SWP 8/91 ELECTRONIC DATA INTERCHANGE:

PERSUADING SENIOR MANAGEMENT

ANDY BYTHEWAY and BERNARD DYER
Cranfield School of Management
Cranfield Institute of Technology
Cranfield
Bedford MK43 OAL

(Tel 0234 751122)

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ANDY BYTHEWAY
Member of Faculty, Cranfield School of Management

BERNARD DYER
Associate of the Cranfield School of Management

Andy Bytheway and Bernard Dyer both have more than 20 years experience of the use of information systems in business, engineering, and the public sector. Their combined work experience embraces the steel industry, civil and nuclear engineering, computer manufacturing, software development, and public sector administration. Both have consulted widely and continue to do so. Andy Bytheway undertook his first major EDI assignment in 1984: a comparative study of international message standards. Bernard Dyer has a special interest in engineering and commercial data within information systems and in information systems in business.

Together they are developing a major international programme of research into EDI and its longer-term effects on business, based at the Cranfield School of Management and syndicated by participating UK, European and Japanese organisations. The work to date has been sponsored by the International Foundation for Artificial Intelligence (Tokyo) and Langton Limited (Henley-on-Thames, England).

EDI: PERSUADING SENIOR MANAGEMENT

A key message from EDI'89 in London (and from many other sources) is that senior management do not understand the significance of EDI nor its potential for business, and that technical management have difficulty in conveying the message. By examining senior managements' view of information systems it is possible to see how strategic analysis techniques can help them understand the benefits of EDI.

Any enterprise that competes with others and exchanges critical business information with customers, suppliers and partners must plan to review and assess the potential impact of EDI on their business and their marketplace. Differences in attitude lead to different approaches to EDI and ultimately to different levels of benefit. The tools of strategic analysis allow us to see this more clearly, also, that EDI itself is just the first indication of more radical changes yet to come. The potential for corporate advantage (and senior management confusion) will probably continue for years to come.

EDI: PERSUADING SENIOR MANAGEMENT

ANDY BYTHEWAY

Member of Faculty, Cranfield School of Management

BERNARD DYER

Associate of the Cranfield School of Management
United Kingdom

INTRODUCTION

There is a tendency to associate EDI with the technology of information systems. This is entirely wrong, and one of the purposes of this paper is to show how matters of policy and strategy are raised by the introduction of EDI. Whilst it is true that a communications network is usually a main feature of the implementation of EDI, these technical facilities can be obtained quite easily from third-party sources and EDI is actually much more concerned (in the event) with purchasing policy, customer and supplier relationships, and the awareness of the industry at large. Despite this it is still difficult to persuade senior management to pay attention to what is going on. The gulf between the EDI "leaders" and the EDI "followers" is very visible, and for technical management the frustration of not being understood can be considerable.

SENIOR MANAGEMENT VIEWPOINTS

We now know enough about EDI to realise that a business might be:

- forced into EDI by a more powerful partner
- tempted into EDI by potential cost savings
- improved by finding better business practice through EDI
- expanded by finding new trading partners through EDI markets.

Each of these is a challenge for management to think about, but how should we help them begin to comprehend the issues? Not unreasonably, senior management like to see things simply and straightforwardly but the issues seem potentially complex.

The totality of management's perspective on business is vast and when we ask them to consider just one part of a business - albeit a complex one - they *need* simplicity. There are thousands of other elements in the business to be considered, any one of which might be impacted by a proposal for change. Finding simple models to present to management in order that they can position an idea in the overall business and appreciate the justification is one of the challenges.

To anyone who has a background in engineering (or even software development) complex engineering diagrams and abstract models are the stuff of life, but management is a softer science and it is less amenable to heavily structured analysis. Models that are popular with senior management are often diagrammatic and very simple. We must resist the temptation to recoil from their simplicity and try to understand the softer and rather more difficult world of management.

STRATEGY AND MANAGEMENT ATTITUDES

There are three quite different attitudes that we might adopt in deciding on a business strategy:

- Efficiency: *"doing things right"*
- Effectiveness: *"doing the right thing"*
- Evolution: *"doing something else"*.

Some management attitudes are constantly focused on the need to optimise: to improve productivity, to reduce costs and to increase the margin of profit. This is all very well in stable markets which rarely change, but it can be disastrous in a market which is evolving and constantly presenting new challenges. A business which ignores a changing environment will not survive competitive threats. *Efficiency* is therefore a legitimate business strategy in mature markets where the competition is known and where most of the competitive advantage has already been worked out.

