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TENSION MANAGEMENT IN LOGISTICS SERVICE INNOVATION PROJECTS

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Research Paper no. 2/06

TENSION MANAGEMENT IN LOGISTICS SERVICE INNOVATION PRODUCTS

Thomas Köhler and Alan Harrison*

School of Management, Cranfield University, Cranfield, Bedford MK43 0AL, United Kingdom

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Editor: Catarina Figueira

For further information, please contact: *Cranfield School of Management Research Paper Series*
Cranfield University, Cranfield , Bedford MK43 0AL, UK
Tel. +44 1234 751122 extension 3846
Fax. +44 1234 752136
E-mail. Catarina.Figueira@cranfield.ac.uk

* Correspondence regarding this paper should be addressed to Thomas Köhler,
Email: thomas.koehler.dba@cranfield.ac.uk

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Abstract

Innovation projects create tensions, which may be envisaged as conflicts between different perspectives on how such projects should be managed. Such tensions have been described in such terms as autonomy versus standardisation. By tracking the origins and life cycle of tensions as they arose in an innovation project in practice, we sought to understand the nature of tensions and to gain insights into how they could be managed. The findings of an exploratory longitudinal case study were used to develop an optimised process model as well as to propose seven ways in which tensions could be managed pro-actively in innovation projects. In a second longitudinal case study, we tested these propositions by means of action research. In both cases, one of us was both project manager and researcher. This provided detailed operational access to the people and processes involved in two systems innovation projects at DHL Express in Germany.

Keywords: management, logistics, innovation, tensions

1. Introduction

Three separate themes have been identified for the management of innovation (Tidd, 1997): first, the management of research and development of new technology; second new product development and marketing; and third, organisational development and change. While 'research on the management of innovation has been highly fragmented, and non-cumulative', we are interested in the third of these themes, which addresses the organisational learning aspect of innovation – where there is 'a need for more research focused at the specific level of organisational learning'. While the subject of the innovation in both of the studies we made was new product development (NPD), we were primarily interested in issues of organisational development and change that arose during the NPD development process. While NPD leads to new products or services, Chapman *et al* (2002) refer to improvement in management practices, organisational issues and processes as examples of 'soft innovation'. This is congruent with the definition of an innovation process as 'the temporal sequence of events that occurs as people interact with others to develop and implement their innovation ideas within an institutional context' (Van de Ven *et al*, 2000).

The substantial growth in the service sector of most developed economies in recent years has resulted in part from outsourcing manufacturing activities that were previously managed 'in house'. A popular choice for such outsourcing is logistics, where specialist service providers have been able to develop substantial savings in cost while also improving service levels to end customers by co-ordinating and innovating logistics operations across international supply chains (Lieb and Randall, 1996; van Hoek, 2001). Logistics innovation projects often focus on 'information re-engineering' (Davenport, 1993), whereby improved accuracy and visibility of information is sought across numerous, widely-dispersed logistics activities. An information process to be innovated is described in terms of a system specification - comprising a requirements definition, a requirements specification and a software specification (Sommerville, 2000). However, service innovations 'are often non-technical in nature, although technology might act as the vehicle that activates and/or enhances the process' (Chapman *et al*, 2002). We focused on the non-technical aspects of service innovations in our study, in keeping with the organisational development and change theme identified above.

Dougherty (1996) poses the basic questions as 'how and why' do organisations inhibit the activities necessary for effective service innovation? Quoting Edmunson and Moingeon (1996), Tidd (1997) distinguishes 'how' as improving or transferring existing skills, and 'why' as understanding the underlying logic or causal factors, with a view to applying the knowledge in new contexts. We focus on the 'why' question in this paper. Dougherty (1996) develops the metaphor 'tensions' to characterise innovation, 'because the term captures very well the organising challenges of iterating between diverse activities, working around barriers, combining insights and resolving conflicts of seemingly opposing forces, all of which can be found in the innovation process'. We used the concept of 'tensions' to explore the opportunities for organisational learning in managing service innovation projects.

Our paper is organised into four further sections. First, we explore the concept of 'tensions' in managing innovation projects; second, we explain how our research questions were operationalised; third, we present our findings; and finally, we present our conclusions and proposals for further research.

2. Tensions in Innovation Products

The concept of managing tensions in innovation projects has evolved from the recognition that conflicts arise and need to be resolved. The resolution process leads to 'beneficial patterns of behaviour' (Lawrence and Lorsch, 1969). The role of conflict led Churn (1976, 1987) to advance his 'principle of compatibility', whereby the needs of a variety of stakeholder groups need to be met. He proposed that conflict arising from this constellation has to be managed and exploited to yield positive results. Exploitation of such conflicts is essentially the management of the tensions that arise (McDonough and Leifer, 1986). These authors proposed that maintaining a balanced state of creative tension is crucial in organisations where technological innovation plays a key role. Their findings showed that ignoring the management of tensions may lead to products that have undesired features, that are too technologically sophisticated, or that are prohibitively costly.

While the literature on tensions in innovation is still relatively immature, authors have explained the key problem in broadly similar ways:

- *autonomy v standardisation*: Klein (1991) states that 'providing autonomy means that individual differences are allowed to arise; standardisation aims to minimise those differences'. If an employee's day is heavily regulated through standardised work practices, then the opportunities for innovation are limited accordingly.

- *risk v control*: the trade-off between incentives to take risks and control 'lies at the heart of the decision that managers must make about how to organise for innovation' (Chesbrough and Teece 2000). Thus we can pose the question 'is it better to allow innovators a free reign within broadly stated project goals, or to discipline them by standardising the innovation process and so maximising the application of explicit knowledge held by the organisation?'

- *creativity v structure*: Brown and Duguid (2001) refer to the tension between how companies generate knowledge in practice versus how they implement it through process. The tension reflects the 'countervailing forces' that spark innovation on the one hand, while introducing the structure that transforms those inventions into marketable products on the other.

- *market based incentives v collaboration*: the study by Harding (2000) of the German technology transfer system refers to the advantages of allowing competition to exist alongside collaboration and networking. She refers to this as 'symbiotic tension'.

