report, Session 2003-04, (London, HMSO, 2004).

Great Britain, Institute for Government, *System Error: Fixing the Flaws in Government IT*, (London, Institute for Government, 2011).

Great Britain, Ministry of Defence, 'Introduction to Acquisition Lifecycles', *Acquisition Operating Framework*, http://www.aof.mod.uk/aofcontent/strategic/guide/lifecycles/sg_introduction.htm, downloaded 14th January 2011.

Great Britain, Ministry of Defence, Unclassified PUS/CDS Statement, *A New Strategy for Defence*, (London, MoD, no date), http://www.mod.uk/NR/rdonlyres/32421DC3-CA13-49BC-88F4-2F77E973CB67/0/strategystatement.pdf, downloaded 4th February 2011.

Great Britain, Ministry of Defence, *Annual Report and Accounts 2002-2003*, (London, HMSO, 2003), http://webarchive.nationalarchives.gov.uk/+/http://www.mod.uk/publications/performance2002/chap13.htm, downloaded 29th January 2011.

Great Britain, Ministry of Defence, *Defence: About Defence: Defence Organisation*, http://www.mod.uk/DefenceInternet/AboutDefence/Organisation/KeyFactsAboutDefence/DefenceOrganisation.htm, downloaded 10th January 2011.

Great Britain, Ministry of Defence, *Defence ICT Strategy*, (London, MoD, 2010).

Great Britain, Ministry of Defence. *Defence Information Infrastructure Integrated Project Team*, 19th June 2007, http://www.mod.uk/DefenceInternet/MicroSite/DES/OurTeams/Joint/DefenceInformationInfrastructureIntegratedProjectTeam.htm, downloaded 5th November, 2007.

Great Britain. Ministry of Defence. *Defence Spending*, http://www.mod.uk/DefenceInternet/AboutDefence/Organisation/KeyFactsAboutDefence/DefenceSpending.htm, downloaded 29th September 2010.

Great Britain, Ministry of Defence, *Defence Technology Strategy for the Demands of the 21st Century*, (London, HMSO, 2006).

Great Britain, Ministry of Defence, *Enabling Acquisition Change: An Examination of the Ministry of Defence's Ability to Undertake Through Life Capability Management*, (London, HMSO, 2006), http://www.mod.uk/NR/rdonlyres/10D1F054-A940-4EC6-AA21-D295FFEB6E8A/0/mod_brochure_hr.pdf, downloaded 15th January 2011.

Great Britain, Ministry of Defence, *How Defence Works: Defence Framework*, (London, HMSO, December 2010), page 3, http://www.mod.uk/NR/rdonlyres/D9DD5017-2E12-43C9-8E4D-3C245A9726B9/0/defenceframework_dec10.pdf, downloaded 9th January 2011.

Great Britain, Ministry of Defence, *MoD Information Strategy*, (London, MoD, 2009).

Great Britain, Ministry of Defence, *MoD Public Service Agreement: Autumn Performance Report 2006-07.* www.mod.uk/NR/rdonlyres/D808A991-FA9B-4ED3-9B99-B45C864BAD1F/0/0607_quarter1_psa_rpt.pdf, downloaded 26th January 2008.

Great Britain, Ministry of Defence, *Modernising Defence*, (London, Ministry of Defence, 1999).

Great Britain, Ministry of Defence, *Network Enabled Capability*, JSP 777, 2005, http://www.mod.uk/NR/rdonlyres/E1403E7F-96FA-4550-AE14-4C7FF610FE3E/0/nec_jsp777.pdf, downloaded 27th October 2007.

Great Britain. Ministry of Defence, *Review of Acquisition for the Secretary of State for Defence: an Independent Report by Bernard Gray*, (London, HMSO, 2009).

Great Britain, Ministry of Defence, Burton, E., *Report into the Loss of MoD Personal Data for Permanent Under Secretary Ministry of Defence*, (London, Ministry of Defence, 2008), http://www.mod.uk/nr/rdonlyres/3e756d20-e762-4fc1-bab0-08c68fdc2383/0/burton_review_rpt20080430.pdf, downloaded 4th April 2011.

Great Britain, Ministry of Defence, Defence Committee, *The Strategic Defence Review: Modern Forces for the Modern World*, (London, HMSO, 1998).

Great Britain, Ministry of Defence, Defence Equipment and Support, Information Systems and Services, *Defence Information Infrastructure: Joint Business Plan 2009-2010*, (London, HMSO, 2009).

Great Britain, Ministry of Defence, DII IPT, *Defence Information Infrastructure*, (Copenacre, DCSA, 2004).

Great Britain, National Audit Office, *A Short Guide: the NAO's Work on the Ministry of Defence*, (London, HMSO, June 2010), page 3, http://www.nao.org.uk/publications/1011/short_guide_mod.aspx, downloaded 9th January 2011.

Great Britiain, National Audit Office, *Assessment of the Capability Review Programme*, (London, HMSO, 2009), http://www.nao.org.uk/whats_new/0708-1/0809123.aspx, downloaded 20th January 2011.

Great Britain, National Audit Office, *Central Government's Management of Service Contracts*, (London, HMSO, 2008), http://www.nao.org.uk/publications/press_notice_home/0809/080965.aspx, downloaded 20th January 2011.

Great Britain, National Audit Office, *Central Government's Use of Consultants*, (London, HMSO, 2006), http://www.nao.org.uk/whats_new/0607/0607128.aspx, downloaded 20th January 2011.

Great Britain, National Audit Office, *Commercial Skills for Complex Government Projects*, (London, HMSO, 2009), http://www.nao.org.uk/publications/0809/commercial_skills.aspx, downloaded 20th January 2011.

Great Britain, Ministry of Defence, *Defence: About Defence: Defence Organisation*, http://www.mod.uk/DefenceInternet/AboutDefence/Organisation/KeyFactsAboutDefence/DefenceOrganisation.htm, downloaded 10th January 2011.

Great Britain, National Audit Office, *Delivering Digital Tactical Communications through the Bowman CIP Programme*, HC 1050 Session 2005-2006, (London, HMSO, 2006).

Great Britain, National Audit Office, *Delivering Successful IT-Enabled Change*, HC 33-1, Session 2006-2007, (London, HMSO, 2006).

Great Britain, National Audit Office, *Driving the Successful Delivery of Major Defence Projects: Effective Project Control*, HC 30 2005-2006, (London, HMSO, 2005), http://www.nao.org.uk/publications/0506/effective_project_control.aspx, downloaded 10th January 2011.

Great Britain, National Audit Office, *Helping Government Learn*, (London, HMSO, 2009), http://www.nao.org.uk/publications/press_notice_home/0809/0809129.aspx, downloaded 20th January 2011.

Great Britain, National Audit Office, *Improving IT Procurement: The Impact of the OGC's Initiatives on Departments and Suppliers in the Delivery of Major IT-Enabled Projects,* November 2004, (London, HMSO, 2004).

Great Britain, National Audit Office, *Major Projects Report 2009*, HC85-I, (London, HMSO, 2009), http://www.nao.org.uk/publications/0910/mod_major_projects_report_2009, downloaded 14th January 2011.

Great Britain, National Audit Office, *Managing Resources to Deliver Better Public Services*, (London, HMSO, 2003), http://www.nao.org.uk/publications/0304/managing_resources_to_deliver.aspx, downloaded 20th January 2011.

Great Britain, National Audit Office, *Ministry of Defence: Defence Information Infrastructure*, (London, HMSO, 2008), http://www.nao.org.uk/whats_new/0708/0708788.aspx, downloaded 29th January 2011.

Great Britain, National Audit Office, *Ministry of Defence: Operation Telic – United Kingdom Military Operations in Iraq*, HC60, (London, HMSO, 2003), http://www.nao.org.uk/publications/0304/operation_telic.aspx, downloaded 24th January 2011.

Great Britain, National Audit Office, *Ministry of Defence: Using the Contract to Maximise the Likelihood of Successful Project Outcomes*, (London, HMSO, 2006), http://www.nao.org.uk/publications/0506/ministry_of_defence_using_the.aspx#footnote1, downloaded 22nd January 2011.

Great Britain, National Audit Office, *Modern Policy-Making: Ensuring Policies Deliver Value for Money*. HC 289, Session 2001-2002. (London: HMSO, 2001).

Great Britain, National Audit Office, *Press Release: Improving IT procurement: the Impact of the Office of Government Commerce's Initiatives on Departments and Suppliers in the Delivery of Major IT-Enabled Projects*, (London, HMSO, 2004), http://www.nao.org.uk/publications/0304/improving_it_procurement.aspx, downloaded 22nd January 2011.

Great Britain, National Audit Office, *The Efficiency Programme: A Second Review of Progress*, (London, HMSO, 2007), http://www.nao.org.uk/whats_new/0607/0607156.aspx, downloaded 20th January 2011.

Great Britain, National Audit Office and Office of Government Commerce, *Good Practice Contract Management Framework*, (London, HMSO, 2008), http://www.ogc.gov.uk/documents/Management_Framework_Good_Practice_FINAL.pdf, downloaded 20th January 2011.

Great Britain, Parliamentary Office of Science and Technology, *Government IT Projects*, Report 200, (London, HMSO, 2000).

**JOURNAL ARTICLES**


Alter, S., 'Could the Work System Method Embrace Systems Concepts More Fully?' *Information Resource Management Journal*, 2007, Vol. 20, No. 2, pages 33-43.

Alter, S., 'Which Life Cycle – Work System, Information System or Software?' *Communications of the Association for Information Systems*, October 2001, 7, Article 17, page 12.

Alter, S. and Ginzberg, M., 'Managing Uncertainty in MIS Implementation', *Sloan Management Review*, 1978, Vol. 20, No. 1, pages 23-31.

Alvarez, A.J.S., 'Towards an Interpretative Integrative Framework to Conceptualise Social Processes in Large Information Systems Implementations', *Information Technology for Development*, 2003, Vol. 10, pages 233-247, this page 233.

