

Strategic Information Systems Planning: Deriving Comparative Advantage from EDI¹

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Abstract

In this paper we argue that EDI should not be viewed simply as a technological infrastructure, but as a technology which may enable an organisation taking a strategic view to derive comparative advantage from utilising it as part of a process of business reengineering - in other words, as a socio-technical entity.

We suggest that Strategic Information Systems Planning (SISP) is a suitable superstructure within which EDI implementation may be considered from an appropriate strategic, as opposed to tactical, perspective.

Finally we describe the theory and current practice of SISP and present guidelines for its application in relation to EDI.

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Introduction

Hill and Ferguson (1988) point to the major problems incurred by users of a paper-based information systems - including time delays, the introduction of errors, inventory levels higher than necessary, slow processing of customer orders and uncertainty in terms of timing and payments. These authors point out that while labour costs have soared relative to other factors of production, computers and communications equipment continue to decrease in price while improving in quality and speed. EDI was seen to offer a solution to these immediate problems long before its potential as a foundation for business process redesign became apparent.

It is important to note that EDI is not *of itself* a business product. When an organisation becomes involved in an EDI scheme, perhaps to link its suppliers electronically, it is the enhanced inventory management which is the product - EDI is merely the vehicle which *enables* the Just-in-Time/Quick Response inventory management systems. The strategic benefits attributable to EDI depend upon two forms of integration:

- ! integration of information received from external sources with existing organisational systems and practices
- ! integration of the internal organisational systems and practices themselves, which can change the entire structure of the organisation.

The first of these forms of integration has already received attention from academe and industry (Boucher, 1989; Skagen, 1989; Benjamin, De Long and Scott Morton, 1990; Payne and Anderson, 1991; Rynne, 1992) although it is less common to see EDI regarded as a facilitator of business re-engineering (Davenport and Short, 1990; Sheombar and Wagenaar, 1991; Swatman and Swatman, 1991b; Swatman, Swatman and Fowler, 1992).

Case studies of organisations which have based a successful redesign of business processes upon the common technological infrastructure provided by EDI (see, for example, the case studies of Levi Strauss in the United States, Tesco in Britain, or BHP Steel in Australia cited in Rochester, 1989; Dubois, 1990; Baker, 1991; INS, 1991; Harris, Parfett and Sarson, 1992; Swatman and Swatman, 1993) all point to the need for a top-down, strategic planning process within which the business process redesign may occur.

The Strategic Information Systems Planning (SISP) literature, on the other hand, recommends a multiple or eclectic (Earl, 1989; Sullivan, 1985) approach in order to gain comparative advantage from Information Technology (IT). In other words, the utilisation of IT for strategic purposes should not simply depend on existing objectives and assumptions, or on improving the efficiency of existing processes (Hammer, 1990). It should also incorporate radical, creative thinking which could lead to radically changed relationships with, for example, suppliers and customers; and a reorientation of the very nature of the business itself.

This paper discusses the relationship between Strategic Information Systems Planning and EDI and suggests that SISP is an appropriate environment for organisations wishing to take a strategic approach to the implementation of EDI and to the subsequent use of EDI as an infrastructure for business process redesign. The practice of SISP is examined and the difficulties encountered by practitioners are shown to be similar to those encountered by the

more advanced EDI-implementing organisations. Finally, we suggest an approach to the practical implementation of EDI based on the practice of Strategic Information Systems Planning enhanced by insights drawn from the SISP literature.

Strategic Information Systems Planning

The theory and, to some extent, the practice of Strategic Information Systems Planning has developed over the past two decades. The focus of interest has shifted from technological and methodological issues towards a creativity leading to the definition of business directions and organisational (re)design.

Initially, SISP was considered to be primarily concerned with the identification of a portfolio of information systems applications and the necessary technology to support these. Although much current practice still reflects this view (Galliers, 1987a; 1991a; 1993) there is now some evidence that organisations are seeking to provide, via SISP:

- ! new or better products/services (Wilson, 1990)
- ! an environment which provides a platform for flexibility and change (Oxford, 1990)
- ! a means by which business processes may be reengineered in line with opportunities afforded by new information technology (IT) and by changed business imperatives (Scott Morton, 1991).