- *heterogeneity v homogeneity*: persistent heterogeneity seeks to overcome the 'microeconomic equilibrium of homogenous firms with zero profits' (Knott, 2003).

A common theme between these various observations is that, while polar positions may be apparent, they represent different perspectives that must be harmonised in given innovation contexts. While it creates management challenges, the harmonisation process is beneficial.

In order to translate innovation into organisational terms, Dougherty proposes four sets of interlinking activities – each with an accompanying tension. First is conceptualising the product to integrate market needs and technological potential; second is organising the process to accommodate creative problem solving; third is monitoring the process; and fourth is developing commitment to the effort. She argues that these tensions cannot be eliminated because they are inherent features of innovation activities, and 'help to power the innovation process'. Tensions 'must be balanced throughout the organisation'. We review each set in turn, quoting from her 1996 paper as appropriate.

Market-technology linking

A new product is defined as a package of features and benefits, each of which must be conceived, articulated, designed, and 'operationalized', or brought into existence (Burgleman, 1983), which is called market-technology linking (Bacon *et al.*, 1994). These activities 'embody a tension between outside (market) and inside (the firm's operations and technology)'. The tension arises from the need to manage the multiple market-technology linkages that develop in different resources around the organisation, and the need to manage the innovation processes efficiently within the firm.

Organising for creative problem solving

The definition of organising for creative problem solving is based on the assumption that - during the innovation process - it is inevitable that 'innovators solve complex problems to overcome surprises, work around barriers, merge processes from different functions, and weave together resources from different locations'. This leads to 'tensions between the old and the new'. A new product may require new supplier relationships, new distribution systems and new merchandising – 'all of which may conflict with existing procedures designed for old products/[services]'.

Evaluating and monitoring innovation

Innovation activities need to be monitored throughout the innovation process because they demand high level knowledge resources with no certainty that viable new products will result. Dougherty points out that evaluation requires multidisciplinary team work, because innovators must rely on one another to assess progress. The tension is between 'strategic emergence' and 'strategic determination'. 'If new products are forced to conform to top-down plans, they would not address new opportunities. But if the organisation relied strictly on bottom-up emergence, its innovations would not build on one another' (Day, 1990).

Commitment to innovation

Innovation requires deeper commitment than regular work because 'the boundaries of responsibility must be broader and more inclusive in the rapidly changing, ambiguous conditions of innovation'. Commitment to innovation 'embodies the tension between freedom and responsibility, which is one of the most challenging tradeoffs'. Large organisations emphasise responsibility over freedom because accountability is 'defined in precise, legalistic ways'. Innovation is often 'not legitimate within the organisation'. Dougherty argues that an interdisciplinary team provides a comfortable sense of accountability and commitment for participants, because innovators share the work with others who can be trusted to do their part (Dougherty and Corse, 1995).

We were encouraged by the advice of Huxham and Beech (2003), who provide evidence that 'raising awareness of the types of tension that frequently arise can enhance practitioners' ability to manage them in a considered way in their particular situation'. Tensions have been adopted in management research because they are considered to provide a better platform for advising managers than definitive prescriptions about 'best practice'. We set out to explore the phenomenon of tensions in two innovation projects in a logistics service context. This paper develops our earlier abstract on the origins and life cycle of tensions as they arose in an innovation project, and proposes how all four tensions listed above could be exploited to improve achievements of innovation projects.

3. Research Design

DHL Express is a subsidiary of Deutsche Post that provides express parcel services in many European countries. The revenue management department relates to debtor accounting activities, and to loss prevention. Loss prevention aims to ensure that customers pay the right price for services used. This is not an easy task with over 44,000 different services available at DHL Express. When discrepancies are found between what was invoiced and what was delivered, customers are either refunded or get the difference withdrawn from their account. This service is particularly aimed at new business customers as an after sales activity. After a new customer has been successfully integrated into the system they are regularly checked.

A service innovation project in this context was commissioned in 2002 to re-engineer the work flows in the loss prevention units in sorting centres in Germany. 'Project ESi V 1.0', as it was called, had to meet new corporate requirements to integrate new codes, new product portfolios, adapting software to Microsoft Windows XP, Microsoft Office XP, a new Oracle version (9i) and to migrate the system to a new server environment. Project ESi was conducted between August 2002 and September 2003 within tight costing constraints.

ESi V 1.0 was used as the context for an exploratory case study to gain a deeper understanding of service innovation management in logistics settings, and to build an improved model of the innovation processes at stake. Our research sought to track the origins and life cycle of tensions as they arose in the various stages of the project. A longitudinal analysis of the project was conducted in order to describe how innovation management was conducted and which inherent tensions were connected to those management activities. A follow-on project - ESi V 2.0 – was conducted between May and November, 2004. ESi V 2.0 was based on business requirements from a project called ‘Licence Plate’. Project ‘License Plate’ aimed at the introduction of a common transport label in accordance with ISO 15394. This label uses an item identifier which is globally unique in accordance to ISO 15459 (License Plate) for any item-related transport process. At Deutschen Post World Net this common label will be usable for any parcel and shipment above postal letters and below full truck loads. This effort includes the implementation of various license plate related business requirements derived from each product, service and region on a common basis. An executive committee decision in May 2001 decreed that all applications at Deutsche Post Euro Express and their partners had to be adapted so that any partner would be able to handle license plates, which are either EAN 128 or ANSI/FACT. In other words, the application developed in ESi V1.0 had to be adapted to achieve exactly the same objectives under new conditions. ESi V 2.0 therefore had similar objectives to ESi V1.0. Few changes from the original project team provided an excellent opportunity to test conclusions drawn from the first project.

It was necessary to adapt our enquiries to a context that included the German works council system. All innovation projects at DHL Express Germany are subject to the works council’s rights of co-determination (§§ 80, 87, 90, 98, 111 BetrVG). This means that agreement must first be given for aspects of an innovation project. The model of tensions in innovation has Anglo Saxon roots. Works council-related activities were included under the tension ‘developing commitment to innovation’ in our study, because these activities aimed to legitimise the innovation by inclusion of the organisation’s workforce.

