

It has always seemed to be the prevailing view that information systems (IS) are technical animals; engineered products analogous to buildings and bridges, manufactured like machine tools or even cars, loaded onto lorries and delivered to users to be used like washing machines, hi-fi or any other consumer product. So it is that we emphasise the technology.

We look for the latest technology on which to 'build' the products. We move from mainframe to client/servers. We adopt standards. We implement quality management procedures derived from manufacturing. We follow methodologies like SSADM which break the manufacturing process down into small steps with inputs and outputs.

When the IS fails to deliver we blame the technology. We change the methods. We think that object-oriented methods will work better than structured methods. We increase the quality checks. We change the technology. In the wake of our blinkered focus on technology we fail to realise that IS are different animals to other technologies.

Information Systems model social systems. They provide a representation of how people interact. As such they show what people think is important and what they don't. They are subject to interpretation. Different people will take a different view of what an IS is providing, and what the data being provided means. The IS will be affected by people's changing views, by the politics and culture within which it resides.

Not only are IS affected by the social systems they are modelling, also they in turn affect the social systems. An IS can be used to strengthen barriers or remove them, to change the nature of the organisational culture, to shift the balance between autonomy and control. They can change the organisational structure in ways that are planned for and in ways that are entirely unexpected.

We may want to understand the benefits of a particular system before deciding whether to run with it. We may want to assure that we're obtaining the correct requirements for the IS. We may want to examine the usage we're getting out of an existing system or rescue a failing system. In each of these situations we need to look at the context and culture within which the IS resides. We need to look at the power and control issues. We need to understand the politics that surround the IS.

Without understanding the culture and politics, we may be putting square systems in round organisational holes. Information systems should grow and develop with the organisation they are modelling. If we are selecting the IS, it should fit the organisation, or, like a plant grown in the wrong environment, it will wither and die.

How then are we to understand the contextual and cultural issues surrounding IS? How are we to examine whether a particular system fits an organisation? Can we sensitise ourselves to the cultural and political issues such that we can incorporate them into benefits management and requirements analysis? What types of issues should we consider? This article looks at some of these questions.

Its theme is that IS managers need to be aware of the social context and the social process within which IS exists. By understanding these, perhaps we can avoid some of the more spectacular IS failures and smooth the path for the acceptance of an IS and the harvesting of the benefits associated with it.

In order to examine these issues, we will look at the implementation of one particular type of IS, executive information systems (EIS). We will draw out some issues from a case study and develop a framework that will enable us to consider those issues relating to context and process.

EIS were designed to put information at the fingertips of the executives at the top of organisations. Instead of ploughing through pages of reports, the executive could access up-to-date information through an interface to a variety of databases. Using drill-down facilities, the executive could move from summary data to an exploration of the detail behind the trends observed at a high level. The use of 'traffic lights' indicated exceptions and drew attention to changes in the organisational information which may be of importance to the executive's decision-making.

EIS have a number of properties that make their development and implementation particularly interesting. Their benefits are difficult to identify since they do not result in immediate, tangible cost savings. Their value is mostly intangible and depends on the quality of the executive using them. They tend to depend on a champion who has a particular vision for their usefulness. Executives tend to be more resistant to IT than other user populations. This can make development very difficult when the executives think they've got better things to do and requirements meetings take place by chance in the car park.

But once installed, EISs can be powerful tools in influencing the political and cultural direction of the organisation. They are tools being used by the most powerful people in the organisation to influence the norms and expectations of the organisation. They give executives direct access to organisational information, cutting out intermediaries. Executives can directly question the details of operational activities and have a greater ability to 'interfere' with the day-to-day activities. The drill-down function can tempt the executive to take much more detailed control of operational activities than would otherwise be the case. The information provided by EIS can reduce autonomy and increase domination from the centre.