Andrews, R., 'The Place of Systematic Reviews in Education Research', *British Journal of Education,* 2005, Vol. 53, No. 4, pages 399-416.

Angelopoulos, S., Kitsios, F. and Papadopoulos, T., 'New Service Development in E-Government: Identifying Critical Success Factors', *Transforming Government" People, Process and Policy*, 2010, Vol. 4, No. 1, pages 95-118.

Anon., 'All Present and Correct', *KableNet.com*, 25 April 2003.

Anon., 'A Stronger Hand', *GC: Government Computing Magazine*, April 2010, page 22

Anon., 'Computerising the NHS: the Health Service's IT Problem', *The Economist*, 17 October 2002, http://www.economist.com/node/1390034, downloaded 3rd January 2008.

Anon., 'Contracts Signal the Green Light for DII(F)', *Preview*, April 2005.

Anon., 'Criticisms of NHS IT Programme were cut from NAO report', *e-Health-Insider,* August 2006, http://www.e-health-insider.com/news/2079/criticisms_of_nhs_it_programme_were_cut_from_nao_report, downloaded 9th December, 2010.

Anon., 'Defence Infrastructure Gets Supplier', *KableNet.com*, 2 March 2005, downloaded 20th May 2005.

Anon, 'EDS Pays for Tax Credit Debacle', *Kablenet.com*, 22 November 2005, downloaded 28th November 2005.

Anon., 'Government Projects Drain EDS', *KableNet.com,* 7 October 2002.

Anon., 'MoD to Wage £5bn IT campaign'. *Government Computing*, 19th March 2003, www.kablenet.com.../2E9E07E556D73E1880256CED004FD0B4?OpenDocumen downloaded 5th December 2003.

Anon., 'MPs Attack EDS', *KableNet.com*, 19 January 2004, downloaded 24th January 2004.

Anon., 'NHS IT Settles Dispute with EDS', *PublicTechnology.net*, 14 July 2004, http://www.publictechnology.net/content/1392, downloaded 31st January 2011.

Anon., 'OGC Sees Red', *Kablenet.com*, 1st March 2005, www.kablenet.com/kd.nsf/printview/D556DD34D70285D580256FB7003EE9A

Anon., 'Retail to Lead IT Spending Downturn', *Contractor UK*, 31 March 2009, http://www.contractoruk.com/news/004290.html, downloaded 29th September 2010.

Anon., 'Sights set on DII', *KableNet.com*, 11 June 2003.

Anon., 'The Bulletin Interview: Ian Watmore', *ITNow*, March 2005, http://archive.bcs.org/bulletin/mar05/intervie.htm, downloaded 16th January 2006.

Agarwal, N. and Rathod, U., 'Defining 'Success' for Software Projects: An Exploratory Revelation', *International Journal of Project Management,* 2006, Vol. 24, No. 4, Pages 358-370.

Arnott, S., 'Government IT Projects Squander £1.5 billion.' *IT Week,* 13th March 2003, www.itweek.co.uk/Print/1139438, downloaded 31st July 2003.

Arnott, S., 'Watmore gets PM Delivery Unit Role', *Computing*, 15 December 2005, http://www.computing.co.uk/ctg/news/1817527/watmore-pm-delivery-unit-role, downloaded 16th January 2006.

Assudani, R. and Kloppenborg, T.J., 'Managing Stakeholders for Project Management Success: An Emergent Model of Stakeholders', *Journal of General Management,* Vol. 35, No. 3, pages 67-80.

Atkinson, R., 'Project Management: Cost, Time and Quality, Two Best Guesses and a Phenomenon, It's Time to Accept Other Success Criteria', *International Journal of Project Management*, 1999, Vol. 17, No. 6, pages 337-342.

Baccarini, D., 'The Logical Framework Method for Defining Project Success', *Project Management Journal*, 1999, Vol. 30, No. 4, pages 25-32.

Baccarini, D., Salm, G. and Love, E.D., 'Management of the Risks in Information Technology Projects', *Industrial Management and Data Systems*, 2004, Vol. 104, Nos 3/4, pages 286-296.

Barber, E., 'Benchmarking the Management of Projects: A Review of Current Thinking', *International Journal of Project Management*, 2004, Vol. 22, pages 301-307.

Barki, H., Rivard, S. and Talbot, J. 'Toward an Assessment of Software Development Risk', *Journal of Management Information Systems,* 1993, Vol. 10, No. 2, pages 203-225.

Bates, M., 'The Design of Browsing and Berrypicking Techniques for On-line Search Interface', *Online Review*, 1989, Vol. 13, No. 5, pages 407–431.

Beale, P. and Freeman, M., 'Successful Project Execution: a Model', *Project Management Journal*, 1991, Vol. 22, No. 4, Page 23.

Belassi, W. and Tukel, O.I., 'A New Framework for Determining Critical Success/Failure Factors in Projects', *International Journal of Project Management*, 1996, Vol. 14, No. 3, pages 141-152.

Belout, A., 'Effects of Human Resource Management on Project Effectiveness and Success: Toward a New Conceptual Framework', *International Journal of Project* Management, 1998, Vol. 16, No. 1, pages 21-26.

Bentley, D. and Rafferty, G., 'Project Management: Keys to Success', *Civil Engineering*, April 1992.

Bernroider, E.W.N., 'IT Governance for Enterprise Resource Planning Supported by the Delone-Mclean Model of Information Systems Success', *Information and Management*, 2008, Vol. 45, No. 5, pages 257-269.

Bernroider, E.W.N. and Ivanov, M., 'IT Project Management Control and the Control Objectives for IT and Related Technology (Cobit) Framework', *International Journal of Project Management*, 2010, In Press

Beynon-Davies, P., 'Human Error and Information Systems Failure: The Case of the London Ambulance Service Computer-Aided Dispatch System Project', *Interacting with Computers*, 1999, Vol. 11, No. 6, pages 699-720

Beynon-Davies, P., 'Information Systems 'Failure': The Case of the London Ambulance Service's Computer-Aided Despatch System', *European Journal of Information Systems,* 1995, Vol. 4, pages 171-184.

Beynon-Davies, P., Owens, I. and Williams, M.D., 'Information Systems Evaluation and the Information Systems Development Process', *The Journal of Enterprise Information Management*, 2004, pages 276-282.

Boehm, B., 'Software Risk Management: Principles and Practices', *IEEE Software*, Jan 1991, Vol. 8, No. 1, pages 32-41

Boehm, B. and Ross, R., 'Theory-W Software Project Management: Principles and Examples', *IEEE Transactions of Software Engineering*, 1989, Vol. 15, No. 7, pages 902-916.

Boynton, A.C. and Zmud, R.W., 'An Assessment of Critical Success Factors', *Sloan Management Review*, 1984, Vol. 25, No. 4, pages 17-27.

Briggs, R.O., Vreede, G.J.D., Nunamaker, J. and Sprague, R., 'Special Issue: Information Systems Success', *Journal of Management Information Systems*, 2003, Vol. 19, No. 4, pages 5-8.

Brockner, J., 'The Escalation of Commitment to a Failing Course of Action: Toward Theoretical Progress', *Academy of Management Review*, Vol. 17, No. 1, 1992, pages 39-61.

Brown, T., 'Modernisation or Failure? IT Development Programmes in the UK Public Sector', *Financial Accounting and Management IT*, Vol. 17, No. 4, November 2001, pages 363-381.

Bryde, D.J., 'Methods for Managing Different Perspectives of Project Success', *British Journal of Management*, 2005, Vol. 16, No. 2, Pages 119-131.

Bryde, D.J. and Robinson, L., 'Client Versus Contractor Perspectives on Project Success Criteria', *International Journal of Project Management*, 2005, Vol. 23, pages 622-629.

Bryde, D., 'Perceptions of the Impact of Project Sponsorship Practices on Project Success', *International Journal of Project Management*, 2008, 26, pages 800-809.

Caldeira, M.M. and Ward, J.M. 'Understanding the Successful Adoption and Use of IS/IT in SMEs: An Explanation from Portuguese Manufacturing Industries', *Information Systems Journal*, 2002, 12, pages 121-152.

Carr, N.G., 'IT Doesn't Matter'.  *Harvard Business Review*, May 2003, pages 41-49.

Cerveny, R.P. and Sanders, G.L., 'Implementation and Structural Variables', *Information and Management*, 1986, 11, pages 191-198.

Chalmers, M., 'Defence Inflation: Reality or Myth?' *RUSI Defence Systems*, June 2009, pages12-21, http://www.rusi.org/downloads/assets/Comment_Defence_Inflation_Myth_or_Reality.pdf, downloaded 23rd January 2011.

Chan, A.P.C., Scott, D. and Chan, A.P.L., 'Factors Affecting the Success of a Construction Project', *Journal of Construction Engineering and Management*, 2004, Vol. 130, No. 1, pages 153-155.

Charette, R.N., 'Why Software Fails', *IEEE Spectrum*, 2005, Vol. 42, No. 9, pages 42-49.

Chua, A.Y.K., 'Exhuming IT Projects From Their Graves: An Analysis of Eight Failure Cases and Their Risk Factors', *Journal of Computer Information Systems*, Spring 2009, http://findarticles.com/p/articles/mi_hb5785/is_200904/ai_n32326224/?tag=content;col1, downloaded 31 March 2010.

Clarke, A., 'A Practical Use of Key Success Factors to Improve the Effectiveness of Project Management', *International Journal of Project Management*, 1999, Vol. 17, No. 3, pages 139-145.

Cole, A., 'Runaway Projects: Cause and Effects', *Software World*, 1997, Vol. 26, No. 3, pages 3-5.

Collins, A. and Baccarini, D., 'Project Success? A Survey,' *Journal of Construction Research*, 2004, Vol. 5, No. 2, pages 211-231.

Collins, T., 'Commons Support Grows for Gateway Publication', *Computer Weekly,* 13th July 2004, p.1.