During this evolution of SISP thinking there has been a striking trend towards an increasingly dynamic process. In the early days, it was not uncommon for SISP studies to take 6-9 months while more recent evidence points to process durations measured in weeks or even days (Lincoln, 1990). Similarly, the time horizons studied have dropped from as much as 10 years in early studies to today's 2-3 year durations. It has been suggested that this is a consequence of rapid technological change and volatile markets but, in any event, the keynote is *flexibility* (Galliers, 1992).

Most organisations undertaking SISP appear to be reasonably satisfied with the results of their efforts. Both Galliers (1987a) and Wilson (1989) report that more than 70% of organisations participating in their studies profess some level of success (although both note that this is likely to be an overestimate of success). Nonetheless, the key factors which influence the success of SISP initiatives are often missing:

- ! quality of management involvement in and commitment to SISP
- ! a single view of the future on which most SISP are based
- ! appropriateness of the SISP in terms of feasibility as well as desirability
- ! choice/style of the SISP approach adopted
- ! lack of assessment of the benefits/impacts of SISP (in business terms)
- ! lack of integration of SISP considerations in business strategy and business reengineering.

SISP and EDI

There are interesting parallels between the key factors which influence the respective successes of SISP and EDI implementation - if we are to judge the success of EDI implementation by its ability to generate comparative advantage²:

Management involvement and commitment: It has been argued that one reason for the slower than anticipated acceptance of EDI is a consequence of the responsibility for EDI being devolved to the IS department (Swatman and Swatman, 1991a). This devolution of control (and, often, of interest) has led to EDI being considered by many organisations a primarily technical rather than organisational issue.

The extent of management involvement in SISP is a less pressing problem than it was in the early days, but there is still concern over the quality of the involvement and the lack of senior management commitment shown in taking responsibility for the implementation of change (Grindley, 1990; Galliers, 1987b; 1991a). Too much of SISP, even today, is concerned with technological issues with less attention being paid to topics such as:

- ! the impact of IT on business processes
- ! organisational arrangements for IS services
- ! the skills necessary (on the part of both users and IS professionals) to implement chosen strategies.

A single view of the future: Despite the volatility of the business and technological environments in which most organisations operate, management perspectives on EDI are too often based on a single set of assumptions about the way in which business will be conducted in the "foreseeable" future. The set of assumptions is often unquestioned - indeed, it is too rarely acknowledged that such a set of assumptions exists. EDI, then, is often considered in isolation both from other technological innovations and from changes in business practice (Swatman and Clarke, 1991; Clarke et al, 1991; Swatman and Swatman, 1991b).

This approach to EDI is largely representative of the way in which organisations still approach strategic IS planning - while business strategies may arise from an analysis of a range of future scenarios, such a wide-ranging consideration does not appear to have been translated into SISP in practice (Galliers, 1991b).

Feasibility and desirability: Many parts of the EDI community (in common with the IS community more generally) have been criticised for developing information systems which effectively perpetuate the *status quo* - that is EDI implementations (in common with information systems more generally) too often automate existing processes without consideration of their continuing optimality.

²We define comparative advantage, in line with the term's conventional usage within the economics literature, as *sustainable competitive advantage*, while the headings for the following analysis are taken from Galliers' (1992) review of SISP.

By contrast, SISP practice, the more "advanced" EDI implementors and many academics seem much more focused on a future vision. There is a danger here, however, that the *current state of IS* within any particular organisation may not be considered. In SISP, this has led to the development of desirable but infeasible plans and in the case of EDI this contributes to the phenomenon of the "perpetual pilot".

Although there is no single framework which accounts for all the issues relevant to both the current status of IS and the feasibility of SISPs, the 7Ss framework (Pascale and Athos, 1981) is an example of a mechanism which does take into account a wide range of issues and which can therefore be used to assess, in broad terms, the current IS status within an organisation and, hence, the feasibility of an EDI implementation - and, more generally, a strategic IS plan (Galliers and Sutherland, 1991; Sutherland and Galliers, 1989).

Assessment of benefits: It is commonly acknowledged within the EDI community that one of the most significant difficulties faced by a prospective adopter of EDI is the lack of a mechanism by which the costs and, more importantly, the benefits of EDI may be assessed prior to implementation. While the cost justification of EDI may be assessed after implementation and compared against the original situation, it is difficult to ask "what if" questions and accurately to assess the potential relativity of costs/benefits in advance (largely due to the importance of intangible factors such as trading partner relationships). Consequently an iterative, contingency-based approach to planning a strategy for EDI implementation (where the plan itself evolves with reference to the continuing experience of applying the implementation plan) is rarely applied.

