12-31-2002

The Impact of E-Commerce on the Role of the IS Professional: an exploratory study

Eugene Cash
Victoria University of Wellington

Pak Yoong
Victoria University of Wellington

Sid Huff
Victoria University of Wellington

Follow this and additional works at: http://aisel.aisnet.org/acis2002

The Impact Of E-Commerce On The Role Of The IS Professional: an exploratory study

Eugene Cash

Pak Yoong

Sid Huff

School of Information Management
Victoria University of Wellington
New Zealand
eugene.cash@nzmp.com

Abstract

This paper describes findings from a case research study that examined the impact of e-Commerce on the role of an IS professional. Semi-structured interviews were conducted with fifteen participants from a variety of public and private organisations. All participants had previous background and experience in one particular area of IS and are currently participating or had participated in e-Commerce projects. A classification scheme that divides the role of an IS professional into four competency domains – technical, business, relationship and conceptual – was used as a guide during the analysis of research data. The findings of the study indicate that IS professionals need to change the 'relationship' and 'conceptual' domains of their role in order to perform more effectively in the e-Commerce environment. Implications of the findings for practice and research are discussed.

Keywords
E-Commerce, human resource, IT skills and knowledge, training

INTRODUCTION

Driven by the Internet revolution, electronic commerce has dramatically changed the business environment, and the role of Information Systems (IS) within the organisation (Leitheiser, 1992; Lee, Trauth, and Farwell, 1995). In the rush to avoid being 'Amazoned' – where an Internet-based competitor threatens your business (Bartholomew, 1999) – many organisations have turned their attention to creating and implementing e-Commerce solutions. In light of that, it is alarming to note that IS professionals, the people most frequently tasked with developing these e-Commerce solutions (Murphy, 2000), often do not have the competencies required to successfully execute e-Commerce projects (Ritter and Walker, 1999). This competency deficit, identified as the key barrier for organisations in implementing e-Commerce strategies (Deloitte Touche Tohmatsu, 2000), raises an important question: to what extent have competency requirements of IS professionals changed as a result of the rise of e-Commerce? Furthermore, what IS role changes have occurred as a result of the need within organisations to manage e-Commerce activities? This paper describes preliminary results from a research study that examines the impact of e-Commerce on the role of an IS professional.

To answer these questions, a case research method was used. Interviewed were fifteen IS professionals employed in businesses implementing or maintaining e-Commerce strategies. The results indicate that the implementation of e-Commerce in organisations has introduced three main business changes – or more accurately, three changes in the attitudes of top management: expectations, perceptions, and compliance. These three changes have in turn driven project changes and subsequent changes in the competency and role of the IS professional. The end result of all these changes, is that IS professionals are now required to acquire, among other things, a new set of relationship skills, including group facilitation, relationship management, and peer networking, and an enhanced conceptual domain proficiency. The implications of this result for the IS professionals are discussed and recommendations for future research and strategies suggested.

LITERATURE REVIEW

Recent research literature has identified the acquisition of 'soft' skills as essential requirements for IS professionals who are working in the e-Commerce environments. For example, Ash and Burn (2001) suggest relationship building as one important competency in the e-business environment. Similarly, Denning and Dunham (2001) consider that the lack of skills and knowledge in the Relationship and Conceptual domains has become a major dilemma for IS professionals. In a study that involves computer programmers, Bailey and Stefaniak (2001) speculate that "the skills most needed by programmers are broader in nature: the ability to adapt to a rapidly changing environment in which they must write and maintain software applications, the ability to work with others, and the ability to think independently" (2001:98).

Similar studies have also indicated these 'soft' skills to be those that professionals consistently highlight as contributing most to their success (Khan and Kukalis, 1990; Leitheiser, 1992; Nakayama and Sutcliffe, 2001). A Galliers and Atkins (1992) study involving IS executives noted that technological issues did not rate highly in managers' perceptions of important concerns. The focus instead was upon how the IS department could contribute to the 'better management of the whole organisation…' (1992:129), and how IS could be used to gain a competitive advantage in the marketplace. A study of over 200 large Australian and New Zealand organisations found similar findings, revealing the biggest skill gaps were in the management and business areas (Broadbent *et al.*, 1992). This is reiterated by the Information Technology Association of America (1999), which recently found that more than one third of the skills identified by managers as important – skills such as problem solving, and the ability to learn quickly – are 'soft'.