Collins, T., 'Decision Not to Publish Gateway Reviews Does Not Bear Scrutiny – and Here's Why', *Computer Weekly*, 13th July 2004, p.14.

Collins, T., 'Government IT: Time Now for Real Change?' *ComputerWeekly.com*, 18 May 2010, http://www.computerweekly.com/blogs/public-sector/2010/05/government-it---time-now-time.html, downloaded 18th November, 2010.

Collins, T., 'IT is the Biggest Area of Waste in the Public Sector', *ComputerWeekly.com*, 6 July 2004, http://www.computerweekly.com/articles/article.asp?liArticleID=131737&liArticleTydownloaded 7th July 2004.

Collins, T., 'Minister to Consider Computer Weekly's Plan to Stop IT Disasters', *Computer Weekly*, 6th July 2004, p.14.

Collins, T., 'MPs Back Publication of Gateway Reports', *Computer Weekly,* 5th July 2005, p.1.

Collins, T., 'Public Sector IT projects Have Only 30% Success Rate – CIO for Department of Work and Pensions', *Computerweekly.com*, 17 May 2007, http://www.computerweekly.com/blogs/tony_collins/2007/05/public-sector-it-projects-have.html, downloaded 3rd January 2008.

Collins, T., 'Senior Responsible Owner: a Good Idea Subverted', *ComputerWeekly.com*, 24th August 2007, http://www.computerweekly.com/blogs/public-sector/2007/08/senior-esponsible-owner-a-good-1.html, downloaded 18th November 2010.

Collins, T., 'Should Large IT Suppliers Worry about Government Spending Cuts', *ComputerWeekly.com,* 22 June 2010, http://www.computerweekly.com/blogs/tony_collins/2010/06/need-large-it-suppliers-worry.html, downloaded 29th September 2010.

Collins, T., 'Watmore Tells MPs Why So Many Government IT Projects Fail', *ComputerWeekly.com*, 10 June 2009, http://www.computerweekly.com/Articles/2009/06/10/236365/Watmore-tells-MPs-why-so-many-government-IT-projects.htm, downloaded 23rd November 2010.

Collins, T., 'Twenty Five Years of Government IT Project Failure', *ComputerWeekly.com*, 6 November 2009, http://www.computerweekly.com/Articles/2009/11/06/238452/Twenty-five-years-of-government-IT-project-failure.htm, downloaded 29th September 2010.

Collins, T., 'What MPs Said about the State IT Projects in 1984', *ComputerWeekly.com*, 12 November 2009, http://www.computerweekly.com/blogs/public-sector/2009/11/public-accounts-mps-attack-it.html, downloaded 18th November 2010.

Collins, T., 'Whitehall Must Embrace Honesty and Openness to Succeed with IT', *Computer Weekly*, 17th May 2005, pages 1-4.

Cooke-Davies, T., 'The 'Real' Success Factors in Projects', *International Journal of Project Management*, 2002, Vol. 20, No. 3, pages 185-190.

Cooke-Davies, T.J., Crawford, L.H. and Lechler, T.G., ‘Project Management Systems: Moving Project Management from an Operational to a Strategic Discipline’, *Project Management Journal*, 2009, Vol. 40, No. 1, pages 110-123.

Crawford, L.H. and Helm, J., ‘The Value of Project Management in the Public Sector’, *Project Management Journal*, 2009, Vol. 40, No. 1, pages 73-88.

Crawford, L., Costello, K., Pollack, J., and Bentley, L., ‘Managing Soft Change Projects in the Public Sector, *International Journal of Project Management,* 2003, Vol. 21, pages 443–448.

Cronin, P., Ryan, F. and Coughlan, M., ‘Undertaking a Literature Review: a Step by Step Approach’, *British Journal of Nursing*, 2008, Vol. 17, No. 1, pages 38-43.

Cross, M., ‘A Measure for Success’, *Government IT*, November 2003, page 4.

Cross, M., ‘Special Report: Public Sector IT Failures’, *Prospect*, October 2005, pages 48-52

Cule, P., Schmidt, R., Lyytinen, K. and Keil, M., 'Strategies for Heading off IS Project Failure', *Information Systems Management*, 2000, Vol. 17, No. 2, Pages 65-73.

Curtis, B., Krasner, H. and Iscoe, N., ‘A Field Study of the Software Design Process for Large Systems’, *Communications of the ACM*, 1988, 31, pages 1268-1287

Czuchry, A.J. and Yasin, M.Y., 'Managing the Project Management Process', *Industrial Management & Data Systems*, 2003, Vol. 103, Nos 1/2, pages 39-47.

Daniel, D.R., ‘Management Information Crisis’, *Harvard Business Review*, Sept-Oct 1961, pages 111-121.

Davis, G.B. et al., ‘Diagnosis of an Information System Failure’, *Information and Management*, 1992, 23, 293-318.

Davis, G.B., 'Strategies for Information Requirements Determination', *IBM System Journal*, 1982, Vol. 21, No. 1, pages 4-30.

de Bakker, K., Boonstra, A. and Wortmann, H., 'Does Risk Management Contribute to IT Project Success? A Meta-Analysis of Empirical Evidence', *International Journal of Project Management*, 2010, Vol. 28, No. 5, Page 493.

Delone, W.H., 'Determinants of Success for Computer Usage in Small Business', *MIS Quarterly*, March 1988, Vol. 12, No. 1, pages 51-61.

DeLone, W.H. and McLean, E.R., 'Information Systems Success: the Quest for the Dependent Variable', *Information Systems Research*, 1992, Vol. 3, No. 1, pages 60-95.

DeLone, W.H. and McLean, E.R., ‘The DeLone and McLean Model of Information Systems Success: a Ten-Year Update’, *Journal of Management Information Systems*, 2003, Vol. 19, No. 4, pages 9-30.

Denyer, D., Tranfield, D. and van Aken, J.E, ‘Developing Design Propositions through Research Synthesis’, *Organization Studies*, Vol. 29, No. 3, pages 393-415.

de Wit, A., 'Measurement of Project Success', *International Journal of Project Management*, 1988, Vol. 6, No. 3, pages 164-170.

Doherty, N.F. , King, M. and Marples, C.G., 'Factors Affecting the Success of Hospital Information Systems', *Failure and Lessons Learned in Information Technology Managemen*t, 1998, Vol. 2, No. 3, pages 91-105.

Dubash, M., ‘The Desktop Lifecycle: How Long is it Anyway?’ *The Register*, 10th March 2011, http://www.theregister.co.uk/2011/03/10/desktop_lifecycle/, downloaded 4th April 2011.

Dvir, D. and Ben David, A., ‘Team Characteristics, Organizational Culture and Project Success: a Neural Network Approach’, *International Journal of Industrial Engineering: Special Issue on Project Management*, 1999, Vol. 6, No. 2, pages 151-160.

Dvir, D., Ben David, A., Sadeh, A. and Shenhar, A.J., ‘Critical Managerial Factors Affecting Defense Projects Success: A Comparison between Neural Network and Regression Analysis’, *Engineering Applications of Artificial Intelligence,* 2006, Vol. 19, No. 5, pages 535-543.

Dvir, D. and Lechler, T., 'Plans are Nothing, Changing Plans is Everything: The Impact of Changes on Project Success', *Research Policy*, 2004, Vol. 33, No. 1, Pages 1-15.

Dvir, D, Lipovetsky, S., Shenhar, A. and Tishler, A., 'In Search of Project Classification: A Non-Universal Approach to Project Success Factors', *Research Policy*, 1998, 27, pages 915-935.

Dvir, D., Lipovetsky, S., Shenhar, A.J. and Tishler, A., 'What is Really Important for Project Success? A Refined, Multivariate, Comprehensive Analysis', *International Journal of Management & Decision Making*, 2003, Vol. 4, No. 4, Pages 382-404.

Dvir, D., Raz, T. and Shenhar, A.J., 'An Empirical Analysis of the Relationship Between Project Planning and Project Success', *International Journal of Project Management*, 2003, Vol. 21, No. 2, Pages 89-95.

Eisenhardt, K.M., ‘Building Theories from Case Study Research’, *Academy of Management Review*, Vol. 14, No. 4, 1989, pages 532-550.

Emam, K. and Koru, A., 'A Replicated Survey of IT Software Project Failures', *IEEE Software*, 2008, Vol. 25, No. 5, Page 84-90.

Enticknap, N., ‘Cautious Growth as Economy Grows’, *ComputerWeekly.com*, 22nd July 2005, http://www.computerweekly.com/Articles/2005/07/22/210967/cautious-growth-as-economy-slows.htm, downloaded 26th October 2007.

Ewusi, M.K., 'Critical issues in Abandoned Information Systems Development Projects', *Communications of the ACM*, 1997, Vol. 40, No. 9, pages 74-80.

Ewusi-Mensah, K. and Przasnyski, Z.H., 'Factors Contributing to the Abandonment of Information Systems Development Projects', *Journal of Information Technology*, 1994, Vol. 9, pages 185-201.

Ewusi-Mensah, K. and Przansnyski, Z,H., 'Learning from Abandoned Information Systems Development Projects', *Journal of Information Technology*, 1995, Vol. 10, pages 3-14.

Ewusi-Mensah, K and Przasnyski, Z.H., 'On Information Systems Project Abandonment: An Exploratory Study of Organizational Practices', *MIS Quarterly*, 1991, Vol. 15, No. 1, pages 67-85.

Fay, J., ‘HP pays $13.9bn for EDS: Silicon Valley Opens a Branch in Texas’, *The Register*, 13 May 2008, http://www.theregister.co.uk/2008/05/13/hp_buys_eds/, downloaded 15th January 2011.

Feeny, D. and Willcocks, L., ‘Core IS Capabilities for Exploiting Information Technology’, *Sloan Management Review*, 1988, Vol. 39, No. 3, pages 9-21.

Fiol, C.M. and Lyles, M.A., ‘Organizational Learning’, *Academy of Management Review*, Vol. 10, No. 4, October 1985, pages 803-814.