The assessment of benefits is also considered to be a key barrier to successful SISP formulation (Wilson, 1989). Interestingly, while 80% of organisations which apply SISP claim that formal plan reviews take place, only 10% report that a formal assessment of benefits is attempted (Galliers, 1987a). Without such assessments it is difficult to see how SISP can be undertaken in an on-going manner. Consequently, organisations are unable to take advantage of the learning which could be achieved, were they to do so. No wonder, then, that mistakes are all too often repeated.

Integration with business strategy and business process redesign: The prevailing orientations of practice in both EDI and SISP present obstacles to their closer integration with business strategy formulation. The view of both EDI and SISP as being primarily technological issues has led to difficulties in implementation and in reaping the potential from new technology in terms of a revolutionary change in the way business is conducted.

While many organisations gain short-term, localised advantage from the application of EDI and, more generally, information technology (Scott Morton, 1991) fewer have been able to use EDI's potential as an enabler of business process redesign for improved business efficiency and effectiveness and fewer still have gained major improvements in inter-organisational collaboration.

Discussion

EDI is an open and essentially cooperative technological infrastructure (McNurlin, 1987; Rochester, 1989; Swatman and Swatman, 1992). It is possible to gain *short-term* competitive advantage from embracing EDI ahead of competing organisations, but is now generally accepted that there is no scope *within the inter-organisational system* for the kinds of barriers to competition suggested by the work of Porter and others (see, for example, Porter, 1980; McFarlan, 1984; Porter, 1985; Porter and Millar, 1985; Cash and Konsynski, 1985) and, consequently, no potential for *sustainable* competitive (comparative) advantage (Clemons, 1986). It has been argued in the literature (Wilmot, 1988; Benjamin, De Long and Scott Morton, 1990; Sheombar and Wagenaar, 1991; Swatman, Swatman and Fowler, 1992) and it is now widely accepted, that EDI's potential to generate comparative advantage (exemplified by the success of companies such as Levi Strauss, Tesco and Australia's BHP Steel) results from the integration of EDI with processes and information systems *within* the organisation. Put another way, an organisation will gain comparative advantage in line with its ability to redesign its internal business structure and processes to take advantage of the opportunities for increased effectiveness offered by EDI.

Swatman and Swatman (1993) have argued strongly that the full potential benefits of EDI may only be achieved by organisations which are mature (in the sense of, say, the MIT 90's model (Scott Morton, 1991) - what Galliers and Sutherland (Sutherland and Galliers, 1989; Galliers and Sutherland, 1991) refer to as Stage VI organisations characterised by:

at the Strategy level:

- ! focus on maintaining/increasing comparative advantage
- ! monitoring futures
- ! interactive planning

at the Structure level, centrally co-ordinated coalitions leading to concurrent corporate and strategic business unit (SBU) views

at the Information Systems level:

- ! inter-organisational systems
- ! new IS-based products
- ! external/internal data integration.

In essence, then, an organisation may gain comparative advantage from EDI by effective business reengineering which, in turn, is dependent on a mature organisation; a strategic and holistic perspective; and senior management-led integration of SISP into business strategy planning - triggered by an opportunist view of EDI as an enabling information technology.

If we view EDI from the perspective of the SIS Planner, we identify the following key issues:

- ! management involvement is essential - but that involvement must extend beyond a simple monitoring of costs. Senior management must:
 - drive the process which determines the extent and direction of business reengineering
 - take responsibility for the implementation of the plan

! the organisation must look at a range of possible futures and conduct "what if" analyses when considering the various alternative approaches to implementing EDI

! the plan must, of course, be feasible. Identification of the current state of the organisation and the capability of the organisation to change that state must be established before any plan may be meaningfully evaluated.

We have pointed out above that it is inadequate simply to report that the organisation must move from state A to state B - we must also define the transition. This is an organisational/social engineering issue much more than a technical IS one

! the (partially)-reengineered organisation must be the constant focus of review and analysis to ensure that redesigned processes remain optimal.

Conclusion

EDI is an opportunity for an organisation to gain comparative advantage through business reengineering which takes advantage of the relaxed constraints offered by the new inter-organisational information system. Such an opportunity is primarily the responsibility of the senior executives and Strategic Business Planners *not* that of the technologists. Too often, the potential benefits of EDI fail to arise *because* EDI is considered from a narrow IT perspective.