Beyond the 'soft' competency domain, there are the more traditional knowledge, skill and ability domains. The proceeding three studies illustrate the amalgamation of thought in relation to the identification of competency domains for the IS professional. Todd, McKeen and Gallupe (1995) defined three competency domains: technical (relating to hardware and software competence), business (industry and organisational knowledge, interpersonal, and communication skills) and lastly systems – encompassing analytical, modelling and problem-solving skills. In another article, Ross and Ruhleder (1993) identify the same three dimensions – technical, business, and problem-solving skills – that compose the human asset within an IS department. Andrews and Niederman (1998) categorised the three broad skills they distinguished as vital in the future. Splitting the business domain of Todd *et al.* (1995) and Ross and Ruhleder (1993) into the two domains of communication and business specific knowledge, the authors also included a third skill of abstraction and modelling skills. The ability to think logically in a number of different modelling paradigms parallels the systems domain described in the Todd *et al.* (1995) study and the problem-solving skills in the Ross and Ruhleder (1993) study and, more significantly, reinforces the conceptual domain largely ignored since Elliot's 1975 study.

Therefore, the following four competency clusters are seen to have emerged within the IS discipline:

- Technical – understanding and proficiency in the performance of specific IS technology-centred tasks.
- Business – organisational, business, and management-specific competencies.
- Relationship – 'soft' skills also described as interpersonal or human skills: the ability to work with and through other people, including competencies in leadership, communication and facilitation.
- Conceptual – the ability to visualise systems, to discern interrelationships among the parts, and to analyse, diagnose and solve problems within complex situations.

The above four competency clusters are used as a classification scheme and organising framework for the analysis of research data.

METHODOLOGY

The methodology selected and used in this research was the case research methodology. Creswell (1994) describes case research as a method in which the researcher explores a single entity or phenomenon bounded by time and activity and collects detailed information by using a variety of data collection procedures during a sustained period of time. In this research, the phenomenon is the impact of e-commerce on the individual participants involved in e-Commerce projects within New Zealand organisations. The questions at the forefront of this research were concerned with 'how' – how have the competencies (the skills, knowledge and abilities) of IS professionals changed in the e-Commerce environment and how has the IS professional role evolved in that environment. This type of examination is exploratory, dealing with questions with 'operational links needing to be traced over time…' (Yin, 1994:6). In such situations, case research is considered more appropriate than survey or experimental research (Yin, 1994).

Study participants were fifteen IS professionals from a variety of public and private organisations, including consulting firms and financial service organisations. Participants were chosen based upon their involvement in e-Commerce projects. One-hour semi-structured interviews with open-ended questions were conducted individually with the participants and tape recorded. Each interview was transcribed and validated by the participants. Questions were originally constructed around the four KSA domains of technical, business, relationship, and conceptual that emerged from the literature review. These questions were refined after the initial round of five interviews. The initial five interviews yielded useful information for the research, and constituted a pilot test of the methodology and constructs upon which the remaining ten structured interviews, and subsequently the study, were based.

This research utilised theoretical propositions to develop the results; continually referring back to the theoretical propositions created prior to the actual analysis. Within this analysis strategy, pattern matching – comparing an empirically based pattern with a predicted one – was the dominant mode of analysis. Internal validity is improved if patterns are found to coincide. Two main areas were subsequently used to initially break down the information: change type (business, project, or role) and KSA change (technical, business, relationship, or conceptual). Known as 'unitising' the data, the occurrence in the data of ideas or events allowed the researcher to categorise the data and uncover repeating themes and patterns in the research.

From the data analysis, a conceptual model was developed that inter-linked the emergent conceptual categories. The model was checked by several of the participants, and suggestions for improvements were incorporated.

RESULTS

The hierarchy of changes in the e-Commerce environment

One of the key findings from this study is the recognition of a ***hierarchy of changes in the e-commerce environment*** (see Figure 1). The hierarchy shows the inter-relationship between the three domains of change brought about by the introduction of e-commerce within an organisation: namely business, project and competencies changes. Even though these change domains are separated for the purpose of theorising, it is important not to regard them as distinct and unrelated. In fact, each of the change domains impacts the others.

At the bottom of the hierarchy is the domain of business changes. This domain comprises changes in what the organisation demands, and in the way in which e-Commerce initiatives, and the IS professionals themselves are perceived by the organisation. This change domain was considered by the participants to be the broadest of the three. Three key types of business domain changes emerged from the data: changing business expectations, changing business perceptions and changing business compliance (discussed in more detail later).

