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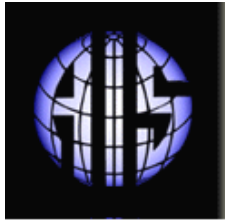
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## HOW GOOD IS THE IT PROFESSIONAL'S APTITUDE IN THE CONCEPTUAL UNDERSTANDING OF CHANGE MANAGEMENT?

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### ABSTRACT

As information technology (IT) functions and their professionals become partners in managing the information resource of the organization, contributors to the strategic planning process and major players in the business, rather than appendages which can be outsourced, new skills and competencies are needed for IT personnel. In particular, the proposition that IT specialists will have to function more like change agents has been echoed by a number of writers. However, there has been no prior empirical research that explicitly measures the degree of knowledge that IT specialists possess about fundamental concepts in the management of change in organizations.

The present study offers to fill that gap. Data were collected using a survey instrument, the Managing Change Questionnaire, which was mailed to over 2,200 Canadian IT specialists. Of the sample, 18% returned completed questionnaires. ANOVA and t-test were used to identify differences among categories of respondents. Overall, IT practitioners' scores were acceptable but not particularly impressive. Results indicate that most IT specialists could pass the test regarding their knowledge of the concepts underlying organizational change management, and in the techniques needed to implement such a process, but they were not outstanding in that knowledge. Further, senior IT managers and systems/business analysts demonstrated a better grasp of many of the issues inherent in organizational change efforts than did technical personnel. Implications of these results for research as well as practice and educational programs in IT are discussed.

**Keywords:** Change management, IT specialists, IT educational programs.

### I. INTRODUCTION

The IT world is changing at an incredible rate. Convergence in the capabilities of computing and communications technologies characterizes a new, still emerging IT era [DeSanctis *et al.* 2000]. The nature of customer relationships, products and services, business partnerships, and economic markets within and outside companies is being redefined [Venkatraman and

Henderson 1998; Lawton and Michaels 2001]. Concurrently, a new paradigm for business strategy known as “sense and respond” is emerging and taking root in managerial thinking [Day 1994; Teece *et al.* 1997]. This strategy emphasizes the continuous readiness of a firm to detect windows of opportunity in the marketplace and respond quickly with superior products, services, and distribution channels. The Internet also transforms the landscape of IT services and pushes attention toward the development of systems that interact with business partners [DeSanctis *et al.* 2000]. In the 1990s, IT was used to support product offerings and corporate strategy. Today, one of the primary challenges is to develop value-added business activities that reach into the marketplace [DeSanctis *et al.* 2000; Timmers 1999].

As a consequence of these trends, IT specialists have more opportunity than ever before to contribute to organizational transformation and performance. However, to be effective and valuable actors in today’s organizations, IT people need to develop and broaden their skills portfolio [Horner Reich and Nelson 2003; Gallivan *et al.* 2002]. New expectations about the role of in-house IT professionals in organizations and their portfolio of skills must shift from an emphasis on technical skills to an emphasis on non-IT skills [Sawyer *et al.* 1998; Gallivan *et al.* 2002; Horner, Reich, and Nelson 2003]. In particular, IT professionals will need to possess and competently apply change management skills (e.g., [Ginzberg 1979; Fougere 1991; Ross 1992; Klenke 1993; Markus and Benjamin 1996; Clark *et al.* 1997; Winston 1999; Kakabadse and Korac-Kakabadse 2001]). Change is an important fact of organizational life these days and IT professionals are at the heart of it. Technology is driving business transformation on an unprecedented scale. Yet a high proportion of IT projects fail to deliver results – largely for reasons unrelated to technical feasibility and reliability. In spite of these facts, change management remains largely an afterthought in IT projects and few IT professionals possess strong skills in this area. Our paper explores what IT specialists actually know about change and how to manage it. As one of the very few empirically-based studies of change management in IT, our study provides the foundation for improving practice and teaching in this important area and, hence, addresses a topic of relevance and value to the *Communications of the AIS* broad-based audience.

## ORGANIZATION OF THIS PAPER

The paper is organized as follows. Section II synthesizes the environmental, technological, and business changes that occurred over the past fifty years and their implications for IT functions and IT professionals and then discusses the role of IT professionals as change agents. Section III is a brief review of some of the significant theoretical perspectives on change management and the presentation of an integrated framework for understanding change in organizations. The methodology used to measure the IT professional’s knowledge about fundamental concepts in the management of change in organizations is presented in Section IV. The next section (Section V) presents and discusses the results of our analysis. The conclusion (Section VI) summarizes our findings and presents recommendations for IT practitioners, educators, and researchers.