Where management are a little more outgoing and concerned with quality, excellence and image, we can see the signs of *Effectiveness.* Whilst a market is still maturing it is very important to pay careful attention to the way that partners (suppliers, customers and others) perceive us: we can not afford to concentrate attention solely on the inside of the organisation. Whilst a low selling price and a high level of service are visible outside and have something to do with efficiency, it is now well known that highly efficient processes actually undermine levels of service and throughput rates. A little redundancy in business resource can do wonders for service levels.

Evolution in business is about extending markets and redefining them, even creating new markets. This is just not possible where managers are preoccupied with efficiency and effectiveness matters. A more adventurous approach is necessary which accepts the need to explore and invest in new business (and expect the financial return at a later date!).

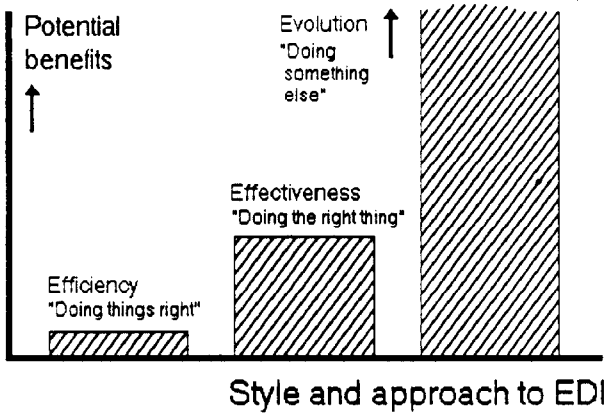
So, we see that if we can come to terms with the nature of our business and the nature of the markets that we are operating within, we can make a judgement about the quality and appropriateness of our business strategy. As markets come and go, those of us who support the business have to deploy our resources to support evolution, effectiveness and efficiency depending upon the maturity of the market.

What, then, of Electronic Data Interchange? How can EDI make a contribution to the business objective? To any objective? Is it constrained to saving us a little money, or is it able to help us take the business forwards?

The answer is "yes, all of these", but it requires that management and specialists meet on neutral ground and work to share common perspectives on the problem.

EDI AND EFFICIENCY

Despite computerisation there is still paper in abundance in business - much of it at the corporate "boundary" where the business talks to other businesses. This use of paper represents more than lost forests: it represents lost time in printing information out, potential errors in the transcription process, time shipping it through the postal system to the recipient, and then waiting for the reverse process when the recipient is able to respond. Clearly there are savings to be made which add up to a more *efficient* way of talking to our business partners: suppliers, customers and others - faster, more accurate and better structured information allowing for much more economic business interaction with them. Direct cost savings are variable but not difficult to estimate. Figures of one to ten US$ per transaction are typical. Wherever the data is high volume - orders, invoices, shipping advices, bills of lading, routine communications of all kinds - there is the potential for improved efficiency through the use of EDI.



EDI AND EFFECTIVENESS

The indirect benefits of EDI have been estimated to be two to three times greater than the direct benefits. More effective customer and supplier communication and better management information, perhaps. Fewer returned orders, fewer queries and smaller more frequent batches.

A key issue is the time factor: how do we measure the benefit from the instantaneous nature of the EDI transaction, the possibility of customers checking stock levels themselves before confirming the order, and the ability to clarify queries and problems over an electronic mail link (instead of through the more imprecise and un-recorded medium of the telephone)? The immediate and obvious pay-back is in efficient volume purchasing with a minimum of error, reduced timescales and shared benefits for both

the buyer and the supplier. Information is made available where it is needed and the whole nature of business is more rational, more disciplined and closer to the optimum. Ultimately, we measure the benefit in increased sales, increased profits and happier customers.

For example, EDI makes possible a completely new approach to the invoicing and payment cycle: conventionally we invoice as soon as we possibly can, and delay payment as long as we can. There are often complex relationships between payments received and the individual amounts billed - how much time is wasted in accounting offices trying to allocate payments to invoice details? The introduction of EDI permits a more rigorous approach and can provide clear attribution of payments. The overhead involved is trivial and the auditability of the accounting function ought to be much more straightforward. Here both parties can benefit far beyond the simple tactic of saving a few days in paying a bill or presenting it a few days earlier.