Secondly, in order to meet the demands of the business changes, traditional project management concepts and practices underwent changes. For example, project

expectations, timeframes and deliverables needed to evolve to cope with the emergent business changes.

Finally, the competency changes domain relates to changes in what the IS professional needs to know in order to perform effectively in his or her job – and was perceived by the participants to evolve largely from changes in the project domain.

The next section describes the three types of business changes brought about by the advent of e-Commerce, and the impact of business changes on the other two change domains.
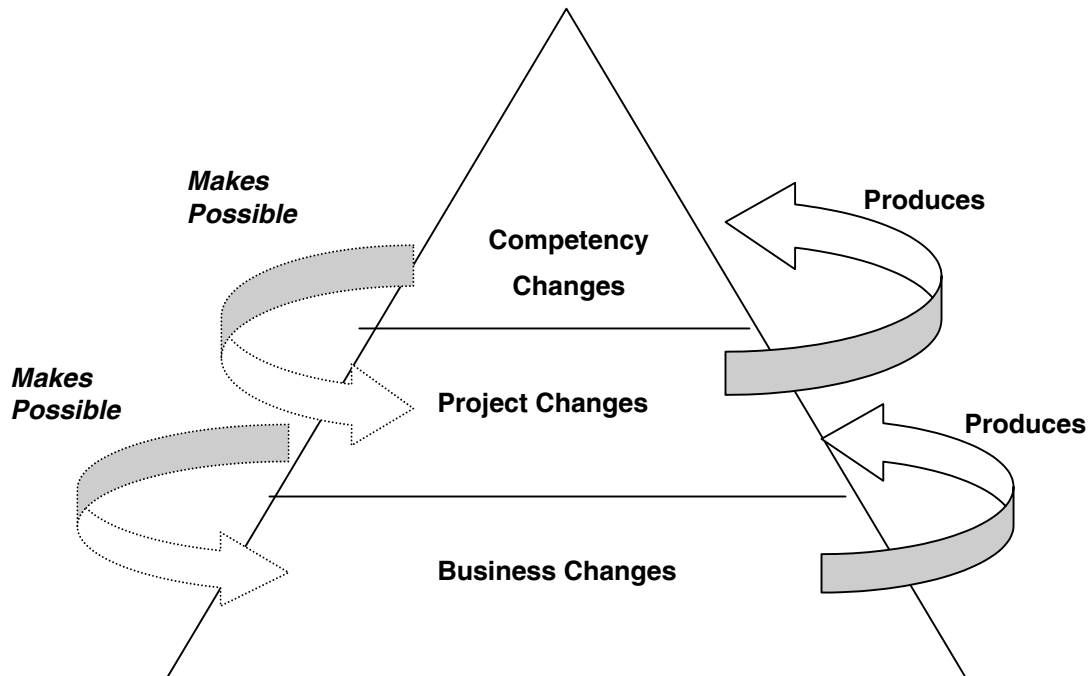

Figure 1: The hierarchy of changes in the e-Commerce environment

Change #	Business Change (Reframing)	Corresponding project and competency changes	
		Project Changes (Retooling)	Competency Changes (Reskilling)
1.	**Changing business expectations** *Intensified development timeframes* *Tailored and pervasive solutions*	1) Greater levels of unstructured planning	1a) Greater levels of conceptual understanding
		2) Multiple and smaller project teams	2a) Developing and maintaining a cohesive team vision
2.	**Changing business perceptions** *Greater opportunity for creative business strategies* *Greater IS recognition in future strategy creation*	1) A more exposed working project environment	1a) Greater levels of 'uninhibited' interaction
		2) Greater variety of solutions	2a) Becoming an expert knowledge provider
		3) Greater technical solution complexity	3a) Technical breadth, Technical depth changes
3.	**Changing business compliance** *Increased desire to interact within the project* *Business more receptive and open to change*	1) Closer integration with senior management	1a) Greater levels of business knowledge
		2) Substantial project teaching	2a) Higher levels of communication abilities
		3) Greater project visibility	3a) Managing expectations

Table 1: Business changes and the corresponding impact on the project and KSA role dimensions of the IS professional (Three Key Business Changes and the Resulting Project and Competency Changes)

Business change 1: Changing business expectations

One of the consequences associated with exaggerated publicity surrounding e-Commerce is that business expectations of e-Commerce projects are often high. Two main changes to business expectations have occurred:

1. Intensified development timeframes and
2. Tailored and pervasive solutions.

Participants have identified that the time it takes to develop e-Commerce solutions is expected to be quicker than previously demanded in conventional IS projects. The time-to-market of the solution was considered imperative to the overall success of the initiative, with one professional noting that the "e-Commerce lifecycle has shrunk right down."