Research question

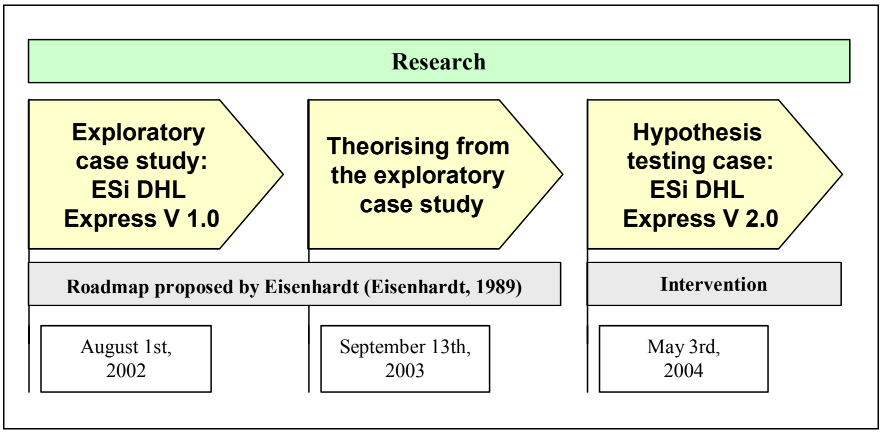
We focused our enquiries in project ESi V 1.0 and V 2.0 according to the following research question:

What tensions are experienced in the planned stages of the new offer development process at DHL Express?

Research Framework

The research was based on three sequential research components. The first case study, using ESi V 1.0 as the context, was exploratory in nature. We then developed fresh propositions from our first case, and finally tested these propositions in a second case study in the setting of ESi V 2.0. Figure 1 provides an illustration of our research framework.

Figure 1: Research Framework



The details of each component and the sequential logic are now discussed in turn.

Case study research

In order to understand the dynamics of the innovation processes under investigation, longitudinal, real-time research from a management perspective was undertaken (Argyris, 1968, 1985; Van de Ven *et al*, 2000). Case study research was adopted as the research strategy: operational links had to be 'traced over time, rather than mere frequencies or incidence' (Yin, 2003). Bryman (1989) supports this view as 'attempts to provide process models of organisations almost always derive from case studies'. Findings from the exploratory case study were used to develop new propositions about optimised sequences of innovation processes, as well as the management of their inherent tensions. In this way a process model was developed which included the contribution of all stakeholders. Our methodology was based on the roadmap proposed by Eisenhardt (1989**).**

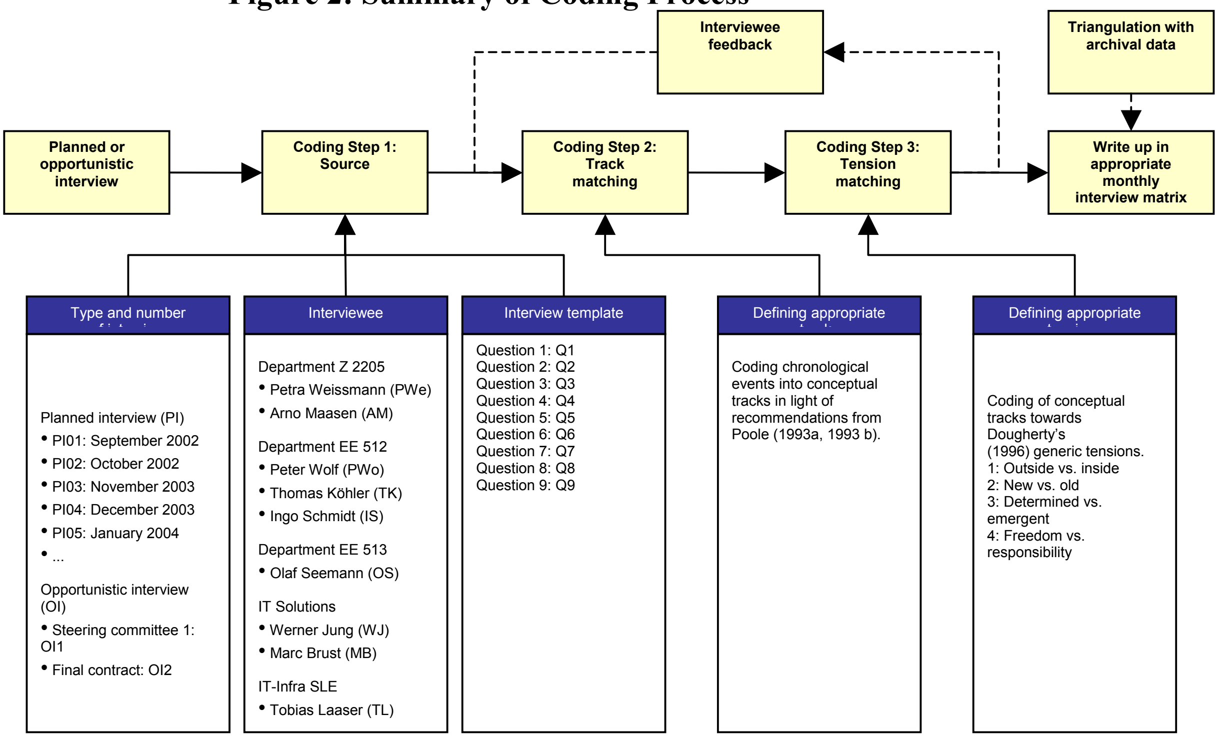
Having generated seven propositions and a generic process model for logistics innovation projects (see next section), a second longitudinal project was selected for hypothesis testing. In ESi V 2.0, we had the exceptional opportunity to conduct a re-run of project ESi V 1.0 with all but three of the original thirty-six stakeholders. The re-run was based on an executive committee decision to introduce a new coding system at DHL - the so-called 'Licence Plate'. All designed loss prevention activities were based on a different parcel identifier system. Loss prevention would thus not be possible with the new coding system. The new project had similar objectives as V 1.0. This provided an excellent opportunity to test our conclusions in relation to the innovation process and tension management. This theory testing case study exposed stakeholders to two different approaches with the ability to express their perceptions of whether the new innovation process was better or otherwise. Whereas the researcher role in project V 1.0 was passive observer, the researcher role in V 2.0 was active participant.