## II. THE EVOLUTION OF THE ROLE OF IN-HOUSE IT PROFESSIONALS

A number of recent studies (e.g., [Kakabadse and Korac-Kakabadse 2001; Gallivan *et al.* 2002; Horner Reich and Nelson 2003]) suggest that the IT profession is experiencing another paradigm shift which requires further adjustments and creates new opportunities for IT professionals. Yet, IT specialists are trying to change a stereotypic image acquired in the earliest days of computing. When large mainframes were first introduced in businesses in the late 1950s and early 1960s, one of the challenges of early adopting firms was to find specialists with the programming skills to write applications for these machines [DeSanctis *et al.* 2000]. Software applications were known as computer systems, whilst the joint disciplines of system development, operations and data entry became known as data processing (DP). The business applications developed for the early computers were, for the most part, accounting oriented [DeSanctis *et al.* 2000]. For this reason, in most adopting firms, the DP department was located in the accounting function. IT professionals, in perfect control of hardware and software, dictated to business units the technology they

theoretically needed and when it would be available to them [Applegate and Zawacki 1997]. The concept of “fortress computing,” IT specialists living in their ivory tower, dates back to this period [Kakabadse and Kakabadse 2000]. Computers were the refuge of bit-programmers who did not make the time to talk to other people in the organization to help them identify their needs [Daniel 1996]. The protected environment of the computer and the special status of its specialists set DP departments aside from the rest of the organization and because of the frustration of not meeting business needs and the obvious isolation of IT departments, business units developed a negative view of IT functions and professionals [Applegate and Zawacki 1997; Kakabadse and Kakabadse 2000].

By the mid-1970s, machines had evolved to the point where new processing options became available. A smaller and less expensive form of technology emerged, namely, the mini-computer. During the early 1980s, software applications became more accessible to the neophyte and users became more computer literate and hence more vocal about the level of IT service they expected [Applegate and Zawacki 1997]. Therefore, a major step taken by IT functions in many organizations was to attempt to address business units’ needs better by involving users in systems development projects. Computer systems gradually became information systems which provided information to management, thus promoting management information systems (MIS). Systems analysis and design then substituted for programming as primary IT skill. Further, the trend to distribute IT staff to user organizations in the early 1980s improved user-IT relationships and meeting business needs with IT [DeSanctis *et al.* 2000]. However, while the distance between users and computer specialists became increasingly smaller, the traditional “brick walls” were only replaced by “glass walls,” whereby systems specialists became more visible, but not integrated members of the organization [Kakabadse and Kakabadse 2000]. As technological and socio-economic changes became more rapid, computer professionals managed to stay ahead of the hardware and software innovations by working harder and introducing more technology such as mid-range computers, local area networks, wide area networks, and client/server computing [Applegate and Zawacki 1997].

Another major paradigm shift occurred in the early 1990s when IT as a competitive weapon and its capability to transform organizations attracted considerable professional and academic interest [Applegate and Zawacki 1997; DeSanctis *et al.* 2000]. The business environment of the early 1990s was increasingly demanding and implications for IT professionals were profound. This period witnessed random and continuous change, mainly characterized by downsizing and re-engineering efforts [Applegate and Zawacki 1997]. The philosophy of continuous improvement of business processes was rapidly adopted as a fundamental strategy for coping with the turbulent business environment [Kakabadse and Kakabadse 2000]. From a technological perspective, open-ended technologies put more powerful tools at the users’ disposal, hence shifting the power of decision-making regarding IT from providers to users [Daniel 1996; Sawyer *et al.* 1998]. The focus shifted away from looking at technology projects as stand-alones and seeing the opportunity to leverage projects to address a more holistic set of business objectives through integration. Thus, by the last half of the 1990s, many organizations turned to the enterprise resource planning (ERP) systems that became commercially available. Successful implementation of these integrated systems proved immensely time-consuming, complex, and costly, and many such implementations failed [Cooke *et al.* 2001]. As a consequence of these changes, IT specialists faced a new environment in which the traditional role and skills for the design of information systems no longer applied [Klenke 1993]. Specifically, a more balanced mix of people, technical and business skills was then expected of IT specialists [Kakabadse and Korac-Kakabase 2000].