Participants also recognised that certain corporate expectations exist regarding the specific tailoring of the e-Commerce solution to the business needs of the company. Rather than offering standardised solutions, businesses often want the IS professional to implement unique, exclusive and distinctive e-Commerce strategies.

The next section describes the impact of changing business perceptions on project changes and subsequently, on competency changes (see Figure 2).
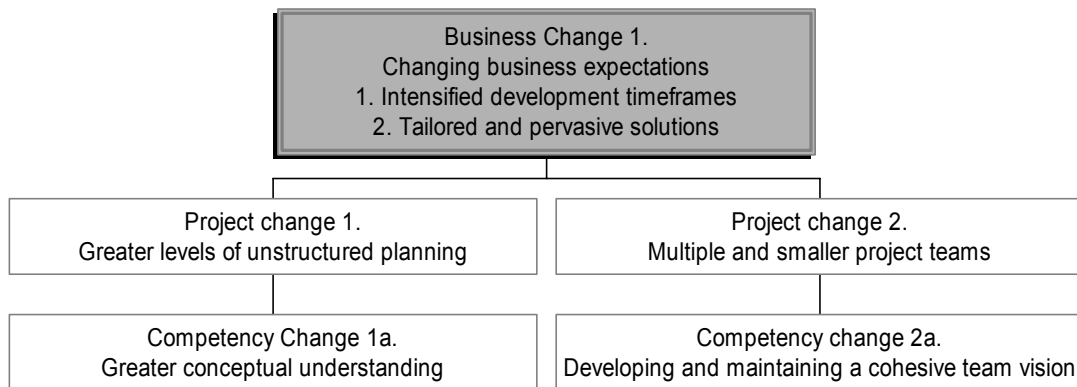

Figure 2: Changing business expectations and its impact on project and competency domains

Project change 1: Greater levels of unstructured planning

In order to attain the development speed demanded by the business, and match the rate of change in the wider environment, IS professionals have adapted traditional project development approaches. Because e-Commerce projects need to be built rapidly – and changed just as fast – incremental, *ad hoc* development was considered more appropriate than the traditional waterfall development approach. Participants described this *ad hoc* approach as more rational, sensible and practical. Rendering large amounts of initial project planning and strategising ineffectual, preliminary plans need to be reactive, fluid and living documents, placing greater pressure on the ability of the IS professional to identify distinctive opportunities and tailor and develop unique solutions. The competency changes influenced by this project change are examined below.

Competency domain change 1a – Greater levels of conceptual understanding

The need to continually refocus upon the requirements of the business, keep up-to-date with changes in the external environment and revise project strategy, all within a largely unstructured work environment, has resulted in the IS professional needing greater levels of conceptual understanding:

> It's become a lot more confusing, in that now I am working on a project that has no tight structure, and which is continually changing…so its meant I have had to become a lot more adept at problem solving, and thinking more broadly within the project.

IS professionals recognised that the ability to sew the threads of e-Commerce together has become essential in order to maintain a conceptual grip and sustain the project environment.

Project change 2 – Multiple and smaller project teams

Shedding the traditional constraints of large, singular project teams, participants noted the use of smaller teams, able to perform several tasks and handle changes in the project or environment quickly. In the e-Commerce environment the IS professional is working within an environment where '…the role potentially has to have more teams running concurrently', as one professional expressed, has impacted upon several dimensions of the IS professional's competency domains.

Competency domain change 2a – Developing and maintaining a cohesive team vision

The nature of working in a multiple project team environment has affected the IS professional predominantly in two domains: conceptual and relationship. Working in a multiple team environment has proved difficult for the IS professional, with many commenting upon the need to develop and maintain a cohesive team and project vision. Consequently, the IS professional has needed to continually articulate the holistic vision of the project, and at the same time maintain a grip on it. Making sure that, as one participant described, the 'right picture is forming' has placed pressure upon ensuring that the multiple teams function effectively.

A second change impacts on the relationship domain of the IS professional and relates to the increasing need to interrelate with a greater number of teams outside the confines of the traditional project environment. The shorter deadlines and smaller team environments have lead to an increase in the outsourcing of specific e-Commerce tasks to external entities. Participants commented on the need to facilitate multiple entities, the need to work well with other people, and for putting aside personal differences in order to collaborate on the e-Commerce projects.