By applying our new propositions to ESi V 2.0, we were taking action in order to understand the consequences of taking that action. Further, team members in the project participated in the case study. This is 'action research' as defined by Coughlan and Brannick (2001). The active involvement assumed by these authors relates to a member of an organisation undertaking an explicit role in addition to his/her normal functional role. In this case all first tier stakeholders executed this dual role. Our strategy of including all members of the direct project team follows the research process proposed by Brooks and Watkins (1994), and means that data is systematically collected from the experience of participants. Inclusion of people from the client system to participate in the research process as 'full partners or co-researchers' is labelled 'participatory action research' (Whyte, 1991). This label is used to distinguish this approach from 'pure' action research and collaborative inquiry as described in Bray *et al* (2000).

Data collection

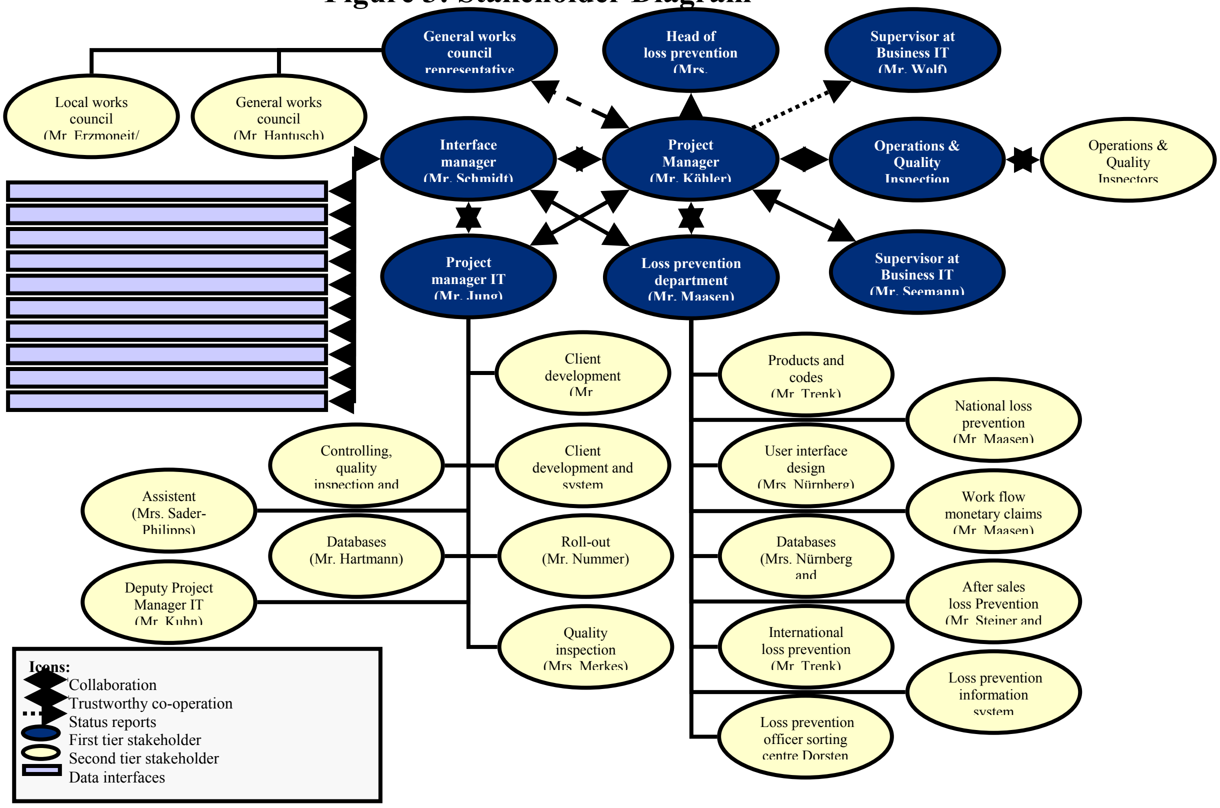
Stakeholder views were captured in three ways. First, planned interviews were held every first week of a month; second, opportunistic interviews were held to capture *ad hoc* information; third, focus group interviews were held to explore first and second tier stakeholders' exposure to a tension. Interviewing all first tier stakeholders helped in developing a 'balanced picture' (Miles and Huberman, 1994), including the views of 'supporters, opponents and doubters' (Pettigrew, 1990). The interview results were then coded as summarised below (Figure 2):.

Figure 2: Summary of Coding Process



The stakeholder diagram in figure 3 shows the first- and second-tier stakeholders in the project. All stakeholders shaded dark are first tier stakeholders and were included in ESi V 1.0. Archival data was used to help triangulate issues raised in interviews within overall development patterns. Such data were drawn from specifications, system interface agreements, the business case, bi-weekly status reports, change request documents and steering committee meeting minutes.

Figure 3: Stakeholder Diagram



4. RESEARCH RESULTS

Van de Ven *et al.* (2000) propose that a temporal sequence of events occurs during an innovation process. Each of these events needs to be documented and analysed as the process unfolds over time. Events are defined as instances when changes occur in an innovation process in terms of ideas, people, transactions, context or outcomes. Change here relates to ‘empirical observations of differences’. In this study, evidence of change was collected as described above. Traceable patterns of change are consolidated into a track from interview to interview. Tensions were identified in thirty-eight tracks in project ESi. As they arose, these tensions had to be managed because of their potentially disruptive effect on the project.

Evidence on the management of tensions led us to make seven propositions:

Proposition 1:

Tensions exist and can be tracked

Proposition 2:

Tensions are inherent to innovation management activities, tasks and functions or steps

Proposition 3:

All activities, tasks and functions or steps in a logistics service innovation should be arranged within a seven step innovation process model.