In this paper, we have discussed SISP in theory and in practice and have shown how the lessons from the past two decades can be applied to the world of EDI by presenting guidelines for the improved practice of SISP as an aspect of business strategy planning, incorporating this relatively new IT. We have argued that organisations considering EDI implementation - or those which have failed to capitalise on EDI by gaining comparative advantage - should adopt a business strategy-based approach.

EDI implementation need not be considered in a theoretic vacuum - the broader SISP literature is both relevant and potentially helpful to organisations implementing EDI today, if they are to gain the comparative advantage they seek from this investment.

Above all, EDI should not be seen in an isolate, purely technical way. Its implementation, for maximum effect, must be viewed as merely one part of SISP and business reengineering.

References

- Baker R.H. (1991) *EDI: What Managers Need to Know About the Revolution in Business Communications*, McGraw Hill, Blue Ridge Summit, Pennsylvania.
- Benjamin R.I., De Long D.W. and Scott Morton M.C. (1990) Electronic Data Interchange: How Much Competitive Advantage?, *Long Range Planning (UK)*, Vol. 23, No. 1, February, 29-40.
- Boucher M. (1989) The EDI Dilemma, *Systems 3X/AS World*, February.
- Cash J.I. and Konsynski B.R. (1985) IS Redraws Competitive Boundaries, *Harvard Business Review*, 134-142, Mar-Apr.
- Clarke R.A., DeLuca P., Gri...ar J., Imai T., McCubbrey D. and Swatman P.M.C. (1991) "The International Significance of Electronic Data Interchange" In Palvia S., Palvia P. and Zigli R.M. (Eds.) *Global Issues of Information Technology Management*, 276-307.
- Clemons E.K. (1986) Information Systems for Competitive Advantage, *Information and Management*, 11, 131-136.
- Davenport T.E. and Short J.E. (1990) The New Industrial Engineering: Information Technology and Business Process Redesign, *Sloan Management Review*, Summer 1990.
- DuBois G. (1990) How to Improve the Bottom Line and Reduce the cost of Doing Business - Where Does EDI Fit In? *Proc Conf EDICA '90 "Paperless Trading - Strategies for the 1990's"*, Sydney, March 29/30.
- Earl M.J. (1989) *Management Strategies for Information Technology*, Prentice Hall, New York.
- Galliers R.D. (1987a) Information Systems Planning in the United Kingdom and Australia - A Comparison of Current Practice, *Oxford Surveys in Information Technology*, 4, 223-255.
- Galliers R.D. (1987b) "Information Technology Planning within the Corporate Planning Process", In *Integrated Project Control*, Pergamon Infotech State of the Art Reports, 15, Pergamon Infotech., Maidenhead, 27-38.
- Galliers R.D. (1991a) Strategic Information Systems Planning: Myths, Reality and Guidelines for Successful Implementation, *European Journal of Information Systems*, 1(1), 55-64.
- Galliers R.D. (1991b) A Scenario-Based Approach to Strategic Information Systems Planning In M.C. Jackson *et al* (Eds) *Systems Thinking in Europe*, Plenum, New York, 73-87.
- Galliers R.D. (1992) Strategic Information Systems Planning: Concepts, Methods and Critical Success Factors, *Proc Conf AIS'92 - Advanced Information Systems Conference*, London, Mar 17-19, 1-5.

Galliers R.D. (1993) Information Systems and Business Reengineering, *Proceedings of the IFCRS Conference*, Lisbon, Portugal, Jul 12-14, in press.

Galliers R.D. and Sutherland A. (1991) Information Systems Management and Strategy Formulation: The 'Stages of Growth Model' Revisited, *Journal of Information Systems*, 1(2), April, 89-114.

Grindley C.B.B. (Ed) *Information Technology Review 1990/91*, Price Waterhouse, London.

Hammer M. (1990) Reengineering Work: Don't Automate, Obliterate, *Harvard Business Review*, 68(4), Jul-Aug, 104-112.

Harris B, Parfett M. and Sarson R. (Eds.) (1992) *Electronic Trader - The EDI Yearbook 1993*, NCC Blackwell Limited, Oxford, England.

Hill N.C. and Ferguson D.M. (1988) Electronic Data Interchange: A Definition and Perspective *EDI Forum: The Journal of Electronic Data Interchange*, Founding Issue, 5-12.