Business change 2 – Changing business perceptions

Two different levels of changing business perceptions have emerged:

1. Changing business perceptions with regard to strategic potential in the marketplace.
2. Changing business perceptions with regard to the role of the IS professional in the e-Commerce environment.

These changes have subsequently led to three main project changes: a more open working environment, greater variety of business solutions and greater technical solution complexity (see Figure 3).
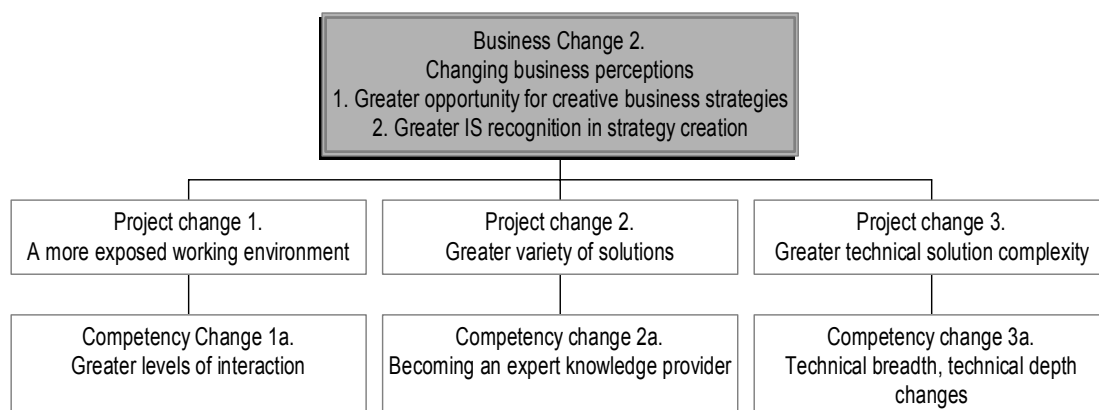

Figure 3: Changing business perceptions and its impact on project and competency domains

Project change 1 – A more exposed working project environment

Organisations are defining themselves differently in the e-Commerce environment, and have become more creative with aspiring strategies; becoming, as one participant noted, "more open". Businesses are looking at e-Commerce projects differently – using them to sound out new potential strategies, subsequently using the IS professional in more of a business role. With the higher e-Commerce project exposure within the company participants noted the increasing demands placed upon them by top management.

Competency domain change 1a – Greater levels of uninhibited interaction

In the e-Commerce environment it has become critical for the IS professional to interact with a wider variety of people. The higher level of interaction, described as "uninhibited interaction" by one participant, has meant many IS professionals are using a wider range of relationship skills than traditionally called upon. The ability to bring others into the project was deemed important for the success of the project, as was having the appropriate conflict management and networking skills. Communication, especially informal, was continually highlighted as crucial. If tasks which were beyond the skill level of existing organisational members were to be completed, and projects kept manageable, the IS professional required close interaction with internal and external entities.

Project change 2 – Greater variety of solutions

The increase in the number of strategies the IS professional is able to pursue, is matched in many cases with the willingness for the IS professional in the organisation to implement new and different strategies (see Business Change #3). The dual change of the IS professional offering more solutions and the business becoming more receptive to these solutions is best described by the following participant:

> *Sure I'm still an IS professional, but there's a need for me in the business to begin to offer strategies that traditionally the business didn't want to know about ... the business is a lot more receptive to strategies which I think deserve at least a look at.*

Offering the business new solutions has resulted in the IS professional extending their traditional business and relationship competencies.

Competency domain change 2a – The need to become an expert knowledge provider

Offering a greater number of solutions and strategies to the business has resulted in IS professionals needing to be able to work closely with other business managers, forcing them to prioritise their strategies and to subsequently align these with a developed but ever-changing e-Commerce strategy. Participants noted the need to increase the:

1. Knowledge of organisational structures.
2. Knowledge of project and strategic alternatives.
3. Knowledge of strategy risks and opportunities.
4. Ability to understand the business environment.
5. Ability to interpret business problems and develop solutions.

A second domain change concerns the relationship competencies of the IS professional. A consequence of the increased number of solutions and strategies the IS professional is expected to facilitate is the observation that relationship skills are increasingly being harnessed in order to reduce the overall conceptual complexity within the e-Commerce projects. Given the breadth of solutions, IS professionals have needed to look to both internal and external entities to provide the specialised knowledge that they themselves are unable to provide.