Fitzgerald, G., and Russo, N., ‘The Turnaround of the London Ambulance Service Computer-Aided Despatch System (LASCAD)’, *European Journal of Information Systems*, 2005, Vol. 14, pages 244-257.

Flynn, N., ‘Modernising British Government’, *Parliamentary Affairs*, Vol. 52, No. 4, October 1999, pages 582-597.

Fortune, J. and Peters, G., ‘Systems Analysis of Failures as a Quality Management Tool’, *British Journal of Management*, 1994, Vol. 5, pages 205-213.

Fortune, J. and Peters, G., ‘The Formal System Paradigm for Studying Failures’, *Technology Analysis and Strategic Management*, 1990, Vol. 2, No. 4, pages 383-390.

Fortune, J. and White, D., ‘Framing of Project Critical Success Factors by a Systems Model’, *International Journal of Project Management*, 24, 2006, pages 53-65.

Fowler, J.J. and Horan, P., 'Are Information Systems' Success and Failure Factors Related?: An Exploratory Study.' *Journal of Organizational and End User Computing*, 2007, Vol. 19, No.2, pages 1-22.

Fowler, A. and Walsh, M., 'Conflicting Perceptions of Success in an Information Systems Project', *International Journal of Project Management*, 1999, Vol. 17, No. 1, Pages 1-10.

Françoise, O., Bourgault, M. and Pellerin, R., 'ERP Implementation through Critical Success Factors' Management', *Business Process Management Journal*, 2009, Vol. 15, No. 3, Pages 371-394.

Frederickson, H.G., ‘Can Bureaucracy be Beautiful?’ *Public Administration Review*, Vol. 60, No. 1, 2000, pages 47–53.

Freeman, M. and Beale, P., 'Measuring Project Success', *Project Management Journal*, 1992, Vol. 23, No. 1, pages 8-17.

Garden, T., ‘Last Post for the Chiefs?’ *RUSI Journal*, March 1999.

Ghobadian, A., Viney, H. and Redwood, J., ‘Explaining the Unintended Consequences of Public Sector Reform’, *Management Decision*, Vol. 47, No. 10, 2009, pages 1514-1535.

Gichoya, D., 'Factors Affecting the Successful Implementation of ICT Projects in Government', *The Electronic Journal of e-Government*, 2005, Vol. 3, Issue 4, pages 175-184.

Gill, T., ‘Early Expert Systems: Where Are They Now?’ *MIS Quarterly*, Vol. 19, No. 1, pages 51-82.

Ginzberg, M.J., 'Key Recurrent Issues in the MIS Implementation Process', *MIS Quarterly*, June 1981, Vol. 5, No. 2, pages 47-59.

Glaser, G., 'Managing Projects in the Computer Industry', *Computer*, 1984, pages 45-53.

Glass, R.L., 'Evolving a New Theory of Project Success', *Association for Computing Machinery. Communications of the ACM*, 1999, Vol. 42, No. 11, Page 17-19.

Glass, R., 'IT Failure Rates - 70% or 10-15%?' *IEEE Software*, 2005, Vol. 22, No. 3, Page 110-111.

Gottschalk, P. and Karlsen, J.T., 'A Comparison of Leadership Roles in Internal IT Projects Versus Outsourcing Projects', *Industrial Management and Data Systems*, 2005, Vol. 105, No. 9, pages 1137-1149.

Goulielmos, M., 'Applying the Organisational Failure Diagnosis Model to the Study of Information Systems Failure', *Disaster Prevention and Management*, 2005, Vol. 14, No. 3, pages 362-377.

Goulielmos, M., 'Outlining Organisational Failure in Information Systems Development', *Disaster and Prevention Management*, 2003, Vol. 12, No. 4, pages 319-327.

Guimaraes, T, Armstrong, C.P. and Jones, B.M., 'A New Approach to Measuring Information Systems Quality', *The Quality Management Journal*, 2009, Vol. 16, No. 1, page 42-53.

Hackney, R.A. and McBride, N.K., ‘The Efficacy of Information Systems in the Public Sector: Issues of Context and Culture’, *The International Journal of Public Sector Management*, 1995, Vol. 8, No. 6, pages 17-30.

Hardgrave, M., ‘Fast Response’, *Defence Director*, Vol. 1, No. 6, November 2003, pages 32-34.

Harte, M., ‘Defence Information Infrastructure (Future)’, *Defence Management Journal*, September 2005, pages 78-79.

Heath, N., ‘Spending Cuts: 400 Government IT Projects under the Microscope’, *Silicon.com*, 22 September 2010, http://www.silicon.com/management/public-sector/2010/09/22/spending-cuts-400-government-it-projects-under-the-microscope-39746379/, downloaded 29th September 2010.

Heath, N., ‘Spending Review: £1 Billion Plus Cuts to Government IT Bill’, *Silicon.com*, 20 October 2010, http://www.silicon.com/management/public-sector/2010/10/20/spending-review-1bn-plus-cuts-to-government-it-bill-39746519/, downloaded 23rd November 2010.

Heemstra, F.J. and Kusters, R.J., 'Dealing with Risk: a Practical Approach', *Journal of Information Technology*, 1996, Vol. 11, No. 4, pages 333-346.

Hilliam, C.E. and Edwards, H.M., ‘A Case Study Approach to Evaluation of Information Technology/Information Systems (IT/IS) Investment Evaluation Processes within SMEs’, *The Electronic Journal of Information Systems Evaluation*, 2001, Vol. 4, No. 2.

Holmes, A., ‘Five Reasons Why Clinger-Cohen Failed’, *NextGov: Technology and the Business of Government*, 8 November 2010, http://techinsider.nextgov.com/2010/08/five_reasons_why_clinger-cohen_failed.php, downloaded 26th November 2010.

Howell, D., Windahl, C. and Seidel, R. 'A Project Contingency Framework Based on Uncertainty and its Consequences', *International Journal of Project Management*, 2010, Vol. 28, pages 256-264.

Huang, S., Chang, I., Li, S. and Lin, M., 'Assessing Risk in ERP Projects: Identify and Prioritize the Factors', *Industrial Management & Data Systems*, 2004, Vol. 104, Nos 8/9, pages 681-690.

Hulme, M.R., 'Procurement Reform and MIS Project Success', *International Journal of Purchasing and Materials Management*, 1997, Vol. 3, No. 1, Pages 2-7.

Hyväri, I., 'Success of Projects in Different Organizational Conditions', *Project Management Journal*, 2006, Vol. 37, No. 4, Pages 31-41.

Ives, B. and Olson, M.H., 'User Involvement and MIS Success: a Review of Research', *Management Science*, 1984, Vol. 30, No. 5, pages 586-603.

Jensen, J.L. and Rodgers, R., ‘Cumulating the Intellectual Gold of Case Study Research’, *Public Administration Review*, 2001, Vol. 61, No. 2, pages 236-246, this page 237-239.

Jiang, J.J. and Klein, G., Risks to Different Aspects of System Success', *Information and Management*, 1999, Vol. 36, pages 264-272.

Jiang, J.J., Klein, G. and Means, T. 'Project Risk Impact on Software Development Team Performance', *IEEE Transactions on Engineering Management*, 2001, Vol. 48, No. 1, pages 46-55.

Jones, C., 'Software Project Management Practices: Failure Versus Success', *Crosstalk: the Journal of Defense Software Engineering*, October 2004, pages 5-9.

Jugdev, K. and Muller, R., 'A Retrospective Look at our Evolving Understanding of Project Success', *Project Management Journal*, December, 2005, Vol. 36, No. 4, pages 19-31

Kablenet.com, 'IT Spend Surges Towards 2004'. 23rd October 2002, *www.kable.co.uk*, downloaded 3rd January 2008.

Kaminetzky, D. and Lavon, B., 'Success or Failure: a Tale of Two Projects', *Civil Engineering*, 1996, Vol. 66, No. 6, Page 62.

Kappelman,L.A., McKeeman, R. and Zhang, L., 'Early Warning Signs of IT Project Failure: the Dominant Dozen', *Information Systems Management*, 2006, pages 31-36.

Karlsen, J., Andersen, J., Birkely, L. and Odegard, E., 'An Empirical Study of Critical Success Factors in IT Projects', *International Journal of Management & Enterprise Development*, 2006, Vol. 3, No. 5 Page 1.

Keil, M. and Mann, J., 'The Nature and Extent of IT Project Escalation: Results from a Survey of IS Audit and Control Professionals', *IS Audit & Control Journal*, Vol. 1, 1997, pages 40-48.

Keil, M. and Montealegre, R. 'Cutting Your Losses: Extricating Your Organisation When a Big Project Goes Awry', *Sloan Management Review*, 2000, Vol. 41, No. 3, pages 55-68.

Keil, M. and Robey, D., 'Turning Around Troubled Software Projects: an Exploratory Study of the De-Escalation of Commitment to Failing Courses of Action', *Journal of Management Information Systems*, Vol. 15, No. 4, Spring 1999, pages, 63-87, this page 64.

Keil, M. and Robey, D., 'Blowing the Whistle on Troubled Software Projects', *Communications of the ACM*, 2001, Vol. 44, No. 4, pages 87-94.

Keil, M., Cule, P.E., Lyttinen, K. and Schmidt, R.C., 'A Framework for Identifying Software Project Risks', *Communications of the ACM*, November 1998, Vol. 41 No. 11, pages 76-83.

Kim, C.S. and Peterson, D.K., 'Developers' Perceptions of Information Systems Success Factors', *Journal of Computer Information Systems*, Winter 2000/2001, Vol. 41, No. 2.

King, L., 'Information Commissioner Orders IT Gateway Review Publication', *CIO*, 24 June 2009, http://www.cio.co.uk/news/118084/information-commissioner-orders-it-gateway-review-publication/, downloaded 23 November 2010.

King, W.R. and Teo, T.S.H., 'Facilitators and Inhibitors for the Strategic Use of Information Technology', *Information and Management*, 1994, No 27, pages 71-87.