In due course there may be more esoteric benefits. Messages which include *standard* message elements can be sent by someone in English, and received by someone in a different language by looking up the elements (or their codes) in a standardised dictionary. This brings our thoughts to the third stage in thinking: evolution

EDI AND EVOLUTION

This is of course the most exciting area for the application of EDI. As well as changing the approach to routine business operations EDI can lead to a complete re-think of the way the business works. Why have an invoice at all? Could payment be initiated on receipt of the shipping advice? How dramatic will be the effect upon time-scales, lags and responsiveness in the payment cycle?

(It is not many years since it was routine practice in the North West of England for a local "corner shop" dealing in groceries and domestic sundries to send a teenager round to the wholesaler with a list of requirements and a signed *blank cheque*. The wholesaler filled in the amount payable (to himself) when the details of the stock availability and price were known *after* the order had been made up. Perhaps this degree of trust still pertains in some areas of commerce, but EDI allows the same immediacy with all the accounting and management controls than we would wish to see put in place.)

EDI lets businesses communicate critical business information quickly, easily and accurately. We find that we can change not just the way we do business but the nature and structure of whole business supply chains. Agents, wholesalers and factoring companies are at risk of elimination because their historical ability to hold stock (and information about that stock) is no longer theirs' alone. In many cases these companies will simply not be needed in the future. The term "disintermediation" has been coined to describe the case where a company in an industry supply chain has simply been cut out of the chain. Any business that is an intermediary needs to pay careful attention to its role

and purpose, and needs to ensure that it adds value in some way. Too many intermediaries today are simply impediments in the smooth execution of business: a great deal of attention is being paid to the use of EDI at the break points in a supply chain, not just to save money or make peoples' jobs more effective, but to optimise the whole industry supply chain itself by rationalising and rebuilding it. There are different approaches even here:

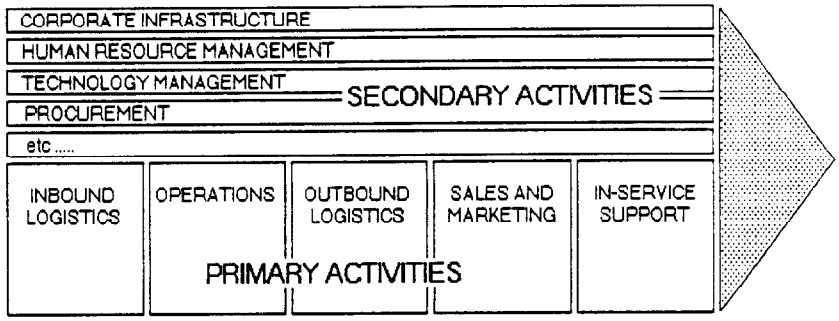
- A company could strive for *differentiation* and customer/supplier leverage through the medium of EDI. It is a form of "vertical integration", in that the company taking the initiative can call some of the shots across the boundaries of the industry value chain and exercise control at those boundaries. In this way the initiating partner can engineer things to their own advantage.
- Alternatively the strategy could be one which aims for *sharing*, on the grounds that any short term advantages will be quickly eroded and the real long term benefits come from sharing, not from competing. This is the more mature view which might produce better returns.
- Third, the initiating partner could consider working entirely through *trade associations* or professional bodies. The Article Numbering Association is one pro-active example where things are organised at the industry level, but there are more subtle ones: the trade association can play an important role in providing a forum for discussions and a vehicle for developing intra-industry standards if the industry so wishes.

Most EDI trading is still at the stage of requiring a distinct partnership between participants rather than providing a basis for "open" business activity. The next major development will be to throw EDI open to all, creating open markets where they were once closed. Clearly, the effects of new markets based upon networks and instant "buy/sell" decisions could radically change the nature of national and international business. Those industries with strong and active trade associations will be the first to benefit.

A FUNCTIONAL MODEL FOR BUSINESS MANAGERS

EDI has a great deal to do with supply chains, and the exchange of information between the partners that make up the links in the chain. Each partner in the chain is doing something which adds value to the overall activity of the industry. A partner that adds cost with no value will not survive the rationalisation of industry supply chains that will accompany the evolving use of EDI.

It is not surprising therefore that the "Value Chain" is a very important model to use when explaining the benefits of EDI in a management context. It is a popular high-level tool for separating the main functional parts of a business: the primary *value-adding* activities and the secondary *cost incurring* activities.