The final project change related to the changing business perceptions and concerns the increasingly complex technical environment IS professionals are now operating in.

Project change 3 – Greater technical solution complexity within the projects

Greater technical complexity has emerged as a key project change. Operating in an environment where e-Commerce solutions are often broader (potentially affecting many areas of the business) and deeper (dramatically affecting these areas), and in which technical change occurs frequently, has meant technical convolution has increased. Participants discussed the increase in the variety of applications that need to be understood and the greater pressure both from within the project and from the business to find and arrive at the right technical solution.

Competency domain change 3a –Technical breadth, technical depth changes

Participants regarded the increase in technical complexity as impacting on how they managed their technical knowledge. The e-Commerce environment has resulted in being "on the back foot" when it comes to maintaining the required technical knowledge for the e-Commerce projects.

Participants with a project management type role noted the need to understand a broader range of applications and languages. Alternatively, participants with a predominantly programming role within the business felt they have needed to specialise in one application in order to maximise their potential in the e-Commerce team – as the following professional explains:

> If anything I'm finding you can just pick a few [applications] and specialise in
> them, because when you go to the client you can't go in there and just know
> a little bit about all things, otherwise you wouldn't know how it worked.

In both contexts participants noted that a clearer vision of what e-Commerce in the future might hold was needed, dictating better research skills, and greater levels of environmental scanning. With the need to keep abreast of new technologies that may impact upon the future success of the project, on-going training has become essential.

Business change 3 – Changing business compliance

Participants perceived that, owing to the high profile of e-commerce projects and a strongly held belief within organisations that they are essential to future success, there has been a substantial change in business compliance. Two main changes were noted:

1. The business has an increased desire to interact and be involved in the e-Commerce project, and
2. The business is more receptive and open to change within e-Commerce projects.

These changes have subsequently led to three main project changes: closer integration with top management, substantial project teaching and greater project visibility (see Figure 4).
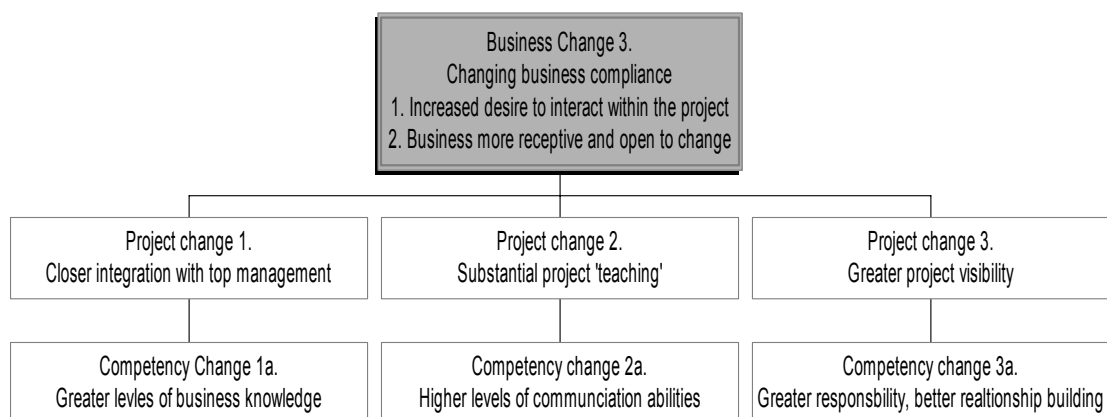

Figure 4: Changing business compliance and its impact on project and competency domains

Project change 1 – Closer integration with top management

The change in business compliance was seen to result in closer levels of integration with top management. This was attributed to two main factors:

1. Businesses wanted to be involved in such a major or potentially significant project, and
2. IS professionals needed to understand business issues only able to be conveyed by top management.

The first of these relates to the fact that a large amount of resources was being spent on e-Commerce projects. The necessity to have e-Commerce strategies in order to alleviate industry pressures, and maintain and improve competitiveness resulted in many participants noting a closer level of desired business interaction in the e-Commerce project.

Competency domain change 1a – Greater levels of business knowledge and relationship building

There are now more areas of the business the IS professional requires an understanding in. These include marketing, design, and customer management – becoming, as one participant noted, "everything to everyone". In order to validate business thinking many participants observed the need to become more of a business professional than a IS professional, with the knowledge of business processes to recommend and justify changes to the business. As these higher levels of interaction occur, the need to informally communicate, and initiate a close and continuous relationship with the business was deemed essential.