Kirkpatrick, D., 'Is Defence Inflation Really as High as Claimed? *RUSI Defence Systems*, October 2008, pages 66-71, http://www.rusi.org/downloads/assets/17kirkpatrick.pdf, downloaded 23rd January 2011.

Kirkpatrick, D., 'Lessons from the Report on MoD Major Projects', *RUSI Defence Systems*, June 2009, http://www.rusi.org/downloads/assets/Acquisition_Issues_Lessons_from_the_MoD_RDS_Summer_09.pdf, downloaded 10th January 2010.

Klein, J.I. 'Parenthetic Learning in Organizations: Toward the Unlearning of the Unlearning Model', *Journal of Management Studies*, Vol. 26, No. 3, 1989, pages 291-308.

Kloppenborg, T.J. and Opfer, W.A., 'The Current State of Project Management Research: Trends, Interpretations and Predictions', *Project Management Journal*, 2002, Vol. 33, No. 2, pages 5-18.

Krauth, J., 'Introducing Information Technology in Small and Medium Sized Enterprises', *Studies in Informatics and Control*, 1999, Vol. 8, No. 1.

Kumar, R., 'Managing Risks in IT Projects: An Options Perspective', *Information and Management*, 2002, 40, pages 63-74.

Kutsch, E., 'The Measurement of Performance in IT Projects', *International Journal of Electronic Business*, 2007, Vol. 5, No. 4, Page 415.

Kutsch, E. and Maylor, H., 'From Failure to Success: An Investigation into Managers' Criteria for Assessing the Outcome of IT Projects', *International Journal of Manufacturing Technology and Management,* 2009, Vol. 16, No. 3, Page 265.

Lake, D., ‘Special Delivery’, *Defence Director,* Vol. 4, No. 6, November 2006, pages 48-49.

Lauras, M., Marques, G. and Gourc, D., 'Towards a Multi-Dimensional Project Performance Measurement System', *Decision Support Systems,* 2010, 48, pages 342-353.

Lee, A.S., ‘A Scientific Methodology for MIS Case Studies’, *MIS Quarterly,* Vol. 13, No. 1, Mar 1989, pages 33-50.

Lester, D.H., 'Critical Success Factors for New Product Development', *Research Technology Management*, 1998, Vol. 41, No. 1, pages 36-43.

Levitt, B. and March, J.G., ‘Organizational Learning’, *Annual Review of Sociology,* 1988, pages 319-340.

Lidow, D., 'Duck Alignment Theory: Going Beyond Classic Project Management to Maximize Project Success', *Project Management Journal*, 1999, Vol. 30, No. 4, Page 8.

Lim, C.S. and Mohamed, M.Z., 'Criteria of Project Success: an Exploratory Re-Examination', *International Journal of Project Management,* 1999, Vol. 17, No. 4, pages 243-248.

Limbrick, S., ‘General Dynamics Launches Legal Battle with EDS’, *Computer Weekly*, 8 January 2010, http://www.computerweekly.com/Articles/2010/01/08/239885/General-Dynamics-launches-legal-battle-with-EDS.htm, downloaded 4th April 2011

Lipovetsky, S., Tishler, A., Dvir, D. and Shenhar, A., 'The Relative Importance of Project Success Dimensions', *R & D Management*, 1997, Vol. 27, No. 2, Page 97-106.

Liu, A.Z. and Seddon, P.B., 'Understanding How Project Critical Success Factors Affect Organizational Business Benefits from Enterprise Systems', *Business Process Management Journal*, 2009, Vol. 15, No. 5, page 716.

Liu, L. and Yetton, P., ‘The Contingent Effects on Project Performance of Conducting Project Reviews and Deploying Project Management Offices’, *IEEE Transactions on Engineering Management,* 2007, Vol. 54, No. 4, pages 789-799.

Lorsch, J., ‘Managing Culture: the Invisible Barrier to Strategic Change’, *California Management Review,* Vol. 28, No. 2, 1986, pages 95-109.

Lyneis, J.M., Cooper, K.G. and Els, S.A., ‘Strategic Management of Complex Projects: a Case Study using System Dynamics’, *System Dynamics Review,* 2001, Vol. 17, No. 3, pages 237-260.

Lyytinen, K., 'The Expectation Failure Concept and Systems Analysts View of Information Systems Failures: Results of an Exploratory Study', *Information and Management*, 1988, Vol. 14, pages 45-55.

Lyytinen, K and Hirschheim, R., ‘Information Systems Failures: a Survey and Classification of the Empirical Literature’, *Oxford Surveys in Information Technology,* Vol. 4, 1987, pages 257-309.

Lyytinen, K. and Robey, D., ‘Learning Failure in IS Development’, *Information Systems Journal*, Vol. 9, 1999, pages 85-101.
Marchand, D.A. and Hykes, A., 'Designed to Fail: Why IT-Enabled Business Projects Underachieve', *Perspectives for Managers*, 2006, page 1-4.
Markus, M.L. and Robey, D., ‘IT and Organizational Change: Causal Structure in Theory and Research’, *Management Science*, Vol. 34, No. 5, 1988, pages 583-598.
Markus, M.L. and Robey, D., ‘The Organisational Validity of Management Information Systems’, *Human Relations*, 1983, 36, pages 203-226.
Martinez, E.V., 'Avoiding Large-Scale Information Systems Project Failure: The Importance of Fundamentals', *Project Management Journal*, 1994, Vol. 25, No. 2, Page 17.
Martins, L.L. and Kambil, A., ‘Looking Back and Thinking Ahead: Effects of Prior Success on Managers’ Interpretations of New Information Technologies’, *Academy of Management Journal*, Vol. 42, No. 6, 1999, pages 652-661.
Mason, R.O. and Mitroff, I.I., ‘A Program for Research on Management Information Systems’, *Management Science*, Vol. 9, No. 5, pages 475-487.
May, L.J., 'Major Causes of Software Project Failures', *Crosstalk: the Journal of Defense Software Engineering*, July 1998, pages 9-12.
McCue, A., ‘The McCue Interview: UK Government CIO Ian Watmore’, *Silicon.com*, 16th February 2005, comment.silicom.com/andymccue/0,3800002581,39127908,00.htm. Downloaded: 28th September 2005.
McFarlan, F.W., ‘Portfolio Approach to Information Systems’, *Harvard Business Review*, 1981, Sept-Oct, pages 142-150.
Meyer, M.W. and Zucker, L.G., ‘Forever Failing Firms’, *Chief Executive*, July-August 1990, pages 68-70.
Might, R.J. and Fischer, W.A., 'The Role of Structural Factors in Determining Project Management Success', *IEEE Transactions on Engineering Management*, 1985, Vol. 32, No. 2, pages 71-78.
Miller, D., ‘The Architecture of Simplicity’, *Academy of Management Review*, Vol. 18, No. 1, 1993, pages 116-138.
Miller, R. and Hobbs, B., 'Governance Regimes for Large Complex Projects', *Project Management Journal*, 2005, Vol. 36, No. 3, pages 42-50.
Milosevic, D.Z. and Srivannaboon, S., ‘A Theoretical Framework for Aligning Project Management with Business Strategy’, *Project Management Journal*, 2006, Vol. 37, No. 3, pages 98-110.
Mitev, N.N., ‘More than a Failure? The Computerized Reservation Systems at French Railways’, *Information Technology and People*, 1996, 9, pages 8-19.
Montealegre, R. and Keil, M., 'De-Escalating Information Technology Projects: Lessons from the Denver International Airport', *MIS Quarterly*, 2000, Vol. 24, No. 3, pages 417-447.
Moores, S., ‘Thought for the Day: the Speed of State Spending’, *Computer Weekly*, 17th July 2002.
Moynihan, T., 'How Experienced Project Managers Assess Risk', *IEEE Software*, 1997, Vol. 14, No. 3, pages 35-41.
Mugan, C., ‘Cabinet Office Loses Key IT Responsibility’, *ComputerWeekly.com*, http://www.computerweekly.com/SiteMapArticle/Articles/2001/04/27/c5791/179830/CabinetOfficeloseskeyITresponsibility.htm., downloaded 30th March 2005.

Müller, R. and Turner, R., 'The Influence of Project Managers on Project Success Criteria and Project Success by Type of Project', *European Management Journal*, 2007, Vol. 25, No. 4, Page 298.
Munns, A.K. and Bjeirmi, B.F., 'The Role of Project Management in Achieving Project Success', *International Journal of Project Management*, 1996, Vol. 14, No. 2, pages 81-88.
Myers, M., 'Dialetical Hermeneutics: a Theoretical Framework for the Implementation of Information Systems', *Information Systems Journal*, 1994, Vol. 5, pages 51-70.
Myers, M.D., 'Qualitative Research in Information Systems', *MIS Quarterly*, Vol. 21, No. 2, June 1997, pages 241-242, *MISQ Discovery,* archival version, June 1997, www.misq.org/misqd961/isworld/, downloaded 21 February, 2004.
Nandhakumar, J., 'Design for Success? Critical Success Factors in Executive Information Systems Development', *European Journal of Information Systems*, 1996, Vol. 5, No. 1, pages 62-72.
Nutt, P. and Backoff, R., 'Organisational Publicness and its Implications for Strategic Management', *Journal of Public Administration Research and Theory,* 3, 1993.
Orlikowski, W.J., 'The Duality of Technology: Rethinking the Concept of Technology in Structuration', *Organization Science,* Vol. 3, No. 3, 1992, pages 398-427.
Oz, E. and Sosik, J.J., 'Why Information Systems Projects are Abandoned: A Leadership and Communication Theory and Exploratory Study', *Journal of Computer Information Systems*, 2000, Vol. 41, No. 12, pages 66-78.
Pan, G., Hackney, R. and Pan, S.L., 'Information Systems Implementation Failure: Insights from Prism', *International Journal of Information Management*, 2008, Vol. 28, pages 259-269.
Papke-Shields, K., Beise, C. and Quan, J., 'Do Project Managers Practice What They Preach, and Does it Matter to Project Success?' *International Journal of Project Management*, 2010, Vol. 28, No. 7, Page 650.
Perrow, C., 'A Framework for the Comparative Analysis of Organizations', *American Sociological Review*, Vol. 32, No. 2, pages 194–208.
Perry, G., 'Officials Blame Suppliers for Delays to NHS IT Scheme', *Project Central,* 2006, http://www.project-central.co.uk/blog/?p=7, downloaded 9th December, 2010.
Peters, G. and Fortune, J., 'Systemic Methods for the Analysis of Failure', *Systems Practice*, 1992, Vol. 5, No. 5, pages 529-542.
Petter, S. and McLean, E.R., 'A Meta-Analytic Assessment of the Delone and Mclean IS Success Model: An Examination of IS Success at the Individual Level', *Information and Management*, 2009, Vol. 46, pages 159-166.
Pich, M.T., Loch, C.H. and de Meyer, A., 'On Uncertainty, Ambiguity and Complexity in Project Management', *Management Science*, 2002, Vol. 48, No. 8, pages 1008-1023.
Pinto, J.K. and Covin, J.G., 'Critical Factors in Project Implementation: A Comparison Study of Construction and R&D Projects', *Technovation*, 1989, Vol. 9, No. 1, pages 49-51.
Pinto, J. and Kharbanda, D.P., 'How to Fail in Project Management (Without Really Trying)', *Business Horizons*, 1996, Vol. 39, No. 4, pages 45-53.
Pinto, J.K. and Mantel, S.J., 'The Causes of Project Failure', *IEEE Transactions of Engineering Management*, 1990, 37, 269-276.