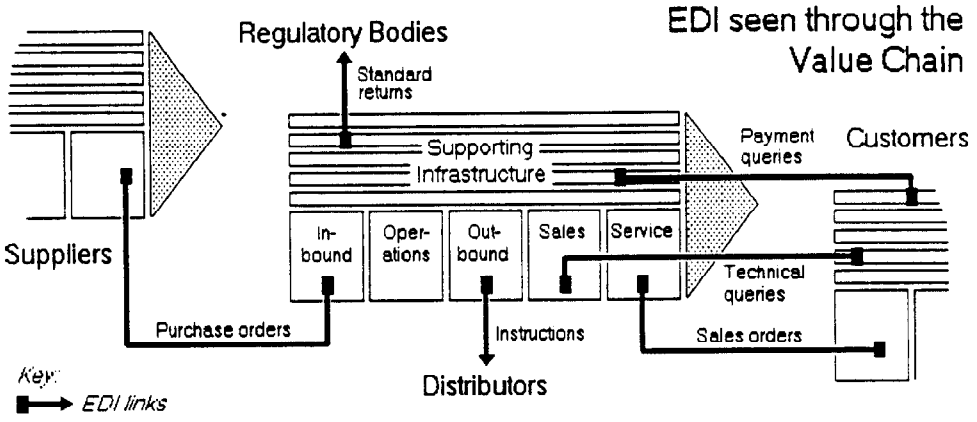
The Value Chain idea

It is common to invoke the "value chain" as a model of a business which focuses our attention on the relationship between value and cost. It helps us to think of a business as a chain of related primary processes which are directly producing added value in the end product, and secondary processes - usually ongoing - which facilitate the primary value-adding processes but do not of themselves directly produce added value: rather, they incur cost (see the widely-known literature on this subject by Michael Porter). The "value chain" is a model of business which focuses our attention on the relationship between value and cost and it lets us position EDI in the overall activities of our business.

A generalised form of the value chain has primary activities under four headings:

- "**Inbound logistics**": the processes which make available all the raw materials and other inputs which are required for the manufacturing, service provision, or other activity upon which the business is based.
- "**Operations**": the processes which transform the raw inputs into something which is a material item, service or other identifiable product that is to be offered to the market..
- "**Outbound logistics**": the processes which package, store, distribute and install the product or service, and make it physically available to the customer.
- "**Sales**": the offering of the product, from stock, to the marketplace (where a business makes to order rather than making to stock, the sales function is more properly located at the very left-hand end of the value chain).
- "**In-service support**": the processes which provide repair, maintenance, and perhaps other user services such as training and enhancement.

Developing a value chain for a specific business involves taking out the general words and replacing them with new words that most accurately describe the business in question. To the information system specialist, the idea of the value chain can be further developed to include not only the goods (or service) but the information that is flowing through the value chain. Anyone skilled in function analysis techniques can quickly show a specific business in the general form of the value chain. In the value chain, material generally moves from the left to the right, and information (sales orders, works orders and so on) from the right to the left. In fact, the value chain can be seen as a simplification or overview of all the *detailed* function models (principally data flow



diagrams) that describe the detail of a business: it is truly a model that joins together management and information systems specialists' thinking.

Each of the activities evident in the value chain can be evaluated for its costs and the value that it adds, and where an enterprise decides that its costs are too high or the value added is too low it can consider doing something about it: contracting out work to specialists, re-engineering the manufacturing processes to make them more efficient, or perhaps seeking alternative forms of distribution. EDI is one thing that can affect the cost of information moving through the value chain and improve the effectiveness of communications between business partners. The justification for "just-in-time" inventory management or for high-value distribution services can often be made through consideration of the information attaching to the supply of raw materials or inherent in the distribution and delivery of the services. In this way the information system specialist can help an enterprise by gearing the investment in *information systems* to the business problems and opportunities as seen in the *value chain.* Consider our three themes of efficiency, effectiveness and evolution:

- **Efficiency**: Without changing the value chain in any substantial way, the efficiency benefits of EDI throughout all stages of the business can be tabulated and related to the known present costs (and value adding) that exists at each stage.
- **Effectiveness**: Where there are qualitative problems in the business - customer complaints, wasted work, inaccurate data or unhappy employees - they can be tabulated against the structure of the value chain and (just as above, but using qualitative argument rather than quantitative analysis) the impact of the speed and accuracy of EDI can be assessed.
- **Evolution**: Where we wish to expand the business by extending the influence of our business into adjacent businesses (or even by acquisition) then the form and nature of the expanded business can be shown using an expanded form of the value chain.

