The whys and whats of an IT specialisation within a generalist management tertiary education.

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Abstract

The use of Information Technology (IT) in support of business is widespread and becoming more so. Indeed, it is no longer possible to meet the expectations of users of financial and other business performance information without information technology. IT both enables and supports new corporate structures and strategic thrusts. To remain competitive, companies are re-thinking how they do business and re-engineering their business processes. IT applications are being used to assist in this transition. To be able to capitalise on the exciting opportunities IT presents and to ensure business benefits are delivered consistently, managers need an understanding of the role technology plays in the business and in its future strategies.

This paper analyses the impact of IT on the structure of business organisations and on the roles executives within these organisations. It examines some management issues associated with the delivery of IT services and attempts to identify some of the opportunities and the challenges that the restructuring of business organisations opens for the executives involved. In particular it examines emerging management structures involving the corporate IT function and identifies some opportunities and challenges for the traditional corporate executive. These opportunities and challenges are the key to identifying the relevance of integrating a meaningful sequence of information technology studies into tertiary education programs primarily designed for managers and accountants. It also identifies the need for IT professionals to be given a broader more business based education and argues the case for an integration of IT and business education.

Keywords

IT Education, Management Education, CIO

1 THE IT OPPORTUNITY

As the technology becomes easier to use, its use becomes more widespread. Recent research has shown that information technology (IT) now accounts for more than 50% of the capital-goods dollars spent in the US. (Rockart, 1995). In all but the very small business, the financial and general management reporting systems are computerised and in many instances most of the functional areas within organisations rely heavily on IT. The use of technology has altered traditional business structures, broken down and blurred departmental boundaries and changed functional roles. This has resulted, *inter alia*, in changes to the traditional role of the accountant and the general manager.

There has also been a movement to use IT applications to deliver competitive advantage. Competitive IT applications may provide some temporary advantage but most IT systems are easily copied by competitors. Therefore, no technology exploiters can rest on installed systems. For an organisation to maintain an advantage in the marketplace, or indeed to avoid being left behind by its competitors, a continual search for new systems and approaches to exploit technology is required. Senior executives must stimulate transformation and the adoption of IT in support of competitive strategies. To wait until change is forced upon the organisation is courting disaster.

The popular call today is for the Re-Engineering or Re-Structuring of business and government organisations and much has been written about the role IT can play in this transformation. The need to re-structure comes, in part, because of the contributions made by past IT investments. Organisations achieved efficiencies in the operational areas of business typically replacing labour with technology. Most of these investments, however, also carried the opportunity for reduction in the middle management ranks. Many of the information and communication functions of middle managers were no longer required because of the extensive diffusion of IT throughout organisations (Pinsonneault & Kraemer, 1993). Often these opportunities were not fully exploited with the result that some organisations began to be shaped more like a lemon than the traditional pyramid (Korporaal, 1993).

Functional skills alone will no longer provide an individual with a comparative advantage. Those aspiring to executive positions within corporations will require a breadth and depth of understanding of the business and its supporting information systems. The crucial question is, which executive is, or should be, best placed to manage this constant and rapid change? For those involved in the design and delivery of tertiary education for future business executives this question translates into, what educational background best suits managers who will be involved in corporations undergoing this constant and rapid change?

2 TECHNOLOGY DEVELOPMENTS

The application of technology to business processes is clearly a moving target with new more powerful technologies being announced on a continuous basis. The increase in the performance available from affordable information technology opens new opportunities for both business and government organisations. Internal and external pressures emerge for the delivery of information in a number of different formats using graphics, imaging, etc. The added power of hardware, and the increase in the sophistication of automated software development aids, enables increasingly sophisticated application systems.

More significant than new equipment and software, however, is the almost self-perpetuating pressure for new uses of available information. As the use of information

technology grows, so too does the amount of electronically stored information. As the amount of electronically stored information expands, there is an increase in the demand for the integration of systems. The combined effect of these developments is in increased use and availability of systems and information and an overall increase in the use of information technology by market segments previously excluded by the price of the technology.