INS (1991) *Tesco - Breaking Down the Barriers of Trade*, International Network Services Limited Publication, Sunbury-on-Thames.

Lincoln T. (Ed) (1990) *Managing Information Systems for Profit*, Wiley, Chichester.

McFarlan F.W. (1984) Information Technology Changes the Way You Compete *Harvard Business Review*, May-June, 98-103.

McNurlin B.C. (1987) The Rise of Co-operative Systems, *EDP Analyzer*, Vol 25, No 6, June, 1-16.

Oxford (1990) 5th Annual PA/Oxford Conference on Information Management, Templeton College, Oxford University, September.

Pascale R.T and Athos A.G. (1981) *The Art of Japanese Management*, Penguin, Hammondsworth.

Payne J.E. and Anderson R.H. (1991) *Electronic Data Interchange (EDI): Using Electronic Commerce to Enhance Defense Logistics*, RAND Publication Series, Santa Monica, California.

Porter M.E. (1980) *Competitive Strategy*, The Free Press, New York.

Porter M.E. (1985) *Competitive Advantage*, The Free Press, New York.

Porter M.E. and Millar V.E. (1985) How Information Gives you Competitive Advantage, *Harvard Business Review*, 63(4), Mar-April.

Rochester, J.B. (1989) The Strategic Value of EDI, *I/S Analyzer*, Vol. 27, No. 8.

Rynne D. (1992) "Business Strategies to Get the Most from EDI", *Proc Conf "EDICA - 4th National EDI Users' Conference"*, Melbourne, Australia, April.

Scott Morton M. (1991) *The Corporation of the 1990's: Information Technology and Organizational Transformation*, Oxford University Press, New York.

Sheombar H.S. and Wagenaar R.W. (1991) "The Strategic Impact of EDI on Logistical Organisation: Towards a Method for Business Redesign", *Proc Conf 4th Electronic Data Interchange Conference "EDI: Business Strategy for the 90's"*, Bled, Slovenia, June 10-12, 208-228.

Skagen A.E. (1989) Nurturing Relationships, Enhancing Quality with Electronic Data Interchange, *Management Review*, February, 28-32.

Sullivan (Jr) C.H. (1985) Systems Planning in the Information Age, *Sloan Management Review*, 27(4), 3-12.

Sutherland A.R. and Galliers R.D. (1989) An Evolutionary Model to Assist in the Planning of Strategic Information Systems and the Management of the Information Systems Function, *School of Information Systems Working Paper*, Curtin University, Perth, February.

Swatman P.M.C. and Clarke R. (1991) Organisational, Sectoral and International Implications of Electronic Data Interchange, *In* J. Berleur and J. Drumm (Eds), *Information Technology Assessment*, North-Holland, Amsterdam, 117-130.

Swatman P.M.C. and Swatman P.A. (1991a) Electronic Data Interchange: Organisational Opportunity, Not Technical Problem *Proc Conf "DBIS '91" - 2nd Australian Conference on Information Systems and Database*, University of New South Wales, Sydney, February, 290-307.

Swatman P.M.C. and Swatman P.A. (1991b) Integrating EDI into the Organisation's Systems: A Model of the Stages of Integration, *Proc Conf 12th International Conference on Information Systems (ICIS'91)*, New York, December.

Swatman P.M.C. and Swatman P.A. (1992) EDI System Integration: A Definition and Literature Survey, *The Information Society*, Summer, ???-???

Swatman P.M.C. and Swatman P.A. (1993) Business Process Redesign Using EDI: the BHP Steel Experience, *Curtin University School of Computing - Technical Report No. 11*, April, 1993.

Swatman P.M.C., Swatman P.A. and Fowler D.C. (1992) "Electronic Data Interchange: Platform for a Strategic Business Focus", *In* J. Gri..ar (Ed) *EDI: Inter-organizational Systems in the Global Environment - Proceedings of the 5th International Electronic Data Interchange Conference*, Bled, Slovenia, September, 360-377.

Wilmot R.W. (1988) International Trends and Developments in EDI, *Proc Conf EDI '88*, London, November, 15-21.

Wilson T.D. (1989) The Implementation of Information Systems Strategies in UK Companies: Aims and Barriers to Success, *International Journal of Information Management*, 9(4), 245-258.