Pinto, M.B.and Pinto, J.K., 'Determinants of Cross-Functional Cooperation in the Project Implementation Process', *Project Management Journal*, 1991, Vol. 22, No. 2, page 13.

Pinto, J.K. and Prescott, J.E., 'Planning and Tactical Factors in Project Implementation Success', *The Journal of Management Studies*, 1990, Vol. 27, No. 3, pages 305-328.

Pinto, J.K. and Prescott, J.E. 'Variations in Critical Success Factors over the Stages in the Project Life Cycle', *International Journal of Project Management*, 1988, Vol. 14, No. 4, pages 5-18.

Pinto, J.K. and Slevin, D.P., 'Critical Factors in Successful Project Implementation', *IEEE Transactions on Engineering Management*, 1987, Vol. 34, No. 1, pages 22-28.

Pinto, J.K. and Slevin, D.P., ‘Critical Success Factors across the Project Life Cycle’, *Project Management Journal*, 1988, XIX, pages 65-75.

Pinto, J.K. and Slevin, D.P., 'Critical Success Factors in R&D Projects', *Research Technology Management*, 1989, Vol. 32, No. 1, pages 31-36.

Pinto, J.K. and Slevin, D.P., 'Project Success: Definitions and Measurement Techniques', *Project Management Journal*, 1989, Vol. 19, No. 1, pages 67-75.

Pinto, J.K. and Slevin, D.P., 'The Project Champion: Key to Implementation Success', *Project Management Journal*, 1989, Vol. 20, No. 4, pages 181-186.

Pinto, J.K., Slevin, D.P. and English, B., ‘Trust in Projects: An Empirical Assessment of Owner/Contractor Relationships’, *International Journal of Project Management*, 2009, Vol. 27, pages 638-648.

Plant, R. and Willcocks, L., 'Critical Success Factors in International ERP Implementations: A Case Research Approach', *Journal of Computer Information Systems*, 2007, Vol. 47, No. 3, Pages 60-70.

Pliskin, N. et al. ‘Presumed Versus Actual Organisational Culture: Managerial Implications for Implementation of Information systems’, *The Computer Journal*, 1993, 36, 143-152.

Rockart, J.F., ‘Chief Executives Define their own Data Needs’, *Harvard Business Review*, Mar-Apr 1979, pages 81-93.

Polymenakou, A. and Holmes, A., 'A Contingency Framework for the Investigation of Information Systems Failure', *European Journal of Information Systems*, 1996, Vol. 5, pages 34-36.

Procaccino, J. and Verner, J., 'Software Developers' Views of End-Users and Project Success', *Communications of the ACM*, 2009, Vol. 52, No. 5, pages 113-116.

Proud, I., ‘Communicating Coherence’, *Defence Director*, Vol. 1, No. 6, November 2003, Pages 21-23

Rai, A., Lang, S.S. and Welker, R.B., ‘Assessing the Validity of IS Success Models: an Empirical Test and Theoretical Analysis’, *Information Systems Research*, 2002, Vol. 13, No. 1, pages 50-69.

Rainer, R.K., Snyder, C.A. and Carr, H.H., 'Risk Analysis for Information Technology', *Journal of Management Information Systems*, 1991, Vol. 8, No. 1

Raymond, L., 'Organisational Context and Information Systems Success: A Contingency Approach', *Journal of Management Information Systems*, 1990, Vol. 6, No. 4, pages 5-18.

Raz, T., Shenhar, A.J. and Dvir, D., 'Risk Management, Project Success, and Technological Uncertainty', *R & D Management*, 2002, Vol. 32, No. 2, Pages 101-109.

Remus, U. and Wiener, M., 'A Multi-Method, Holistic Strategy for Researching Critical Success Factors in IT Projects', *Information Systems Journal*, 2010, Vol. 20, No. 1, Pages 25-52.
Robert, D.W., 'Creating an Environment for Project Success', *Information Systems Management*, 1997, Vol. 14, No. 1, Page 73.
Robey, D. and Newmand, M., ‘Sequential Patterns in Information Systems Development: an Application of a Social Process Model’, *ACM Transactions on Information Systems*, Vol. 14, No. 1, pages 30-63.
Robey, D., Boudreau, M-C, and Rose, G.M., ‘Information Technology and Organizational Learning: a Review and Assessment of Research’, *Accounting Management and Information Technologies*, 2000, Vol. 10, pages 125-155.
Robey, D., Smith, L.A. and Vijayasarathy, L.R., 'Perceptions of Conflict and Success in Information Systems Development Projects', *Journal of Management Information Systems*, 1993, Vol. 10, No. 1, Page 123.
Ropponen,J. and Lyytinen, K., 'Can Software Risk Management Improve Systems Development: An Exploratory Study', *European Journal of Information Systems*, 1996, Vol. 6, No. 6, pages 41-50.
Rosacker, K.M. and Rosacker, R.E., ‘Information Technology Project Management within Public Sector Organizations’, *Journal of Enterprise Information Management*, 2010, Vol. 23, No. 5, pages 587-594.
Rosenthal, S.R., 'Producing Results in Government: Moving Beyond Project Management and its Limited View of Success', *Journal of Policy Analysis and Management*, 1989, Vol. 8, No. 1, Page 110
Saarinen, T., ‘An Expanded Instrument for Evaluating Information Systems Success’, *Information and Management*, 1996, Vol. 31, pages 103-118.
Saarinen, T., 'Systems Development Methodology and Project Success', *Information and Management*, 1990, 19, pages 183-193.
Sanger, C., ‘E-Defence’, *Defence Management Journal*, Vol. 3, No. 4, Autumn 2000, page 13.
Sauser, B., Reilly, R. and Shenhar, A., 'Why Projects Fail? How Contingency Theory Can Provide New Insights - A Comparative Analysis of NASA's Mars Climate Orbiter Loss', *International Journal of Project Management*, 2009, Vol. 27, No. 7, Page 665-679.
Say, M., ‘Leaner and Meaner’, *Government Computing*, March 2007, pages 12-13.
Schmidt, R., Lyytinen, K., Keil, M. and Cule, P., 'Identifying Software Project Risks: An International Delphi Study', *Journal of the Management of Information Systems*, Spring 2001, Vol. 17, No. 4, pages 5-36.
Schneider, K., ‘How Does Your Budget Size Up?’ *ComputerWeekly.com*, 6 February 2003, http://www.computerweekly.com/articles/article.asp?liArticleID=124830&liArticleTypeID=20&liCategoryID=2&liChannelID=18&liFlavourID=1&sSearch=&nPage=1, downloaded 9th October 2004.
Schultz, R.L., Slevin, D.P. and Pinto, J.K., ‘Strategy and Tactics in a Process Model of Project Implementation’, *Interfaces*, 1987, Vol. 17, No. 3, pages 34-46.
Seddon, P.B., 'A Respecification and Extension of the DeLone and McLean Model of IS Success', *Information Systems Research*, September 1997, Vol. 8, No. 3, pages 240-253.
Sharifi, M. and Manian, A., 'The Study of The Success Indicators for Pre-Implementation Activities of Iran's E-Government Development Projects', *Government Information Quarterly*, 2010, Vol. 27, No. 1, pages 63-69.