The convergence of the capabilities of computing and communications technologies characterizes a fourth, still emerging IT era [DeSanctis *et al.* 2000]. Digital convergence presents unparalleled business opportunities for redefining the nature of customer relationships, products and services, business partnerships, and economic markets within and outside companies [Venkatraman and Henderson 1998; Lawton and Michaels 2001]. Workers are more and more connected to their work and their team-mates, and computing extends far beyond the formal

workplace [Apgar 1998; Dubé and Paré 2004; Rivard *et al.* 2004]. Concurrently, a new paradigm for business strategy known as “sense and respond” is emerging and taking root in managerial thinking [Day 1994; Teece *et al.* 1997]. This strategy emphasizes the continuous readiness of a firm to detect windows of opportunity in the marketplace and to respond quickly with superior products, services, and distribution channels. The World Wide Web also changes the portfolio of IT services and pushes attention toward the development of systems that interact with clients, suppliers, and procurement intermediaries pressuring IT specialists to develop value-added business activities that reach into the marketplace [DeSanctis *et al.* 2000; Timmers 1999]. As a result of these technological, organizational, and strategic developments, more than ever before IT professionals have the opportunity to contribute to business transformation and performance. However, to be effective and valuable actors in today’s organizations, IT people need to develop and broaden their skill portfolio [Horner Reich and Nelson 2003; Gallivan *et al.* 2002].

Table 1 synthesizes the environmental, technological and business changes the occurred over the past fifty years and their implications for IT functions and IT professionals.

Table 1. Evolution of the Role of In-House IT Professionals

	<b>Era 1</b>	<b>Era 2</b>	<b>Era 3</b>	<b>Era 4</b>
Period	1950s-1960s (DP)	1970s-1980s (MIS)	1990s (IT)	2000s
IT infrastructure	Large mainframe computers Structured programming languages	Mini-computers PCs Databases LANs and WANs	Open-ended technologies (client-server, groupware, multimedia, mobile)	Convergence of computing and communications technologies Omnipresence of the Web
Pace of technological innovation	Gradual	Rapid	Fast	Very fast
IT specialists' primary role	Sole providers of computer applications “High priests of IT”	Still in control of systems development but must work harder to implement more technologies	Traditional role and skills for the design of systems no longer apply Making the systems work across platforms is the new priority	Collaborate to the building of new strategies, new products and services, new relationships and new organizations with IT
Users' familiarity with computers	Almost inexistent	Low	Moderate	Moderate to high
IT specialists' autonomy	Very high	High	Moderate	Low
<b>Primary IT skill</b>	<b>Programming</b>	<b>Systems analysis and design</b>	<b>Systems integration and implementation</b>	<b>A shift from technical to non-technical skills</b>
Interface IT-business units	Brick walls separate IT function from business units IT specialists are invisible	Glass walls replace brick walls IT specialists are more visible but not integrated members of the organization	IT has become a business unit with its own performance objectives and measures Greater interaction with other business units	IT specialists are integrated members of the organization Most large companies appointed CIOs to their top management teams
Image & credibility of IT specialists	Perceived as “techies” with no knowledge of business	Perceived as “techies” having low to moderate credibility	Perceived as “techies” having low credibility	Becoming effective change agents will improve IT specialists' credibility

As discussed above, today's business environment is increasingly demanding whereby the challenge of being ahead has and will continue to be a way of life in the foreseeable future [Kakabadse and Korac-Kakabadse 2001]. The implications for IT professionals are profound. Today's technological and business environment creates new expectations about the role of in-house IT professionals in organizations and therefore the portfolio of IT-related skills needs to shift from an emphasis on technical skills to an emphasis on non-IT skills [Sawyer *et al.* 1998; Gallivan *et al.* 2002; Horner Reich and Nelson 2003].

In particular, the proposition that IT professionals need to possess and competently apply change management skills is echoed by a number of researchers (e.g., [Ginzberg 1979; Fougere 1991; Ross 1992; Klenke 1993; Markus and Benjamin 1996; Clark *et al.* 1997; Winston 1999; Kakabadse and Korac-Kakabadse 2001]). In an article entitled "The Future Role of the Systems Analyst as a Change Agent," Fougere [1991] argues that a new paradigm for the systems analyst needs to be developed to ensure the completion of successful IT projects. Successful IT implementation frequently requires significant upheavals in organizational structure and processes which are often met with resistance as well as adjustments to reward systems, changes in authority or responsibility patterns, or power shifts. For IT professionals, the role of change agent is virtually built into their job descriptions [Klenke 1993]. Such a role highlights the importance of interpersonal and conceptual skills for IT professionals. As change agents, they must be able to secure cooperation and must be adept at participating and overcoming resistance to change in procedures and the power structure.