3 ORGANISATIONAL TRANSFORMATION

Economic trends seem to suggest growing diseconomies in large structures. Smaller and medium-scale business units are being made more effective through the application of information technology. It is, however, the indirect effects of the technology on the structure of business which poses the greatest challenge. This is a significant issue and it has been a recurring one...*the greatest challenge posed by information technology is in determining just how it will reshape organisations* (Weber, 1988 p11).

The impact of IT on organisational structure is contingent, inter alia, on who controls the IT decisions. Centralised control of IT tends to deliver reductions in middle management positions via the introduction of applications which replace the routine, structured and information communication components of the middle manager's role. Decentralised, line management, controlled IT tends to result in IT applications which support the unstructured and decision making aspects of the role, thus consolidating the power of middle managers (Pinsonneault & Kraemer, 1993).

We are witnessing an increasing integration of organisations as they move along a continuum of expanding connectivity. The term connectivity is used by both Venkatraman (1991) and Thewlis et al. (1992) to describe the interaction between the business forces and information technology. There is an evolving relationships between individuals, between individuals and organisations and between organisations. This continuum commences with exchanges of limited amounts of structured, standardised data relating to business activity, (eg. orders and delivery details exchanged via EDI) and proceeds to more extensive, less formally structured, information exchanges across public and private communications networks (eg. inventory information on product availability, price/volume relationships, etc.).

Electronic commerce, connecting organisations at the IT application level, is capable of delivering far more than cost efficiencies (reduced errors and data re entry). It must be seen also from the perspective of industry competition. The traditional approaches to gaining competitive advantage as described by Porter for example (1985) are diminishing. So, IT applications for competitive advantage, delivered by electronically connecting separate organisations, have become the strategic planners holy grail.

The new forms or styles of organisation which emerge will be based on the extensive use of communications technologies to provide business process integration and team-working across internal and external organisational boundaries. Techniques such as just-in-time purchasing are enhanced (and complicated in a legal/business sense) by the evolution of integrated inter-business processes. Many of the future benefits of information technology will be delivered, therefore, through a combination of technology and changed organisation structures. These benefits will only be delivered by people who are able to identify and deploy the technologies most likely to deliver business advantage.

4 WHO IS DRIVING IT?

With the increase in the rate of change of technology, information systems and business methods, new approaches are being adopted to manage and plan the use of IT in organisations. While management acknowledges the importance of information technology, it is increasingly cynical about the benefits obtained. Companies have developed and implemented IT systems to aid their business but in many cases there is little evidence that this had been done with long term strategic business considerations in mind. As a result there is a growing demand for stronger business cases from those proposing IT projects together with an information management perspective rather than a technology management perspective.

To understand the background and motivation behind some of the pressures towards IT outsourcing by State Governments in Australia a longitudinal study has commenced. Relevant enterprises who had advertised their outsourcing intentions in 1994/95 were contacted and requested to participate. The main thrust of this study is to gain an understanding of the decision maker's perceptions of the switching costs in the IT service market. Of relevance to this paper, however, is the background of those making the IT outsourcing decisions. In all nineteen of the identified organisations agreed to participate. From each organisation the person most closely involved in the decision making was interviewed. In the majority of instances (15 out of 19) the person charged with driving the decision process came from the IT function.

This critical corporate decision (to outsource IT or not) is being most heavily influenced by an executive from within the IT function. One significant reason for this would be the feeling of inadequacy most general managers express when faced with IT decision making. A feeling based on a lack of background in IT exacerbated by the failure of IT professionals to communicate well with senior management. Research elsewhere, however, has shown that strong partnerships between the IT executive and the senior corporate executives are essential to the success of systems projects (Feeny, et al., 1992; Gatian, et al., 1995).