Shenhar, A.J., ‘One Size Does Not Fit All Projects: Exploring Classical Contingency Domains’, *Management Science*, Vol. 47, No. 3, pages 394-414.
Shenhar, A.J., ‘Strategic Project Leadership: Towards a Strategic Approach to Project Management’, *R&D Management*, Nov 2004, Vol. 34, Issue 5, p569-578.
Shenhar, A.J. and Dvir, D., 'Project Management Research: the Challenge and Opportunity', *Project Management Journal*, 2007, Vol. 38, No. 2, pages 93-99.
Shenhar, A.J. and Dvir, D., 'Toward a Typological Theory of Project Management', *Research Policy*, 1996, Vol. 25, pages 607-632.
Shenhar, A.J. , Dvir, D., Levy, O. and Maltz, A.C., 'Project Success: a Multidimensional Strategic Concept', *Long Range Planning*, 2001, Vol. 34, No. 6, pages 699-725.
Shenhar, A.J. and Levy, O., 'Mapping the Dimensions of Project Success', *Project Management Journal*, June 1997, Vol. 28, No. 2, pages 5-14.
Shenhar, A.J., Tishler, A., Dvir, D., Lipovetsky, S. and Lechler, T., 'Refining the Search for Project Success Factors: A Multivariate, Typological Approach', *R & D Management*, 2002, Vol. 32, No. 2, Pages 111-126.
Shields, P and Hassan, T ‘Intermediate Theory: The Missing Link in Successful Student Scholarship, *Journal of Public Affairs Education*, 2006, Vol. 12, No. 3, pages 313-334.
Simons, M., ‘UK Defence Systems Get £5bn Overhaul,’ *ComputerWeekly.com*, 20th March 2003, www.computerweekly.com/Article120264.htm, downloaded 30th July 2003.
Slevin, D.P. and Pinto, J.K., 'The Project Implementation Profile: New Tool for Project Managers', *Project Management Journal*, 1986, Vol. 17, No. 4, pages 57-70.
Snow, A.P., Keil, M. and Wallace, L.,' 'The Effects of Optimistic and Pessimistic Biasing on Software Project Status Reporting', *Information and Management*, 2007, Vol. 44, pages 130-141.
Spector, A. and Gifford, D., 'A Computer Science Perspective of Bridge Design', *Communications of the ACM*, April 1986, Vol. 29, No. 4, pages 268-283.
Standing, C., Guilfoyle, A., Lin, C. and Love, P.E.D., 'The Attribution of Success and Failure in IT Projects', *Industrial Management and Data Systems*, 2006, Vol. 106, No. 8, pages 1148-1165.
Stern P. and Harris, C., ‘Women’s Health and the Self-Care Paradox: A Model to Guide Self-Care Readiness – Clash between the Client and Nurse’, *Health Care for Women International*, 1985, Vol. 6, pages 151–163.
Sumner, M., 'Risk factors in Enterprise Wide/ERP Projects', *Journal of Information Technology*, 2000, Vol. 15, pages 317-327.
Symons, V.J., 'A Review of Information Systems Evaluation: Content, Context and Process', *Journal of Information Systems*, 1991, Vol. 1, No. 3, pages 205-212
Symonds, M., ‘Survey: Government and the Internet: The Next Revolution’. *The Economist*, 22nd June 2000, www.economist.com/surveys/showsurvey.cfm?issue=20000624, downloaded 9th October 2004.
Taylor, T., ‘Smart Procurement: an Objective of the Strategic Defence Review’, *RUSI Journal*, April 1998, pages 33-36.
Tesch, D., Sobol, M., Klein, G. and Jiang, J., 'User and Developer Common Knowledge: Effect on the Success of Information System Development Projects', *International Journal of Project Management*, 2009, Vol. 27, No. 7, Page 657.

Thomas, D. ‘Mod Cuts £4bn IT Overhaul Shortlist to Three’, *ComputerWeekly.com*, 18th December 2003, www.computerweekly.co.uk/articles/articles.asp?liArticleID=127301@liArticleT...., downloaded 20th January 2004.
Thomas, G. and Fernandez, W., 'Success in IT Projects: A Matter of Definition?' *International Journal of Project Management*, 2008, Vol. 26, pages 733-742.
Thong, J.Y.L. and Yap, C-S, 'Information Systems Effectiveness: a User Satisfaction Approach', *Information Processing and Management*, 1996, Vol. 32, No. 5, pages 601-610.
Thong, J.Y.L., Yap, C-S and Raman, K.S., 'Top Management Support, External Expertise and Information Systems Implementation in Small Businesses', *Information Systems Research*, June 1996, Vol. 7, No. 2, pages 248-267
Tishler, A., Dvir, D., Shenhar, A. and Lipvetsky, S., ‘Identifying Critical Success Factors in Defense Development Projects: a Multivariate Analysis’, *Technology Forecasting and Social Change*, 1996, Vol. 51, No. 2, pages 151-171.
Tranfield, D., Denyer, D. and Smart, P., ‘Towards a Methodology for Developing Evidence-Informed Management Knowledge by Means of Systematic Review’, *British Journal of Management*, 2003, Vol. 14, No. 3, page 207-222.
Turner, JR., 'Five Conditions for Project Success', *International Journal of Project Management*, 2004,Vol. 2, No.1, pages 1-8.
Turner, J.R. and Muller, R., 'On the Nature of the Project as a Temporary Organisation', *International Journal of Project Management*, 2003, Vol. 21, No. 1, pages 1-8.
Turner, J.R. and Müller, R., 'The Project Manager's Leadership Style as a Success Factor on Projects: A Literature Review', *Project Management Journal*, 2005, Vol. 36, No. 2, Pages 49-61
Verner, J., & Evanco, W., ‘In-House Software Development: What Project Management Practices Lead to Success?’ *IEEE Software*, 2005, Vol. 22, No. 1, 86-93.
Wallace, L. and Keil, M., 'Software Project Risks and their Effect on Outcomes', *Communications of the ACM*, April 2004, Vol. 47, No. 4, pages 68-73.
Wallace, L., Keil, M. and Rai, A., 'How Software Project Risk Affects Project Performance: An Investigation of the Dimensions of Risk and an Exploratory Model', *Decision Sciences*, Spring 2004, Vol. 35, No. 2, pages 289-321.
Wallace, L., Keil, M. and Rai, A., 'Understanding Software Project Risk: a Cluster Analysis', *Information and Management*, 2004, Vol. 42, pages 115-125.
Walsh, J. and Kanter, J., 'Toward More Successful Project Management', *Journal of Systems Management*, 1988, Vol. 39, No. 1, Page 16.
Ward, J.M. and Taylor, P., 'Evaluation and Realisation of IS/IT Benefits: an Empirical Study of Current Practice', *European Journal of Information Systems*, 1996, Vol. 4, No. 2, pages 214-225.
Wateridge, J. ‘How Can IS/IT Projects be Measured for Success*? International Journal of Project Management*, 1998, Vol. 16, No. 1, pages 59-63.
Wateridge, J. ‘IT Projects: a Basis for Success', *International Journal of Project Management*, 1995, Vol. 13, No. 3, pages 169-172.
Weaver-Hart, A., ‘Framing an Innocent Concept and Getting Away with it’, *UCEA Review*, 1988, Vol. 24, No. 2, pages 11–12.
Weir, D., 'When Will They Ever Learn? The Conditions for Failure in Publicly Funded High Technology Projects: The R101 and Challenger Disasters

Compared', *Disaster Prevention and Management*, 2002, Vol. 11, No. 4, pages 299-307.

Westerveld, E., 'The Project Excellence Model: Linking Success Criteria and Critical Success Factors', *International Journal of Project Management*, 2003, Vol. 21, No. 6, Pages 411-418.

Wheeler-Carmichael, G, 'Government IT projects: the McCartney Report 'Successful IT: Modernising Government in Action' and the CSSA Report 'Getting IT Right for Government', *Computer Law and Security Report*, 2000, Vol, 16, No. 5, pages 325-328.

White, D. and Fortune, J., 'Current Practice in Project Management: An Empirical Study', *International Journal of Project Management*, 2002, Vol. 20, No. 1, pages 1-11.

Whittaker, B., 'What Went Wrong? Unsuccessful Information Technology Projects', *Information Management & Computer Security*, 1999, Vol. 7, No. 1, pages 23-29.

Whyte, G.A. and Bytheway, A., 'Factors Affecting Information Systems' Success', *International Journal of Service Industry Management*, 1996, Vol. 7, No. 1, pages 74-93.

Wilcox, S., 'Budget 2010: Government ICT Spending Cut as Darling Talks Digital Economics', *www.publictechnology.net*, 24 March 2010, http://www.publictechnology.net/sector/central-gov/budget-10-nominal-cut-it-programmes-announced, downloaded 5th October 2010.

Williams, B.R., 'Why do Software Projects Fail?' *GEC Journal of Research*, 1995, Vol. 12, No. 1, pages 13-16.

Williams, M., 'Defining Network Enabled Capability', *Defence Management Journal*, pages 77-78.

Williams, N., 'Modernising Government: Policy Making Within Whitehall,' *The Political Quarterly*, Vol. 70, No. 4, Oct-Dec 1999, Page 412-421.

Williams, T.M., 'The Need for New Paradigms for Complex Projects', *International Journal of Project Management*, 1999, Vol. 17, No. 5, pages 269-273.

Winter, M.C., Brown, D.H. and Checkland, P.B., 'A Role for Soft Systems Methodology in Information Systems Development', *European Journal of Information Systems*, Vol. 4, 1995, pages 130-142.

Wright, J.N. 'Time and Budget: the Twin Imperatives of a Project Sponsor', *International Journal of Project Management*, 1997, Vol. 15, No. 3, pages 181-186.

Wright, S. and Wright, A.M., 'Information System Assurance for Enterprise Resource Planning Systems: Implementation And Unique Risk Considerations', *Journal of Information Systems*, 2002, Supplement, Vol. 16, pages 99-113.

Yap, C.S., Soh, C.P.P. and Raman, K.S. 'Information Systems Success Factors in Small Business', *OMEGA*, 1992, No. 20, pages 597-609.

Yap, C-S. and Thong, J.Y.L, 'Programme Evaluation of a Government Information Technology Programme for Small Businesses', *Journal of Information Technology*, 1997, Vol. 12, pages 107-120.

Young R., 'Twelve Requirements Basics for Project Success', *Journal of the Quality Assurance Institute*, 2008, Vol. 22, No. 1, pages 19-25.

Zeiger, P., 'Software Project Failure Lessons Learned', *Communications of the ACM*, Vol. 42, No. 11, November 1999, page 22.