However, this depends on context. If the executive ignores the EIS, it's equally possible for the effect of the EIS to be to increase autonomy and reduce the executive's control. In many organisations, while the executive continues to depend on written reports and meetings, middle managers recognise the value of the information in the EIS. It becomes everybody's information system and is used to gain more autonomy in management roles. The executive is left behind. The effect of EIS in one organisation may be entirely different to the next.

Let's look at a case study to see if we can identify the contextual issues affecting the direction of the EIS and the process by which its social role develops.

The Communication Company was a major defence contractor, active internationally. In 1987 the directors recognised a need to improve its IS. The company's operating environment was changing. The defence market was beginning to shrink with the end of the cold war. The advent of competitive bidding for Government contracts brought an end to the days of cost-plus work. There were more small projects which needed better management and some customers were demanding EDI links in order to do business. The company was division-based, where a division could cross several sites. The Managing Director was seen as a 'numbers man', interested in particular critical success factors.

IS was centrally based around a mainframe which produced inflexible reports. Data needed to be provided quicker and more flexibly. Initially, a relational database was procured which met some of the needs. However, after 12 months, there was an increasing awareness of the importance of PCs and a requirement to move away from keyboard-based applications. This led to EIS being reviewed.

The directors believed that they wanted an EIS but could not define their exact needs. They appointed consultants to report on the provision of better data. Their proposal, for a complete office system, was rejected as being too expensive and the project was restricted in scope. The company's data processing function, known as Corporate Computer Services (CCS), was invited to prototype an EIS using a spreadsheet-like front end to the relational database.

CCS produced a prototype consisting of fixed-format reports which the head of finance, based at one particular site and acting as sponsor, did not think suitable for his purposes. As a result, in 1990, a separate group, Management Systems, was set up to produce a more flexible prototype.

The setting-up of this group was an act of faith by the head of finance. There was no formal evaluation of the benefits of EIS, since knowledge as to the nature of EIS was limited. Staff were sent on training courses to learn to use an EIS. A year was spent experimenting on possible designs, particularly addressing problems of data navigation and intuitive interfaces. At the end of 1991, the group began developing a simple financial system. This budget model was followed up by the development of a manpower system and a marketing system.

Take-up of the system was encouraged by the active support of higher management. In marketing, the marketing manager used the system on-line in meetings to demonstrate its effectiveness as an alternative to reams of paper-based reports. In finance, the director demanded that budgets be produced using the new EIS system in preference to old spreadsheets.

However, it took longer to enter data in the new EIS system than in the existing spreadsheet-base system. This acted as a disincentive to conversion. While staff were not stopped from using the old method, it was made clear that results were required from the new system.

Managers could obtain information much more quickly from the new system. It was the speed of retrieval of data, rather than of data entry, that encouraged its take-up.

Demonstrations of the system to the MD and other directors were very encouraging. The use of the system was recommended for other sites and Management Systems carried out demonstrations. As it spread to other sites, there were plans to make it company wide by networking it from the central data centre.

The overall success of the system was demonstrated by its spread through the organisation and the increasing resources allocated to it by the directors.

The Communication Company EIS system soon had 120 users, of which up to 20 were connected at any one time. By the end of 1993, the Management Systems team had grown from two to 11 staff. EIS supported a range of meetings. Managers took responsibility for the data entered into the EIS system. Actual project data was retrieved directly from a mainframe and forecast data was entered manually. The fact that the data was now trusted reduced the amount of meeting time taken up in arguments about figures. Also flexible reports could be obtained and managers had information at their fingertips.

Users felt that the EIS was delivering what they wanted and was improving their ability to respond to the changing business environment. Overheads were being reduced. Less overtime was being spent in gathering together figures. At budget time, corridors no longer filled with boxes of photocopied reports. If a correction was required, it was no longer necessary to replace one sheet in every set of photocopied reports. The

EIS was perceived to save time because it was no longer necessary to walk down to Accounts to get figures, with the usual delays and impromptu meetings that followed.