It is in developing this relationship that the IS professional has faced an additional change, that of greater strategic decision making demands. IS professionals have needed a clear understanding of business processes to a higher extent than traditionally required. This has meant the day-to-day running of the business and the specific business processes within the organisation need to be well understood, as does the long-term strategic agenda of the organisation.

Project change 2 – Substantial project teaching

The closer level of interaction between the IS professional and the business brings with it certain role changes for the IS professional. While the IS professional is expected to have a greater understanding of client needs, they also need to be aware of the limitation of the client's knowledge. The technical complexity alone is often enough to confuse top management who have little knowledge in this area. In the e-Commerce environment, where both the strategic and technical side of the project is often broad and continually changing, top management confusion is exaggerated. Participants noted the need to explain more of the project to the business, ensuring that they understood the project, so that both parties can collaborate to develop future e-Commerce strategies.

Competency domain change 2a – Higher levels of communication abilities in order to "speak through the techno-babble"

The number of involved stakeholders and the complexity of the project has made it difficult for the IS professional to develop a meeting of minds regarding the project. As such the IS professional has needed to be a lot more proactive in continually communicating and pushing the project to the business. Accordingly, changes to the knowledge, skills and abilities of the IS professional relate to the relationship domain, and more specifically to the communication abilities of the IS professional. Greater levels of expected involvement by the business in the project has placed greater pressure on the ability of the IS professional to communicate and mediate effectively both formally and informally between the technical and business side of the project.

Project change 3 – Greater project visibility

A direct consequence of the increased involvement and receptiveness to e-Commerce projects by the business is the increase in the project and personal visibility of the IS professional. Higher project visibility has had a number of impacts, both advantageous and

detrimental. Positively, participants noted this higher visibility has meant greater organisational support for the projects and better funding opportunities. Greater project visibility has led to one of the most significant changes for the IS professional in the transition from traditional to e-Commerce projects – managing expectations. This, along with the other changes for the IS professional are explained below.

Conceptual domain change 3a – Greater responsibility and managing expectations

Managing expectations has become an essential skill in the e-Commerce environment given the perceived high management anticipation attached to the expected outcome of e-Commerce projects. This is typically attributed to the high profile, crucial nature and associated hype of e-Commerce projects, as well as the significant finance committed to them. Some professionals saw their personal responsibility increase in the business, as a result of the higher expectations. Participants highlighted the ability to communicate formally and informally with the client/ business as critically important. Within this environment the IS professional is considered a trusted expert. The IS professional takes on a teaching role through increasing the awareness of what is and is not possible with the projects, and by educating the organisation about the business/ strategic potential of e-Commerce. The impact of this emerging role is clearly significant in understanding how e-commerce is changing the KSA requirements of the IS professional.

Summary

'Soft' competencies, exemplified in recent IS literature, is accentuated in the e-Commerce environment. While business and conceptual complexity has increased, the changes to those domains have not been as significant as the considerable changes occurring in the relationship domain. Participants need to expand their relationship skills because the e-Commerce environment has created a work environment which is conceptually and commercially even more turbulent than before. Participant responses indicate a number of distinct differences in e-Commerce projects that have led to these changes. The desire of top management to have the solution quicker than traditional projects and for these solutions to 'touch' upon more areas of the business is signalled as a key change. Also highlighted was the desire to use the IS professional in the creation and management of future business strategies, and the greater desire of top management to be directly involved in the project. These changes have subsequently led to project changes. The use of *ad hoc*, 'fluid' development methodologies, smaller and multiple development teams, a more exposed working environment and closer integration with top management are a few of the project changes discussed by the research participants. It is these changes, different from those traditionally faced in non e-Commerce projects, that have been identified as leading to the accentuated changes upon the relationship knowledge, skills and abilities of the IS professional.

CONCLUSIONS

Understanding the learning needs of the IS professional has long been a primary concern of IS researchers and practitioners. Achievement of organisational benefits through information systems depends heavily on the ability of the IS professional to perform his or her role effectively. For this reason, research into IS professional competencies is both important and constructive.

The implementation of e-Commerce in an organisation has introduced three main business changes (social changes occurring in the business leaders): business expectations, business perceptions, and business compliance. These three changes have driven project changes and the subsequent changes in the competency or role of the IS professional. Project changes included the use of smaller teams, closer interaction with top management, greater visibility in the organisation, and greater project commitment. Resulting competency changes varied considerably. The data suggested that, although moderate change occurred in the business and conceptual domains, participants reported significant business and conceptual complexity in the e-Commerce projects. The real competency change was found in the relationship domain, where the participants were dealing with the business and

conceptual complexity by developing relationships with internal and external entities able to provide input to the project process.