Markus and Benjamin [1996] suggest that IT specialists need to become better agents of organizational change for three main reasons:

1. **Poor Implementation Practices.** A high proportion of large-scale IT projects fail for reasons unrelated to technical feasibility and reliability [Markus and Keil 1994]. How a system is implemented is a major factor in the results organizations achieve from new IT [Benjamin and Levinson 1993; McKeen and Guimaraes 1997; Paré 2002; Kohli and Sherer, 2002]. Such a view is also shared by Gardner and Ash [2003] who wrote: *"the relatively low level of organizational benefits realised by typical strategic information technology interventions over the past decade is often a product of poor adoption and implementation practices on the part of senior managers and IT practitioners, who have failed to understand the non-linear and emergent nature of change in complex organizations"* (p. 18).

While good design is important, successful change with IT requires implementation planning, execution, and improvisation to deal with resistance and unforeseen events [Orlikowski and Hoffman 1997]. And as the environment becomes more demanding and rapid, IT specialists are more likely to be required to be adaptable [Kakabadse and Korac-Kakabadse 2000] and actively involved in the management of organizational change [Markus and Benjamin 1997].

2. **New Sourcing Options.** Starting in the early 1990s, outsourcing of some information systems activities became an attractive option for many organizations. Transaction cost considerations suggest that IT work which does not require organizational loyalty and/or specialized organizational skill (e.g., technical work) will be widely outsourced. This hypothesis is supported by Aubert *et al.* [2004] who found that in areas where more technical skills are needed to perform IT activities, companies are more likely to rely on external suppliers. Conversely, any IT activity where organizational loyalty and insider knowledge of the organization are essential (e.g., system implementation and change management), is less vulnerable to outsourcing.
3. **Credibility.** Many organizations have experienced a crisis of confidence in their IT functions because of a poor record of project completion, a weak reputation for IT service quality, and the weak profile of their leaders [Earl and Feeny 1994; Damon 1997]. The image of IT professionals being more interested in working with technology than

contributing to the success of the business still persists today [Kakabadse and Korac-Kakabadse 2000]. In this regard, it has been argued that:

*“the only sustained competitive advantage to using IT derives from the human capital of talented employees who know how to fit technology to the organization’s needs and who can skilfully partner with business users to manage organizational changes”* [Gallivan *et al.* 2002: p.1].

IT specialists often lack an understanding of the interpersonal and people skills needed for successful organizational transformation. In other words, they tend to let the technology sell itself [Rochester and Douglas 1990]. They don’t see the users’ resistance to change as normal [Smith and McKeen 1992; Bashein and Markus 1997], and don’t understand what their role should be in resolving change issues [Rochester and Douglas 1990; Bashein and Markus 1997]. On the other hand, in those organizations where IT plays a role in transforming the business, IT professionals are perceived as credible and effective change agents [Kakabadse and Korac-Kakabadse 2000]. Markus and Benjamin [1996] posit that becoming better change agents is likely to improve IT specialists’ credibility.

In short, while not all IT projects will require formal change management knowledge and techniques, (e.g., an upgrade from Windows NT to Windows 2000) most IT efforts today do involve change at some level, whether such change is focused on a single individual, work group, or an entire organization. Many applications fundamentally alter the way a group of people operate, both as individuals and as a whole, and the way they relate to suppliers, customers and one another [Goff 2000; Markus 2004]. In such circumstances, we concur with Fougere [1991], Markus and Benjamin [1996], Winston [1999] and many others, that IT specialists are in the right position to facilitate organizational change. However, if IT practitioners do not properly understand change they will not be effective in helping others through this often difficult and arduous process [McNish 2001].

### III. THEORETICAL FOUNDATIONS OF CHANGE MANAGEMENT

IT managers and specialists can draw their knowledge about the process of change in organizations from several major theoretical perspectives. The following review focuses on process-oriented models grounded in theories from the fields of organizational behavior (OB) and organizational development (OD). More important, within the frontiers of process-oriented models, we decided to focus on three theoretical perspectives which 1) exemplify significantly different (complementary) conceptualizations of how change affects organizations and individuals and 2) adequately reflect the overall Change Management framework discussed in this study. We acknowledge that these models are distinct from the strategic planning models (e.g., [Kanter *et al.* 1992]) that are frequently the focus of many organizational change efforts.