The application of appropriate information technology to business functions releases managers from lower level tasks. Thus there are increasing opportunities for managers to become more involved with the definition, development, and management of the IT systems destined to undertake some of their current tasks. Indeed, it has been argued that more involvement in IT decisions is needed from line management in organisations to ensure business relevance and to improve the probability of success. *Only they possess the clout to embed IT into their strategies and to commit the necessary financial resources* (Rockart, 1995). New techniques are required for evaluating IT investments. Conventional accounting techniques which fail to recognise the value of the IT assets installed in an organisation may lead to inadequate or outdated IT systems.

Furthermore, businesses with sophisticated information systems risk failure if their systems are not well controlled or if they are not kept relevant to the changing business needs. Increasingly, these businesses will expect their managers to understand the business systems installed and to be able to provide critical comment on their value. Thus, managers will need an underpinning education which integrates traditional commerce knowledge and skills with an understanding of the opportunities available to organisations that effectively use IT. The corollary also stands, that the education of IT professionals must aim to equip them with the skills to interact with managers providing them with support and guidance.

5 THE MERGING OF PRIORITIES

In 1994 the Information Management Group (IMG) of the Australian Institute of Management (AIM Victorian Branch) surveyed 120 AIM members to gain an understanding of the relevance of information management issues and their perceived importance¹. The participants had previously expressed some interest in information management thus the survey is biased. However, the results do provide a useful indication of the key concerns held by business managers.

The survey identified a strong belief that IT issues are as important to the general manager as they are to the technologist. The top three issues in 1994 were:- Aligning IT and Business Strategies; Business Process Reengineering/Improvement and; Strategic Planning. The results of a similar survey conducted in 1995 show a slight realignment of interests². The top three issues in 1995 were:- Strategic Planning; IT Architecture Planning & Management and; Aligning IT and Business Strategies.

Information Architecture (IA) is typically thought of as an area for the IT professional while business process re engineering (BPR) finds most of its advocates in more general management disciplines. The promotion of IT architecture planning & management at the expense of business process re engineering and/or improvement may seem strange. However, it has been shown that both BPR and IA are centred on business processes and are driven by organisational goals and objectives so much so that, the lack of a realistic IA strategy can hinder BPR. (Teng & Kettinger, 1995).

6 MANAGING THE INFORMATION ASSET

Every business, government, and non profit organisation relies on the use of information to achieve its goals (Boddie, 1993). People at all levels in these organisations seek and value quality information. They recognise that their organisations cannot survive against global competition without information which is relevant, accurate, accessible, timely and useable. There is also a growing demand for extra forms of non-financial information as it becomes increasingly important in improving business performance. For non-financial information to be of long term value, however, it must be subjected to controls, checks and balances similar to those traditionally applied to financial information.

This often results in the call for senior corporate executives to play a more dominant role in information technology decisions. Rockart argues that although the CEO's vision is key and sets the tone, it cannot do it all (1995). He believes that functional managers are better placed to determine how IT should be used within their organisation, and argues that they are closer to the business and therefore should be able to see the most effective ways to utilise IT. In contrast, though, Emery contends (1991) it is unrealistic to expect users to anticipate trends in the technology or for them to develop mechanisms for assimilating attractive new uses within the organisation. Perhaps Rockart's observations were drawn from a management group more broadly exposed to IT and its corporate opportunities.

Emery's most important observation, however, was that users cannot easily deal with the cross-functional needs which emerge in organisations, nor can they make informed judgements on the alternatives open to them. This cross functional problem is a significant

¹Results reported by the author to IMG committee at the October 1994 meeting

²Results reported by the author to IMG committee at the November 1995 meeting

reason for systems implementation failure (Wetherbe, 1991). Information providers, therefore, will best serve their organisations by permeating functional boundaries, and negotiating optimal outcomes. They must involve themselves in the business process to build a shared understanding of the use of the information. By demonstrating this information management perspective, they will be in a position to identify innovative applications of IT to support business strategies and to coordinate action.