In late 1993 the MD who had supported the EIS left. A new MD was appointed and the company was reorganised from division-based management to site-based management. The sites were then more autonomous. It was up to each site to decide whether to continue investment in the EIS. Several did not wish to continue with it since there was no central impetus for it take-up. Financial support for EIS was reduced. The new MD took on a different role and was less interested in the analysis of numbers.

The profile of EIS was further reduced by the departure of the finance director. The Management Systems group which had reported to the finance director, now reported to the on-site technical manager and was effectively back under the control of CCS. By the end of 1994, EIS was looking for new sponsors and imminently likely to be halted as a major development.

How are we to understand what happened at the Communications Company? We need some framework to help us recognise why an IS succeeds or fails within an organisation. One such framework has been proposed by Geoff Walsham of Lancaster University. It looks at the relationship between IS and organisational change under four headings. It's not a methodology. The ideas it provides are not exhaustive and not supposed to be a straitjacket. Geoff Walsham describes it as a 'sensitising device'. It should encourage us to think through the social aspects of an IS and therefore introduce the IS into the organisation more sensitively and be more aware of the social effects of that IS.

Walsham's interpretive framework contains four components: content, context, process and what he calls context/process linkage.

Firstly, there is the content. We must be quite clear about the purpose of the organisation. What does it do? What are the products, processes and systems within the organisation? What procedures does it use for production and administration? We must also understand what IS is available and how the IS we are reviewing or looking to procure will fit with the existing systems. It is here that the systems analysis is done. We look at the processes the system is going to support and the data required. But we also need to consider the procedures used within the IT function, whether there are methodologies, how evaluation is carried out and how the system is developed. These are things that we do already in developing and reviewing IT. But our problem is that we rarely go beyond that. We consider our IT in terms of technical and administrative content but do not incorporate social aspects.

Secondly, there is the social context. This part of the interpretive framework looks at the social context within which the IS is placed. Here we ask: how is it that we've got to this point? We look at the historical context: what is the history of the use of IS? What previous attempts have been made to solve the problem that the new IS is aimed at? We look at the social relations of those who are participants in the IS: Are there people who should be involved but aren't (and visa versa)? Are there good relations between the people who are involved, or are there clashes of personality? We also look at the social infrastructure and ask whether there's good management co-ordination, the correct level of skills and sufficient commitment to the IS. These and other contextual issues can be examined at many levels, which is essentially boil down to three levels of analysis.

Firstly, external context. Organisations and the IS they use are influenced by a wide variety of external factors. Legislation,

environment, commercial competition and changes in technology all affect the desirability of a particular information system and its value to the organisation.

Secondly, organisational context. Within the organisation, the groupings of functions, the types of departments and the management style are some of the issues which will affect the usefulness and success of an IS. Changes in organisational structure will be reflected in changes in the IS since it reflects the social structure within which it is embedded.

Thirdly, individual context. The acceptability of an IS will depend to a great extent on the people who use it. The backgrounds of individuals, their career history and their attitudes could be key in determining the success of the IS. This is a particularly important aspect in EIS acceptance.

In understanding the context within which an IS is set, or within which we intend to procure an IS, we should seek a broader analysis which considers macro as well as micro context.

The third part of the interpretive framework is social process. Looking at the social context provided a static view of the organisational environment. Looking at the social process addresses the dynamics of organisational change. Here we ask questions about the culture and politics within the organisation which surround the IS. We look at the subcultures and ask: how do the subcultures affect the take-up of the IS? Some subcultures might resist the IS, or force the requirements in a particular direction. Subcultures may use IS as weapons against each other or as an aid to strengthening cultural barriers within the organisation. Furthermore the IS may have different meanings within different subcultures. They see the significance of events, actions and IS differently. While the IT department may see EIS as a useful tool, giving power over the information to the executive, the executive may see it as a way of clouding the issue and as a source of information overload.