Proposition 4:

Tensions may be clustered within four generic activities, being market-technology linking, organising for creative problem solving, evaluating and monitoring and finally commitment to innovation

Proposition 5:

Tensions can be managed

Proposition 6:

Tensions can be described as ‘bi-polar’, ‘multipolar’ or ‘proxy’ in nature.

Proposition 7:

Core tension management can be tension ‘reconnaissance’, tracking and restoring unbalanced tensions

We describe the features of these propositions in more detail below.

4.1. A seven step innovation process model

Based on the findings in project one and the more informed view based on the test run in the second project, the inquiry team proposed a process comprising the following phases (see Figure 4):

1. pre-phase,
2. business requirement statement phase,
3. system requirement statement phase,

4. ‘bargaining’,
5. development and field testing,
6. inspections and
7. roll-out.

Figure 4: Seven step logistics service innovation process model

Pre-Phase	Business requirement statement phase	System requirement statement phase	‘Bargaining’	Development and field test	Inspections	Roll-out
A1: Process vision A2: Project agreement A3: Project plan A4: Risk/ dependencies analysis A5: Requirement list A6: First information of IT committee of the general works council	A1: Business requirement specification A2: Project launch A3: Submission of final information document to IT committee of the general works council	A1: Analysis of business requirements A2: Description of a required system architecture A3: Description of required functionalities A4: Definition of needed physical components A5: Description of required data flows A6: Description of required soft-ware components A7: Description of required interfaces to other systems A8: Description of required data migrations	A1: Negotiating resources A2: Adapting specified modules to current available budgets A3: Optional request to delete or postpone requirements A4: Launch of application development A5: Award of development mandate A6: Project plan A7: Triggering decision phase of the general works council	A1: Application development A2: Hardware procurement A3: Requirement management through change requests A4: Definition of service level A5: First planning activities for follow up release A6: Hardware development A7: Field test preperations A8: Field test A9: Inspections preperations A10: System fusion	A1: User acceptance test A2: Technical acceptance test A3: Roll-out preperations	A1: Installation of application A2: Preperation of operational readyness A3: Operation of new system

This model differs significantly from all reviewed service innovation models. Reviewed examples were Donnelly *et al.* (1985), Johnson *et al.* (1986), Bowers (1986), Norling *et al.* (1992), Wilhelmsson and Edvardsson (1994) based on Edvardsson and Mattsson (1992). The most striking difference is that service innovation in logistics contexts may include process innovation and derived product innovations.

Step 1: pre-phase

The pre-phase starts with a process vision. This process vision is a first definition of the bundle of features, by which a logistics service provider seeks differentiation from competitors’ offerings (Storey and Eastingwood, 1994). This is then split up into separate processes which need to be subject to innovation which is labelled information engineering (Davenport, 1993). The view of having to define the core service attributes first and thereafter the service delivery system is also supported by Cowel (1984).

We furthermore propose to articulate a final set of deliverables of the innovation process, a so called project agreement which should be flanked by a project plan, an analysis of organisation specific risks and dependencies and a list of requirements.

In a German company the relevant works council has to be informed about the plan to change existing processes.

Step 2: business requirement statement phase

In the performance specification phase all requirements defined in the requirement list have written out. This first development artefact is called a performance specification (Sommerville, 2001) and outlines all future processes and related parameters.

Additionally German organisations have to submit a detailed elaboration all planned changes to the responsible works council

Step 3: system requirement statement phase

In the following stage all business requirements have to be analysed. First of all the R&D department has to develop a common understanding of the ultimate goal and any unclear business requirements has to be sorted out.

Once the business requirements are clear, they have to be converted into a system requirement specification (Sommerville, 2001). This specification describes how the envisioned processes should be supported by technical enablers. The specification may include:

- a description of a required system architecture,
- a description of required functionalities,
- a definition of needed physical components,
- a description of required data flows,
- a description of required software components,
- a description of required interfaces to other systems and finally
- a description of required data migrations from older systems.

Step 4: 'bargaining'

The bargaining phase may include call for tenders and the transaction of the tender. It also includes triggering the decision phase of the general works council.

Step 5: development and field testing

In this phase the future 'service system' (Edvardsson and Olsson, 1996) is developed. It encompasses the development of all software and hardware for the future new offer.

The field test is a secondary test involving with selected or voluntary participants before the product is finally released to production. This step includes the 'fusion' of the developed software, hardware and the processes of the process vision. It is important to use participants' feedback to amend the software, hardware and the processes and the way they are used in combination. This testing is beyond Beta-testing in software development, yet they pursue similar goals of enhancing the newly developed systems 'fitness for use' (Kan, 2003).

The field test in project one goes beyond this definition for two reasons. The definition is more for commercial software, but the "customer" could equally well be people within an organisation, where it would be released for "general use" rather than "general sale". Secondly software might be just one component of the innovation. In our case the field test exposed new processes, new hardware and new software to real use.

Step 6: inspections

The inspections phase has two major cornerstones. One being the user acceptance test, being the test of both fitness for use and the test whether all specified requirements are met. The second cornerstone is the technical acceptance test. The technical acceptance test examines whether all components interact and work faultless.

Step 7: roll-out

Roll out refers to all tasks concerning the distribution of new service platform in the network and its operations.

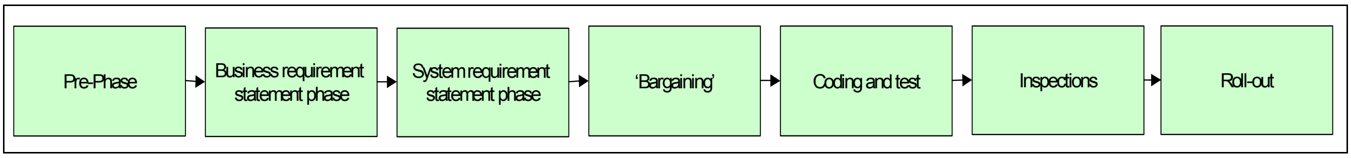
4.2. Process model scalability

The exploratory case study was a fairly large project. The proposed framework had to be amended in the second longitudinal project. Due to projects varying in size the process model was designed min a modular way, so activities may be added or omitted depending of size of an innovation project.