Zhou, L., Vasconcelos, A. and Nunes, M., 'Supporting Decision Making in Risk Management Through an Evidence-Based Information Systems Project Risk

Checklist', *Information Management & Computer Security*, 2008, Vol. 16, No. 2, pages 166 – 186.
Zimmer, B.T., 'Project Management: a Methodology for Success', *Hospital Materiel Management Quarterly*, 1999, Vol. 21, No. 2, Page 83-89.
Zimmer, M., '"But the Data is Already Public": On the Ethics of Research in Facebook', *Ethics and Information Technology*, Vol. 12, 2010, pages 313-325.
Zmud, R.W., 'Management of Large Software Development Efforts', *MIS Quarterly*, 1980, Vol. 4, No. 2, pages 45-55.
Zwikael, O. and Globerson, S., 'From Critical Success Factors to Critical Success Processes', *International Journal of Production Research*, 2006, Vol. 44, No. 17, pages 3433-3449.

## NEWSPAPER ARTICLES

Anon, 'Government Faces £1.5 billion Bill for IT Failure,' *The Guardian*, 12th March 2003
Cross, M., 'Inside IT: Public Domain,' *The Guardian*, 10th April 2003, page 19.
Cross, M., 'Message Off Target', *The Guardian*, 7th July 2005, http://society.guardian.co.uk/internet/story/0,8150,1522583,00.html, downloaded 25th January 2006
Kirkup, J., 'Gordon Brown under Fire over Defence Spending Climb-Down', *Telegraph.co.uk*, 18 March 2010, http://www.telegraph.co.uk/news/newstopics/politics/gordon-brown/7470402/Gordon-Brown-under-fire-over-defence-spending-climb-down.html, downloaded 29th September 2010.
Savage, M., 'Labour's Computer Blunders Cost £26bn', *The Independent*, 19th January 2010, http://www.independent.co.uk/news/uk/politics/labours-computer-blunders-cost-16326bn-1871967.html, downloaded 29th March 2010.
Thomas, D., 'The Gremlins Strike – Again', *The Sunday Telegraph*, 30 November 2003, page 20.

## ONLINE DOCUMENTS/WEB PAGES

Advanced Institute of Management Research, *The Stages of a Systematic Review*, http://www.networkedcranfield.com/logicofenquiry/gst/SR/stages/Pages/default.aspx, downloaded 10th March 2011.
Anon., 'David Cameron: Public Sector Reform Cannot Be Delayed', *BBC Website*, 17 January 2011, http://www.bbc.co.uk/news/uk-politics-12203000, downloaded 20th January 2011.
Anon., 'Government Structures', *Serco Website*, 4 November 2010, http://www.serco.com/instituteresource/subjects/publicsectorreform/govstructures/Index.asp, downloaded 19th January 2011.
Anon., 'Market Testing', *Serco Website*, 4 November 2010, http://www.serco.com/instituteresource/subjects/UKmkt/mkttest/Index.asp, downloaded 19th January 2011.
Anon., 'PPP/PFI', *Serco Website*, 4 November 2010, http://www.serco.com/instituteresource/subjects/UKmkt/ppppfi/index.asp, downloaded 19th January 2011.

Anon., ‘Public Services Industry, *Serco Website,* 4 November 2010, http://www.serco.com/instituteresource/subjects/UKmkt/PSI/index.asp, downloaded 19th January 2011

Anon., ‘Transformational Government Fundamentals’, *Improvement Network,* 16 December 2009, http://www.improvementnetwork.gov.uk/imp/core/page.do?pageId=1068533, downloaded 22nd January 2011.

Atlas Consortium, ‘Increments and Releases’, *Atlas Consortium Website*, http://www.atlasconsortium.info/what-is-dii/increments-and-releases.aspx.htm, downloaded 3rd February 2011.

BBC, Current Affairs Group, *File on Four: Transcript of Programme on Defence Acquisition*, Programme Number 04VY3023LHO, Broadcast 8th June 2004.

BBC, *Martha Lane Fox Urging Government Online ‘Revolution*’, 23 November 2010, http://www.bbc.co.uk/news/uk-11815731, downloaded 23rd November 2010.

BBC Online Network, *Passport Misery for Thousands*, 29th June 1999, http://news.bbc.co.uk/1/hi/uk/380911.stm, downloaded 15th January 2005.

Castillo, J.J., ‘Snowball Sampling’, *Experiment Resources*, http://www.experiment-resources.com/snowball-sampling.html, downloaded 8th March 2011.

Chinneck, J.W., *How to Organize your Thesis,* (Canada, Department of Systems and Computer Engineering, University of Ottawa, 1999), http://www.sce.carleton.ca/faculty/chinneck/thesis.html, downloaded 2nd November 2010.

Colorado State University, *An Introduction to Content Analysis,* http://writing.colostate.edu/guides/research/content/pop2a.cfm, downloaded 5th May 2009.

Effective Learning Service, *An Introduction to Research and Research Methods,* (University of Bradford, School of Management, Bradford, ND), page 4, http://www.khhtqt.ueh.edu.vn/Resources/intro%20to%20research%20reports.pdf, downloaded: 5th May 2009.

Great Britain, Ministry of Defence, *Smart Acquisition,* MoD Website, December 2009, http://webarchive.nationalarchives.gov.uk/+/http://www.mod.uk/DefenceInternet/AboutDefence/Organisation/KeyFactsAboutDefence/SmartAcquisition.htm, downloaded 4th April 2011.

Great Britain, National Audit Office, *Defence*, http://www.nao.org.uk/our_work_by_sector/defence.aspx, downloaded 10th January 2010.

Hartley, K., *UK Defence R&D Policy: An Economist’s Perspective*, http://www.york.ac.uk/depts/econ/research/documents/dera.pdf, downloaded 14th July 2003.

HP, *News Release: EDS, an HP Company, Becoming HP Enterprise Services*, (Palo Alto, CA, HP, 23 September 2009), http://www.hp.com/hpinfo/newsroom/press/2009/090923xa.html, downloaded 15th January 2011.

Meyer, E.T., *Software Tools for Content Analysis*, JISC: Toolkit for the Impact of Digitised Scholarly Resources (TIDSR), 19th March 2009, http://microsites.oii.ox.ac.uk/tidsr/kb/56/software-tools-content-analysis, downloaded 29th May 2010.

Palmquist, M., *Content Analysis*, http://www.ischool.utexas.edu/~palmquis/courses/content.html, downloaded 5th May 2009.

Prime Minister, *Statement on the Strategic Defence and Security Review*, Number.10.gov.uk, 19 October 2010, http://www.number10.gov.uk/news/statements-and-articles/2010/10/sdsr-55912, downloaded 15th January 2010.

SOCITM, 'SOCITM's Response to the Spending Review', *SOCITM's Webpage*, 21 October 2010, http://www.socitm.net/press/article/152/socitms_response_to_the_spending_review, downloaded 2nd December 2010.

Taylor, J.C.T., *Information Management: a Strategy for Defence,* PowerPoint presentation, downloaded from ModWeb 9th January 2001.

**PRESENTATIONS**

Oldnall, M., 'Defence Information Infrastructure', *Presentation to Masters in Defence Administration Course,* (Shrivenham, Defence Academy, May 2006).

**REPORTS**

Butler Group, *Improving Public Sector Projects,* April 2003, www.butlergroup.com, downloaded 9th October 2004.

Center for Technology in Government, *Making Smart IT Choices: Understanding Value and Risk in Government IT Investment,* (Albany, NY, University of Albany, April 2004).

Europa, IDABC, *UK Government Continues to Lead ICT Spending in Europe,* June 2005, http://europa.eu.int/idabc/en/document/4336/5860, downloaded 19th September 2005.

General Electric, *GE 2005 Annual Report: Letter to Stakeholders,* http://www.ge.com/ar2005/letter.htm, downloaded 23rd January 2007.

Heeks, R., *Failure, Success and Improvisation of Information Systems Projects in Developing Countries,* (Manchester: Institute for Development Policy and Management, 2002).

Heeks, R., Mundy, D. and Salazar, A., *Why Health Care Information Systems Succeed or Fail,* (Institute for Development Policy and Management, Manchester University, Manchester, 1999).

Intellect, *Getting IT Right for Government*, (London, HMSO, 2000).

OECD, *The Hidden Threat to E-Government: Avoiding Large Government IT Failures,* OECD Public Management Policy Brief, PUMA Policy Brief No 8, March 2001, http://www.oecd.org/dataoecd/19/12/1901677.pdf, downloaded 24th November 2010.

Kable, *UK Public Sector Defence ICT Market Overview to 2010*, (London, Kable, 2007), www.kablenet.com/kd.nsf/020781ea9db2becf80256f2a0051cf72/$FILE/ICTandBPOintheUKcontents.pdf, downloaded 26th October 2007.

The Standish Group, *The Chaos Report (1994*), (Boston, MA, The Standish Group, 1994).

The Standish Group, *Chaos: A Recipe for Success*, (Boston, MA, The Standish Group, 1999).

## TECHNICAL/WORKING PAPERS

Bullen, C.V. and Rockart, J.F., 'A Primer on Critical Success Factors', *Center for Information Systems Research Working Paper, No 69*, (Cambridge, MA, Sloan School of Management, MIT, 1981).

Chalmers, M., 'A Question of Balance? The Deficit and Defence Priorities', *RUSI: Future Defence Review,* Working Paper No. 7. June. (London: RUSI, 2010).

Chalmers, M., 'Preparing for the Lean Years', *RUSI: Future Defence Review,* Working Paper No. 1, July 2009, http://www.rusi.org/downloads/assets/FDR_Working_Paper_1.pdf, downloaded 23rd January 2011

Morris, P.W.G. and Hough, G.H., *The Pre-Conditions of Success and Failure in Major Projects*, Technical Paper No. 3, (Templeton College, Oxford Major Projects Association, 1986).

Sauer, C., *The Value Of Case Studies In Understanding Organizational Aspects Of Information Systems,* Internal Paper (Australia, Dept of Computer Science, University of Western Australia, 1988).

## THESES

Wallace, L., *The Development of an Instrument to Measure Software Project Risk*, Doctoral Dissertation, (Atlanta, GA, Georgia State University, 1999), www.cob.vt.edu/wallace/dissertation.pdf., downloaded 4th January 2007.

## UNPUBLISHED PAPER

Quick, B., (2009), Unpublished Paper on the History of DII.