We also look at the politics and ask: who has the power and how will the IS alter the distribution of power? IS alters the balance between control and autonomy. We are used to IS primarily as an instrument of control, trying to reduce people's options through the programming of procedures. This may not be a good thing, particularly if the IS reduces people's opportunities to operate in flexible way which may increase efficiency and provide a better service. IS can also increase autonomy. Access to better information can mean that I don't have to consult intermediaries or experts before making a decision. It can also reduce managerial control over groups of workers. The implementation of Email is a classic example. It increases the autonomy of the workers using it and reduces the scope of managerial control.

The fourth part of this interpretive framework tries to link the context and process issues. There's some overlap between this and the context and process parts. Indeed, these divisions are not hard and fast: some issues can be considered under both context and process. Here Walsham uses a sociological theory called structuration theory. This has been formulated by Anthony Giddens of Cambridge University. It explores the links between what people do individually and what happens within social structures such as the organisations we work within. We work within the norms, rules and conventions of our organisations. But we don't do this passively. By supporting these rules, we reinforce them. If we reject those rules, new ones are formed by our actions and the social structure is changed. IS can play a key role in this cycle. They provide a particular interpretation of the rules. They facilitate coordination and control, altering the balance of power between the organisation and the individual. And they encapsulate the norms. This is a key aspect of EIS:

by setting the norms within the EIS we can potentially change the norms of the organisation.

Using these guidelines, let's try to draw out some issues that are raised by the Communication Company case study.

Firstly, let's review the content. The company produces communication systems for the defence sector. This is primarily project-based work with a sophisticated technical content. Such project-based work needs a great deal of information to control it. The company was particularly interested in manpower, financial and marketing data. EIS could provide a good front-end to extract the required data and present it in a flexible and easy to understand manner. It sounds like, from a content point of view there's great potential for the use of EIS here.

Secondly, in looking at the context, we see that initially the development of EIS is supported. Indeed some of the contextual issues at the Communication Company make it very fertile ground for the development of an EIS. Historically, the company's IT is based on a mainframe approach. While EIS can be mainframe-based, it was the advent of PCs and the recognition by the higher management of the presentational power of PCs that increased the push for EIS. The increasing emphasis of the technology away from mainframes led to the use of relational databases and spreadsheets. The latter are often the precursors of EIS development. The centralisation of DP within CCS was also part of the context for the development of EIS. CCS could not provide the requested flexibility. They could not support rapidly changing user requirements. Such intransigence led users, particularly the finance director, to look elsewhere for support. This was not aided by the perception of CCS as a distant organisation.

There was significant co-operation amongst the senior managers and a general recognition of a need for a culture change. The managers co-operated in the promotion of the EIS and were significantly involved.

If we look at context externally, internally and individually, we find several important issues are raised which significantly influenced the push towards EIS and its initial success. The external environment was rapidly changing. The end of cost-plus work, the introduction of competitive bidding, the shrinking defence market and the increasing electronic communication requirements all increased the need for better information. Organisationally, the strong management and its division-based nature meant that ideas could spread rapidly and be well-supported from the top. There was less antagonism between the sites than was apparent when the structure reverted to a site-based one. At an individual level, the background of the managing director as a 'numbers man' was significant. Furthermore there was commitment by senior management to computerisation and good managerial co-ordination.

Thirdly, if we look at the cultural and political issues under the heading of social process, we find several interesting elements that influenced the rise and fall of EIS at the Communication Company. The power of the financial director enabled him to drive the EIS. He provided the resources and space to develop the EIS and accepted EIS as a significant investment in terms of over a hundred thousand pound. He effectively set up a new subculture which reflected his views about information delivery. This subculture operated entirely separately from CCS. The central computing resource played no part until the departure of the financial director put the Management Systems group back under the wing of CCS. The financial director also wielded power to force the use of EIS by the clerks by demanding that reports were produced from it and not from the existing spreadsheet systems. The clerks, themselves a subculture, provided some initial resistance to the EIS but were