Medium sized innovation projects

Projects which are smaller than project ESi DHL Express should still have the basic proposed sequence. Yet the field test would be the first thing a smaller project might consider to cancel. Figure 5 shows proposed optimal workflows for medium sized innovation projects.

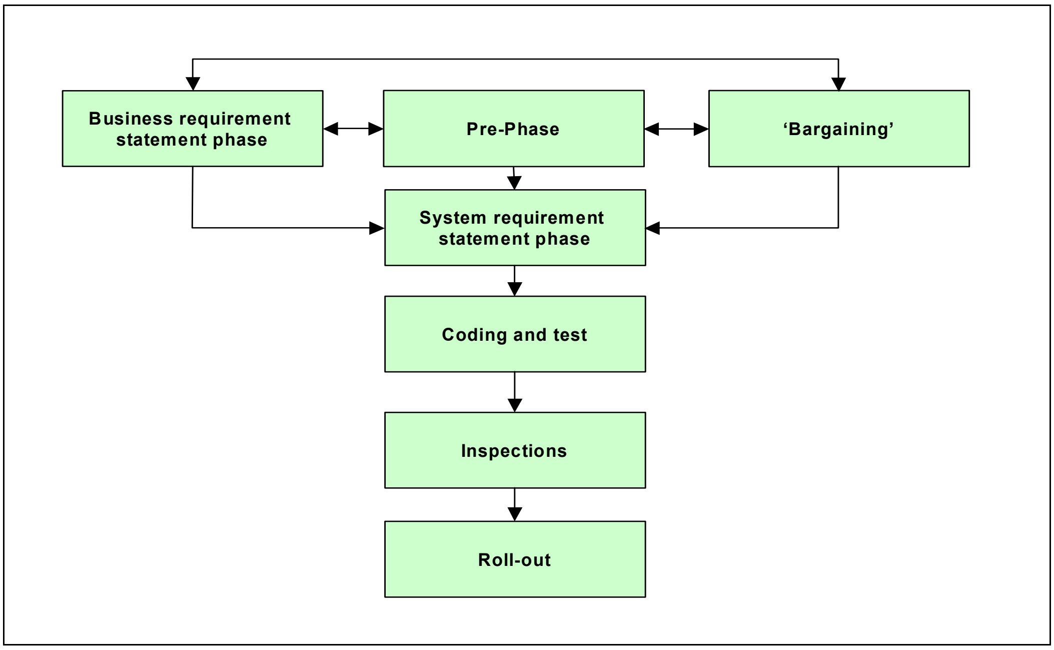
Figure 5: Proposed optional workflows for medium sized innovation projects



Small Innovation projects

Small projects, like three to six month long projects may experience that the pre-phase, requirement specification phase and 'bargaining' become one inseparable cluster. Here sketchy defined requirements may be directly transformed into a system requirement specification, see Figure 6:

Figure 6: Proposed optional workflow for small innovation projects



Large Innovation projects

Very large projects may be tackled by four different approaches:

- Sequential multiple large innovation projects

- Programmes with multiple large innovation projects

- Programmes with multiple business requirement statements and one system requirement statement leading to a single release

- Programmes with multiple business requirement statements and multiple system requirement statement leading to a single release

All of the four proposed innovation process models have in common that the field test is optional. Yet internal IT tests within the development organisation still applies. The four workflows can be summarised in three frameworks.

Option 1:

Sequential multiple large innovation projects

This first option ties together a bundle of processes or requirements. Then those are managed in a release and all remaining processes and requirements are postponed to a follow up release. This option may be chosen if budgets are an issue and the follow up release and budgets are available in the following year.

Option 2:

Programmes with multiple large innovation projects

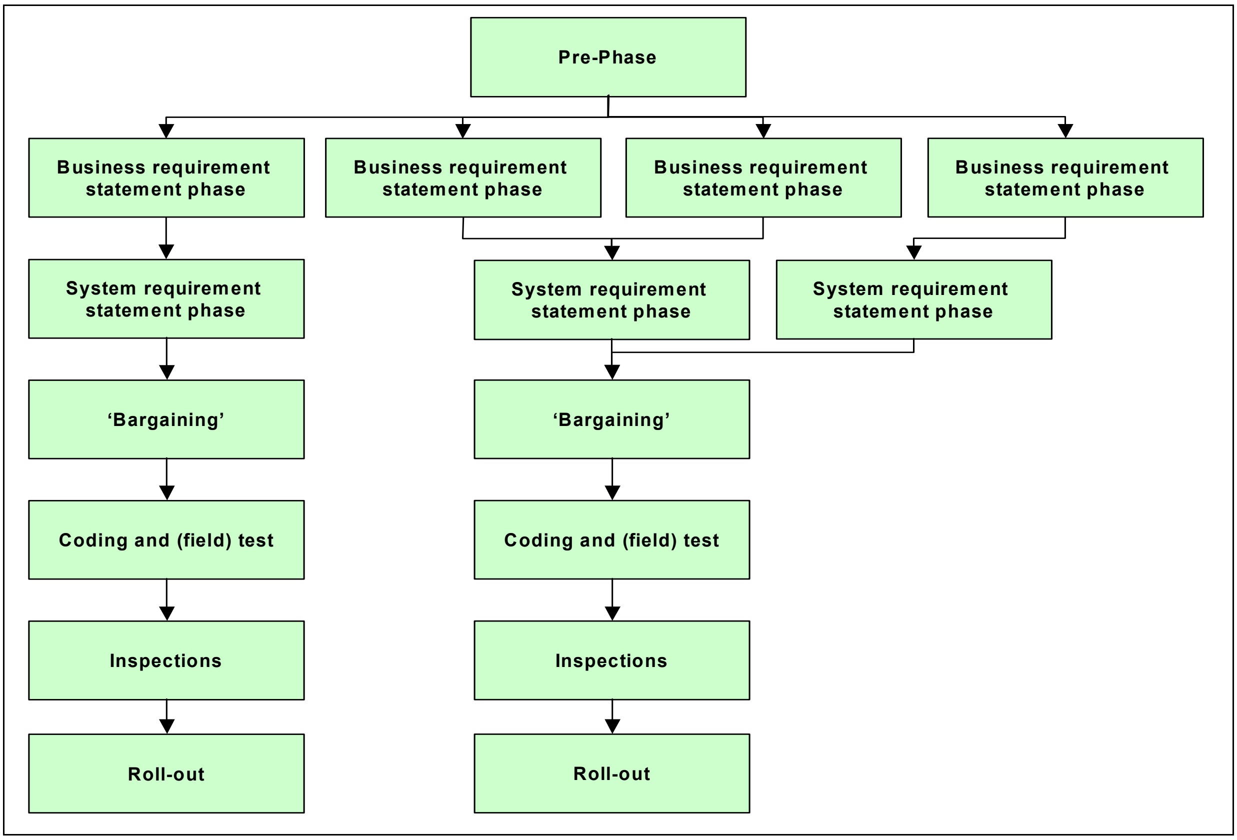
The second option is to manage several innovation projects simultaneously as a programme. Each project in itself is a large project.