The value chain idea only takes us so far: we can understand the functions of our business better, we can position our business relative to those of our partners and competitors and we can position EDI in relation to all. We can use it as a framework to evaluate the costs and value-related benefits of EDI in our business, but it will not always provide the justification that we need for the investment in EDI.

A JUSTIFICATION TECHNIQUE

We need at least one additional level of detail if we are to deal successfully with the matching of senior management thinking and IS thinking and the justification problem. The additional detail has nothing to do with the decomposition of the overall function into data flow diagrams, but with the specific things that a business must achieve to fulfil its *objectives.* When management define their business objectives, they often use the *Critical Success Factor* idea to tie down some of the details and to set a framework by which they can determine success or failure. Consider the following (general) examples:

- **Efficiency**

  Objective: - reduce inventory levels

  Critical success factors:
  - record receipts and issues accurately*
  - introduce regular stock cycle counting
  - eliminate pilfering

- **Effectiveness**

  Objective: - improve customer relations

  Critical success factors:
  - count complaints*
  - deliver on time*
  - eliminate errors in orders*
  - train telephone sales staff

- **Evolution**

  Objective: - develop new products rapidly and cheaply

  Critical success factors:
  - design and build for reusability
  - standardise subcontractor design info*
  - provide access to technical literature*
  - provide access to industry standards*

Each Critical Success Factor is perfectly comprehensible to management, and a moment's study of the examples provided will show that the contribution of EDI to some of them (not by any means all of them) will be evident, both to senior management and to systems specialists (see the asterisks for some possible starting points). The Critical Success Factor, above all else, provides very firm connections between EDI opportunities and business needs and it is the specialist's responsibility to study this idea

and to use the technique in dealing with management's needs. Developing Critical Success Factors from business objectives is a creative and formative group exercise. It has been said (with good purpose) that it is not the factors themselves that are so important - it is the process of deciding and agreeing them. A group of managers (of whatever mixture) will find a working session on critical success factors to be a very effective way of pulling ideas together and finding consensus.

There is one particular advantage to the Critical Success Factor which is not immediately apparent. In those cases where a company insists on a return on investment ("ROI" - from information technology or any other investment) it is often difficult to justify the more innovative projects. EDI will frequently fall into this category. By using Critical Success Factors to *demonstrate* that EDI is critical to the achievement of the primary business objectives the need for detailed ROI analysis (which would probably be inaccurate or meaningless) can be circumvented. Some organisations accept the Critical Success Factor argument alone as sufficient justification for those strategic, evolutionary ideas that are so difficult to predict until they have been tried.

SUMMARY

Business management is at liberty to adopt different attitudes to the business, based in ideas of efficiency. effectiveness and evolution. EDI has a contribution to make in each case, but until the strategic approach has been discussed and agreed (by all people concerned) management will find it difficult to relate the EDI opportunity to business problems.

In order to achieve agreement about EDI, it is useful to develop:

- an *agreement* about whether the business is aiming for efficiency, effectiveness or evolution which clarifies what is to be achieved (without this there will be conflict and confusion between cost management attitudes and investment management attitudes);
- a simple *functional model* of the business which lets both management and systems specialists see where EDI fits into the business activity (without this no-one will be able to see clearly which parts of the business have to get involved with EDI);
- a tabulation of those *Critical Success Factors* which are critical to the success of the business strategy and the potential contribution of EDI in each case (without this the justification for EDI will be weak and management will find it difficult to see any reason at all to proceed).

Of course, once senior management is interested and involved with EDI there will be other issues to be dealt with. For example security, legal issues, network and service supply, standards and implementation. Getting senior management and specialists to recognise the overall business objectives, the strategic impact of EDI and the potential operational benefits will be an important pre-requisite to dealing effectively with these

more mundane problems. Of all the models and techniques available, the Value Chain and Critical Success Factor analysis are already established as favourites with informed managers, and they are worth everyone's attention in the exploration of the potential for EDI in business. One of the main keys to success is the recognition by all those concerned that EDI contributes in different ways - at the operational and strategic levels - and that the ability of EDI to take the business forwards in different ways depends upon separating these different kinds of contribution. This will help senior management to understand the complex issues involved and greatly increase the probability that EDI will be properly understood and correctly deployed to the ultimate advantage of business.