overruled by the financial director. Other directors promoted the EIS by using it themselves and through their influence, sponsors of EIS were appointed throughout the organisation who became 'prophets' for the system. Indeed, successful demonstrations to and by those in power, particularly the managing director, increased the political influence of the system. However, this situation did not last. The change in management and in the management structure reduced the influence of the EIS across sites. By the end of this study, the EIS was only being promoted on one site and was struggling for funds. In this rise to power and subsequent fall, the actual functionality of the EIS and its technical value did not change. It was the social process and context that changed, rendering the EIS firstly of central value to the organisation and subsequently a more peripheral system. At the height of its use, the EIS increased both the autonomy and control of the managers. They could develop their own reports using the EIS without needing the services of CCS and they could exert better control over resources. Furthermore, the hands-on approach of the managers, particularly the financial director, and the emphasis on the interface helped assure that the system reflected the manager's understanding of the organisation.

Finally, looking at the ideas of structuration theory, of power, interpretive schemes and norms, we see that the EIS flourished because of the existing power structures. Its use increased the power of senior managers such as the marketing director. The EIS itself enabled the establishing of new norms. The accuracy of the data in the EIS changed people's expectations of meetings and produced a new norm of individual, managerial responsibility for the data. Potentially, the EIS could create new norms of project management and new expectations of what was acceptable as slack within projects. It was clear that the power of the managers was important in promoting the spread of EIS. So we see the social culture of the Communication Company influencing the EIS and the EIS in turn influencing the social culture and politics of the company.

In this article I have shown how issues of social context and process are key to the development and success of an IS within an organisation. This is all very well in retrospect. Lessons can be learnt and corrections made. At the Communication Company there was a need for a change in culture within the Corporate Computer Services. They could be made more responsive and flexible, perhaps through training, through decentralisation or through more rigorous outsourcing and the threat of losing their core business with the Communication Company. We have seen the effect of the changing in management and the loss of the financial director. This should lead the company to seek new sponsors or to change the direction of the EIS to suit the changing management.

But we need to be able to use frameworks such as this interpretive framework as a prescriptive device. We need to identify and address contextual and cultural problems before it's too late. We need to be able to assess the organisational fit and decide whether an IS is going to be of value culturally as well as technically. Many of the benefits of the IS will be cultural and political. They will depend on the context and the nature of the organisations, the individuals within the organisation, and the external environment.

The following provides some pointers for accessing the suitability of EIS for an organisation, based on this case study, and split into the four headings suggested by the framework:

Content:

Management recognition of need for better information in order to respond to a changing environment.

EIS suits organisations in a wide range of sectors. These are characterised by being relatively large in size. Products and process will be fairly complex, requiring a greater than average level of control and management. EIS may act as an information bridge, enabling better delivery and interpretation of data.

Context:

Large amounts of data are available on a wide variety of systems but little effort has been made to unite them.
IS function unable to provide flexible reporting facilities or rapid response to information requirements.
Organisation subject to significant change both internally and externally.
Managerial culture is hands-on and significant collaboration and cross-fertilisation of ideas occurs between managers and with the executive. There should not be barriers between managers of different departments. Forward-looking management, willing to invest in better information and seeing it as being intrinsically important.

Process:

Management able to implement findings which result from using the EIS. Managers have an understanding of the organisation and its business before using EIS.
Management support for EIS is strong, regardless of understanding of what EIS is.
Management aware of changing technology.
Requirement for improved control of resources.
Agreement of approach to EIS implementation.
Controlled user expectations concerning the benefits that EIS can deliver.

Context/Process Linkage:

New norms being established within the organisation.
EIS interpreted as adding value to data.
Extent to which EIS will alter control and power within the organisation clearly understood and agreed amongst the subcultures.

In doing such a generalising exercise we have to be careful. Each situation is unique and a generalisation may miss the key element for a particular situation. Perhaps our best hope is that, by remembering to ask social, political and cultural questions during the evaluation or development of an IS, we will identify the issues that matter in our situation. Information systems are essentially agents of organisational change. IT cannot be treated just technically. We need to be sensitive to the society in which the IS operates. Context is as important as content, which is what this publication is all about.