6.1 Implications for the Accountant

It is no longer sufficient for the accountant, as a business information provider, to be a knowledgeable end user of information technology; accountants must have in-depth knowledge of information technology (Thewlis, et al., 1992). With a more detailed understanding of information technology the discipline can address problems pro-actively rather than re-actively. Accountants must become involved in *attesting to the fairness of the information presented* (Brown, 1990). Thus the underpinning training available to accountants must equip them for this more expansive role.

6.2 Implications for the General Manager

While it is clear that information technology forms the backbone of business communication, transaction processing and decision making; there is also the problem that these technology based systems have been developed independently of other aspects of the organisation (Moreton, 1995). In many cases these systems have been justified and designed using the principles of work study derived from the scientific management era. Morton argues that a critical element in the development of a transformed organisation is a process that coherently combines the design, development and exploitation of both systems and the organisation. Organisations are increasingly investing in IT applications without achieving the desired returns in the form of added value. This is most frequently because the usual approach to designing and implementing systems has focused entirely on information processing and ignored the related aspects of organisational development.

It is too simplistic to single out the IT professional for blame here. The business executive must also shoulder a significant proportion of the fault. Thus the formal tertiary education of general managers should cover IT issues previously felt to be more relevant to the education of future IT professionals. Further, there is scope in the continuing education of managers to build in a significant coverage of IT topics.

6.3 Implications for the IT Professional

The alignment of IT and business strategies remains close to the top in management concerns. So, the information manager must be a person capable of building a successful relationship with those in the corporate management team. Such relationships are developed where there is a shared vision of the role of IT as an agent of transformation (Feeny, et al., 1992). It is refreshing therefore to see that practicing IT professionals are showing a decrease in the perceived importance of application development skills and an increase in the importance of aligning IT with business problems (Lee, et al., 1995).

The concept of a corporate information manager implies centralised strategy and goal setting; a person who works with line managers to determine IT project viability and priority is required. The shared vision concept, however, enables more decentralised implementation and control of IT. Thus, the information manager will require a technological perspective but

this must be balanced by an ability to communicate with business leaders and to recognise the integrating role required of tomorrow's IT applications.

6.4 Implications for the Educator

It is clear then, that those aspiring to a role in the corporate world, be it as accountants or in a more generalist managerial role, have little or no choice. They need to become the leaders in *(managing) the designing and controlling of systems that create information* (Brown, 1990) and in interpreting the information delivered. To become a player in this critical field, one must have the capacity to formulate a long term business strategy incorporating IT, to justify the cost of IT, to quantify the benefits achieved and to assist in the successful implementation of business applications based on information technology. Thus, the education of future executives must emphasise the link between IT and business strategy rather than simply concentrate on the link between the use of IT and business efficiency.

The development of curriculum for the education of future IT professionals must support diverging career paths for these graduates (Lee, et al., 1995). The preparation of a graduate who might seek employment within a specialist IT organisation or within a corporate IT function, somewhat isolated from the business itself, should focus on technology. While the preparation of a graduate who might specialise on the effective application of IT to meet business needs should focus on knowledge of the business and interpersonal skills. Both potential careers require professionals who good technology management skills.

In summary, tertiary courses underpinning the training of both business and IT professionals must evolve as the needs of business evolve. Flexible undergraduate programs which, in parallel to the traditional skills, expose students to IT concepts and analyse the business implications of IT will be more relevant to the needs of graduates and employers in the 21st. century.

7 MANAGING THE IT FUNCTION IN THIS NEW ENVIRONMENT

The IT Function must be carefully managed and controlled to ensure that it makes an effective contribution to the organisation. It has been shown that the individuals currently being selected to provide IT leadership to corporations have a very different job history from those of the traditional IT executive (Applegate & Elam, 1992). Information managers are just as likely to come from outside the organisation as from inside it. They will most likely have business experience outside the IT function and their agendas focus on the link between business and IT strategy. In this context, the management of information technology should be viewed as part of, or subordinate to, the overall information management role.