Option 3:

Programmes with multiple business requirement statements and one or several system requirement statement leading to a single release

Within stage gate innovation processes milestones can be used to re-evaluate innovation projects. This leads to the proposal to use business requirement statements and system requirement statements to carefully plan a new logistics system and present the result of each phase to get stakeholders consent to continue.

Figure 7: Proposed optional workflows for very large innovation projects



Constellations

Evidence in response to our research question seems to add a second dimension to the four generic tensions of Dougherty, shown in figure 2. The 'second dimension' addresses the constellation of stakeholders involved, and can be 'bi-polar', 'multipolar' or 'proxy' in nature. These constellations may thereby include two stakeholders, more than two or - in cases in which one stakeholder manages a third party – they may be perceived as a proxy.

Bi-polar tensions

In some instances, bi-polar tensions can arise between two stakeholders. Most of these instances relate to commitment problems in which one stakeholder enforces a prerequisite activity within a given context. In a simplified stakeholder diagram depicted below the 'problem owner' and champion of a project and the project manager are subject to a bi-polar tension. In project ESi, the project champion enforced a revision of most of the work that had been done up to that time. The emerging new project content made it difficult to manage the effects on budgets, timelines, relationships to interface systems, expectations and requirements.

Multi-polar tensions

Multi-polar tensions arise between three or more stakeholders. One example was the settlement of the hardware dimensions of the future system. The software development unit at Deutsche Post IT Solutions was asked to give a recommendation for an appropriate hardware configuration. This configuration aimed to please future users by means of fast application. On the other hand, the future operations group (which usually has the last say) wanted the project to be cheaper in terms of leasing, housing, administration and maintenance costs. The third stakeholder involved was the specialised department in charge of the loss prevention application. Within their specification a one second inquiry time was specified. The operations group's proposal for hardware dimensions did not meet the requirements of the loss prevention group. The project manager's role was to resolve the conflict between loss prevention group and operations. Further, this conflict could not last too long because of time constraints on the project.

Proxy tensions

In a proxy tension a core first tier stakeholder had to manage an activity involving a third party. Service Line Express, the infrastructure procurement and management body for DHL Express, had to acquire the agreed hardware via T-Systems International. This was the track with the highest potential for disrupting the whole project. In outsourcing, the commitment to innovation in a proxy tension is limited to the contracts involved. Commitment levels of first tier stakeholders within the project team are generally higher than those of resources not directly involved in the innovation project.

Core tension management components

Tension management relates to managing an activity and the inherent tension in an emancipated manner. Tension management may be clustered in terms of tension 'reconnaissance', tracking and restoring unbalanced tensions.

In a non-research setting tension 'reconnaissance' and tracking are crucial as managers usually do not have interviews to draw on. Tension reconnaissance labels all activities undergone to get knowledge about tensions with the potential to get unbalance, getting unbalanced or which are already unbalanced. Tension tracking relates to developments over time, the spin off of derivatives or stakeholder inclusion. Certain tensions may continue throughout a project, others are one off situations. The ability to restore balance has two aspects, one being the ability to actively manage participants executing an innovation towards a common goal. In this case study, the latter was achieved in all cases. On the other hand, to manage external resources, especially in bureaucratic settings via proxy tensions is a problem which needs further investigation as this may have a lethal impact on innovation activities.

5. Conclusions

Our final section draws together our conclusions about the seven propositions we advanced above.

Proposition 1

Tensions exist and can be tracked.

This study identified tensions in fifty-eight tracks. Thirty-eight tracks were uncovered in project ESi DHL Express V 1.0 and fifteen in ESi DHL Express V 2.0. Tensions were perceived in both projects and we were able to track the life cycle of the tensions. Hence the proposition that tensions exist and can be tracked, made in project two was not disproved and is hence maintained. As simple as this proposition may seem, it has noticeable consequences. The main consequence is that tensions are inherent to innovation activities. Hence innovators have to manage activities with the same commitment as the underlying activity. Organising for innovations now includes preparing a sequence of activities as well as a platform for stakeholders in which tensions can be managed. One example of a platform like this is the introduced first Thursday of a month, where stakeholders gather and manage current tensions.

Proposition 2

Tensions are inherent to innovation management activities, tasks and functions.

Dougherty (1996) criticised the 'anything goes' definition of innovation which may be defined as a 'adoption of any device, system, process, problem, program, product or service that is new to an organisation' (Downs and Mohr, 1976; Kanter, 1988; Damanpour, 1991). She proposed a change in perspective to one based on the activities of innovation in a focal firm. This shift in perspective needs to be extended. Innovation projects may be organised into processes. In turn, processes can be broken down into activities, tasks and functions or steps (Harrison, 1998). So tensions may not only be applied to activities: they may be applied at the level of activities, tasks and functions or steps (see our conclusions in section 3).