A major implication for IS professionals is that they are now required to acquire a new set of relationship skills, including group facilitation, relationship management, and peer networking. The challenge is to explore how these skills and knowledge can be taught; as they are not usually included in traditional IS educational programmes.

This has been an exploratory study focusing on the impact of e-Commerce on the role of an IS professional. Research opportunities abound. One suggestion is to replicate the study in different locations in order to generate hypotheses for testing (Benbasat *et al.*, 1987). A further study could be to examine in detail the type of educational activities for IS professionals who are managing e-Commerce projects.

REFERENCES

Andrews, A. and Niederman, F. (1998). A Firm-Level Model of IT Personnel Planning, *Proceedings of the ACM SIGCPR Conference,* Boston, 274-285.

Ash, C. and Burn, J. (2001). m-Powering Personnel for e-Business Change, *Proceedings of the ACM SIGCPR Conference,* San Diego, 65-73.

Bailey, J. and Stefaniak, G. (2001). Industry Perceptions of the Knowledge, Skills, and Abilities Needed by Computer Programmers, *Proceedings of the ACM SIGCPR Conference, Boston*, San Diego, 93-99.

Bartholomew, D. (1999). Piloting companies in the brave 'net' world. *Industry Week*, 248(10), 67-76

Benbasat, I., Goldstein, D.L., and Mead, M. (1987). The case research strategy in studies of information systems. *MIS Quarterly*, 11(3), 368-386.

Broadbent, M., Lloyd, P., Hansell, A. & Dampney, C.N.G. (1992). Roles, responsibilities and requirements for managing information systems in the 1990's. International Journal of Information Management, 12, 21-38

Creswell, J. (1997) Research Design: Qualitative and Quantitative Approaches, Sage Publications, Thousand Oaks, CA.

Denning, P. and Dunham, R. (2001). The Profession of IT: The core of the third-wave professional. *Communications of the ACM*, 44(11), 21-25.

Deloitte Touche Tohmatsu. (2000). *Deloitte e-Business Survey: Insights and Issues facing New Zealand Business*. Deloitte and Touche. Deloitte Consulting.

Elliot, C. (1975). Quality of a Data Processing Manager. *Data Management*, 13(1), 35-37.

Galliers, R. D. & Atkins, M. H. (1992). Human Resource Development for IS Executives. The 1992 ACM Special Interest Group on Computer Personnel Research Conference, ACM, 129-135.

Information Technology Association of America. (1999). Executive Summary – Bridging the Gap: Information Technology Skills for a New Millennium. ITAA, Retrieved April 24, 2000, from http://www.itaa.org/workforce/studies/hw00execsumm.htm

Khan, M.B., & Kukalis, S. (1990). MIS professionals: education and performance, Information And Management, (19)4, 249-255.

Lee, D., Trauth, E., and Farwell, D. (1995). Critical Skills and Knowledge Requirements of IS Professionals: A joint Academic/Industry Investigation. *MIS Quarterly*, 19(3), 313-340.

Leitheiser, R.L. (1992). MIS Skills for the 1990's: A Survey of MIS Managers' Perceptions. *Journal of Management Information Systems*, 9(1), 69-91.

Murphy, C. (2000). Reinventing the CIO. *Informationweek*, 768, 48-62.

Nakayama, M. & Sutcliffe, N. (2001). IT Skills Portfolio Research in SIGCPR Proceedings: Analysis, Synthesis And Proposals. Proceedings of the 2001 ACM Special Interest Group on Computer Personnel Research, ACM, 100-112.

Ritter, T., and Walker, J. (1999). Are you ready for the business on the Internet? *Business Communications Review*, 29(10), 26-32.

Ross, J., & Ruhleder, K. (1993). Preparing IS professionals for a rapidly changing world: the challenge for IS educators. Proceedings of the 1993 Conference on Computer Personnel Research, ACM, 379-384.

Todd, P.A., McKeen, J.D., & Gallupe, B.R. (1995). The Evolution of IS Job Skills: A Content Analysis of IS Job Advertisements from 1970 to 1990. MIS Quarterly, 19(1), 1-27.

Yin, R.K. (1994). *Case Study Research, Design and Methods (2nd ed)*. Newbury Park, Sage Publications.

COPYRIGHT