The computer scientist's role has traditionally been a passive one, concentrating on the delivery of the technology providing low cost and high quality information services. Concentrating on only one of the three roles defined by Winski (I/S Analyzer, 1992), that of the utility provider. The IT specialist, however, might also aspire to a more broadly defined information management role, involving the coordination of IT applications delivery and planning with business strategies. Winski defines these broader aspects as having a change agent and a business partnership role; directing and co-managing critical changes in business processes; and integrating information technology into external products and services.

Many general managers feel that information technology is the province of the computer scientist or IT professional. So the concept that generalist managers should manage the

information delivery function and have subordinate to them the managers of the supporting technology is some way from realisation. Placing the technical role subservient to the overall management of information will succeed only when a new 'hybrid' manager emerges.

Such a 'hybrid' manager will require a different educational background than has been traditionally provided for IT professionals, accountants and managers. A 'hybrid' manager will need an understanding of the analysis of business systems needs and the justification, development and implementation of technology based systems, sufficient to be involved in the planning and coordination of the IT function. These managers, however, would not require the detailed understanding of IT systems design and development expected of computer scientists. Clearly, there is still some way to go in the design of both generalist management and IT professional education before graduates are well prepared to take on these roles.

8 SELECTING AN APPROPRIATE INFORMATION MANAGER

Tomorrow's, IT reliant, organisations will be best served by a senior IT executive with a broad understanding of information technology, the opportunities it creates and the risks involved in its use. The corporate information manager must concentrate on the business aspects of information technology rather than on the technology itself. The information manager must be able to advocate strongly in high level corporate forums for the exploitation of information technology. Research by Applegate and Elam supports these contentions (1992). Although they do not use the term, they show that 'hybrid' managers, individuals with strong business, technical, and organisational experience, are increasingly being chosen to lead corporate IT functions.

An aspiring information manager will need good interpersonal communication skills as well as an understanding of strategic business planning and a broad vision to ensure effective use is made of the information resource available from both internal sources and external business partners. The ideal information manager needs an understanding of the importance of developing a high level map of information requirements of the organisation — an Information Architecture — but would focus on the 'why' and 'what' of business systems and be able to keep the 'how' in perspective.

Organisations should expect that their senior IT executive will stimulate organisational learning and recognise emerging technologies which are, or might be, of relevance. He or she will be able to undertake appropriate IT investment analysis, clearly communicating the benefits and risks, and to manage the organisational change involved in implementing new applications of IT. Because of the emerging importance of electronic commerce and the outsourcing of IT services the information manager will also need the ability to develop and manage contracts involving the supply of technology-based services.

9 TERTIARY COURSE DESIGN

Most undergraduate courses in Australia designed to develop managers and accountants are structured around 24 subjects, or units, and include a single compulsory unit in information technology. Typically, this introductory unit provides students with a background to the potential of IT and some of the skills they will require to use personal computers and IT applications. General business students need the opportunity to take further relevant IT units within a generalist business/commerce degree. Conversely most undergraduate courses

designed to develop IT professionals are drawn from the computer science stable and spend the majority of the available 24 units in covering technology related issues. The future IT professional needs a greater exposure to general business areas. In addition the emphasis needs to be less 'technology manipulative/application development' oriented and more 'technology implementation and management' oriented.

In summary, management graduates should, in parallel to the required studies in accounting, finance, and law, undertake studies in information systems and information technology and IT graduates in parallel to the required technology specific units should undertake studies in accounting, finance, and law. Further, to ensure the interaction between these student groups, course developers need to develop meaningful sequences in information systems and technology which appeal to both classes of student. Such courses would focus on the management and use of business information systems rather than on the hardware and software systems infrastructure, concentrating on systems evaluation, systems design and implementation and IT facilities management.

A graduate who completed such an information systems and technology sequence should be in a position to offer sound advice on the derivation of IT strategies from corporate strategies, on the selection of hardware and software, on the management of IT service providers both internal and external, and on the evaluation of IT investment proposals. Such a graduate would also be equipped with the interpersonal skills required to manage the organisational change involved in the implementation of information systems using the technology available today and in the future.

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11 BIOGRAPHY

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