Proposition 3

A logistics service innovation process model should be made up of seven steps

In figure 2 above, we proposed a seven-step innovation process. There was a high level of consensus in the research team that this process represented the preferred sequence in both new innovation projects and in legacy developments. This process has underlying prerequisites. The most important is that the whole process should be centred on information engineering derived from a process vision. All subsequent developments should aim to support this process vision.

The next prerequisite is that all stakeholders in charge of operationalising process vision developments are treated as partners and not as suppliers. Hence, business requirements are articulated at a general level: each contributor then proposes how his or her contribution may be applied. This proposition significantly changes the role of stakeholders. Both works council and information system developers require a shift in their contribution. The works council are shifted towards neutral auditors, whose role is to ensure that the impact of an innovation is implemented in a way that the social charges on the organisation's workforce is either minimised or socially cushioned. This shift is advocated by Springer (2004), who concludes that some works councils have not yet made the transition to 'social partners'. Project one in particular showed how 'social partners' can contribute to innovation outcomes.

In the same way, a shift in the contribution of information technology development may be needed. The proposed seven step logistics service innovation process model differs from other service innovation models in that it is capable of delivering an information system component. By shifting their perceived contribution, we propose that information technologists are seen as partners. This differs from more traditional information system development models in which a client requires the commitment of a supplier (for example, Balzert, 1989). The proposed procedure includes a partner to propose how a process can be supported and is allowed to influence requirements if this eases or optimises developments and deliverables.

Proposition 4

Tensions may be clustered within four generic activities: market-technology linking, organising for creative problem solving, evaluating and monitoring innovation and finally developing commitment to innovation.

In 'Organising for Innovation', Dougherty (1996) presented a table of tensions, showing how balances are lost, and how they may be restored. This table proposes a set of generic activities. She explicitly states that this set is not exclusive. Yet it has to be highlighted that none of the research participants felt that coding the four tensions was difficult, or that certain issues had to be forced into this list. No additional activities and related tensions are proposed in this study.

Proposition 5

Tensions can be managed.

Tensions are suggested to be enabling in innovation settings (Dougherty, 1996), and thus have to be nurtured. However, if a tension is unbalanced it has to be managed immediately in order to avoid disruptive effects. Managing tensions is time consuming and demanding. According to Huxham and Beech (2003) 'collaborative arrangements are inherently difficult to manage and tend towards a state of collaborative inertia in which the rate of output seems slow and even successful outcomes are achieved only after much pain or hard grind'.

Yet it is necessary to do so in pursuit of a goal of optimising innovation outputs. This view is echoed by Lawrence and Lorsch (1967), who state:

> *'If managers involved openly exchange information about the facts of the situation as they see them, and their feelings about these facts, and work through their differences, the probability of reaching a solution that is optimal for the whole organization should be greatest.'*

In line with the perception of all stakeholders involved at first tier level, we were able to manage tensions. Despite the investment in time and effort, we were able to manage any tension involved and bring both projects to successful conclusions (in terms of meeting cost, schedule and technical objectives). Hence, although managing tensions may be challenging, it should be done.

Proposition 6

Tensions can be described as 'bi-polar', 'multi-polar' or 'proxy' in nature.

Current literature on tensions discard the level of complexity found in projects one and three (cf. Dougherty, 1996 and Huxham and Beech, 2003). It was possible to identify constellations of stakeholder involvement in each activity which was either 'bi-polar', 'multi-polar' or 'proxy' in nature.

The working definition underlying this proposition for all three constellations are now presented in turn:

1. *Bi-polar tensions:* relate to constellation in which two first tier stakeholders collaborate in an activity and are therefore exposed to the inherent tension of that activity.

2. *Multi-polar tensions:* are inherent to activities in which three or more first tier stakeholders are involved.

3. *Proxy tensions:* are base on an activity in which a first tier stakeholder has to include a third party within a activity.

In the second project, it was possible to code all tracks towards one of the constellations above. Even though no additional constellations were found this list may not be exclusive.

***Proposition** 7*

Core tension management can be tension 'reconnaissance', tracking and restoring balance.

Core tension management is a label for a set of activities which innovators should include in their everyday work. Tension reconnaissance relates to gathering information about potential sources of conflict derived from different positions stakeholders may have when contributing to an activity. Not all activities or tasks have a perceived tension because it may not surface.

For example, involved stakeholders may have common or aligned goals. Thus activities have to be reviewed individually in search of unbalanced tensions. This activity adds further complexity to the job of an innovator. At least at activity level it has to be anticipated which stakeholders are involved in terms of constellation as well as surfacing potential hidden agendas. In case positions are explicit, as they were in this research, they can be nurtured in order to improve outputs.

The process of nurturing includes the tracking of tensions, as the life cycle of each tension track differed. Tracks were either recorded as one off situations, medium and long term tracks, which potentially cascaded into spin-offs, keeping track helped the team to manage the life cycle of tensions. This included the review interventions towards tensions until a track was perceived as resolved. Restoring balance to tensions relates to the necessity to intervene in order to avoid that tensions were unable to deliver their enabling benefits.

We propose the term 'friction' where a tension can no longer be handled by a project team before it cascades into one or more spin-offs. 'Friction' relates to any tension that has the potential to stop an innovation process in its tracks. The notion of friction sprang to mind during work on track nineteen and its spin-offs in project one. All we wanted was to buy hardware. Once we had defined the dimensions of the server, we ordered it. Then we had to order it again, because the original order had gone missing. Then we had to borrow a spare server. Then the servers were delivered and six hard disks were missing.

It was the development of spin-offs in tension tracks which were perceived as one of the worst things to happen in a project. Thus, in ESi DHL Express V 2.0 this was one of the issues which we tried to avoid. High priority was given to a track that was perceived as developing spin-offs, and hence affecting other activities which in themselves in balance.

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