#### CHANGE MODELS

Traditionally, change was seen as a relatively mechanistic entity in organizations [Lewin 1958]. Change usually starts with a high level task force that determines what changes need to be made. The task force then announces what will be done and appoints project teams to implement the different elements involved. From here, each team follows a series of sequential steps for envisioning, planning, implementing, consolidating, and institutionalizing their particular change component. In other words, change is managed in a mechanistic fashion – broken down into its component items, plotted out over the expected time it will take, and managed in pieces.

Schein [1987] provides an example of an approach to organizational change that develops from Lewin’s three-stage process of ‘unfreezing’, moving, and ‘refreezing’. Schein views unfreezing as the process of creating motivation and readiness for change. There are several ways of accomplishing this process:

1. disconfirmation, when members of the organization experience a need for change which, in turn, motivates them to embrace change;
2. induction of guilt or anxiety involving the establishment of a perceived gap between what is not currently working well and a desired future state; and
3. creation of psychological safety, providing an environment in which people feel safe enough to experience disconfirmation and induction.

The second step for Schein, akin to movement in Lewin's model, is the process of helping people to see things differently and react differently in the future. Changing can be accomplished by identification with a new role model or mentor which enables one to see things from another's viewpoint, by scanning the environment for new and relevant information, or by being actively involved in the conceptualization and realization of the new organizational and/or technological vision. The third step, refreezing, involves taking the new, changed way of doing things and fitting it comfortably into one's total self-concept. At this stage, it is important that the attitudes, behaviours, and perceptions be refrozen so that the desired state becomes the new *status quo* and equilibrium for the individuals involved. In an IT-based change context, the infusion and appropriation of a new system is often accomplished through a process of mutual adjustment between the characteristics of the technology and the individual's work practices and personal attributes [Tornatsky and Klein 1982].

### **ORGANIZATIONAL TRANSFORMATION MANAGEMENT**

Beckhard and Harris [1987] focus on the significance of the transition state through which an organization must navigate to evolve from its "present state" to its "desired future state." Creating an agenda for change [Kotter 1995] includes (1) a vision of what can and should be; (2) a vision that takes into account the legitimate long term interests of the parties involved; (3) a strategy for achieving that vision; and (4) a strategy that takes into account all relevant organizational and environmental forces.

Most companies identify a specific person or group of people to be responsible for achieving change. For most changes, particularly large-scale ones, a transition management team is recommended [Beckhard and Harris 1987; Duck 1993]. The role of the team is to oversee the corporate change effort and make sure that all parts of the change fit together. It acts as a change catalyst and works cross-functionally to manage and guide the change process. Reporting to the CEO, the team should be on the job until the change process stabilizes, at which point the team disbands. It is usually composed of leaders who are respected by the organization and who offer wisdom, objectivity, and effective interpersonal skills. This team must also be given the resources and clout to manage the change process.

During the change process, the transition team must create a detailed road map of all the activities to be accomplished during the transition in order to achieve the desired future state. The cornerstone of this process is effectively communicating, throughout the whole organization, the new work processes that will define the changed organization [Duck 1993]. The team should also undertake several different types of analysis, such as a stakeholder analysis, to determine who will be affected by a particular change [McKeen and Smith 2003], a risk assessment analysis [Aubert *et al.* 1998], and a root cause analysis, which involves looking for and addressing the underlying causes of problems [Goldratt and Cox 1992]. Throughout the transition, change leaders should watch for and address inconsistencies in such practices as management policies, success measures, and rewards that undermine the credibility of the change effort. They must ensure that messages, metrics, management behaviour, and incentives all match the overall thrust of the change initiative [Duck 1993]. In short, for successful change to occur it is vital to manage the synchronization of the different aspects of change, not just the individual pieces of it.

### **INDIVIDUAL IMPACTS**

A third key perspective on change in organizations concerns the experiences of individuals during the change process. Researchers and practitioners in our field acknowledge user resistance as a



major obstacle to IT implementation success [Schultz and Slevin 1975; Davis *et al.* 1989; Marakas and Hornik 1996]. Managing user resistance can be highly challenging. A recent study conducted by Lapointe and Rivard [forthcoming] demonstrates that within the implementation of a given system, resistance can have a wide variety of antecedents and manifestations that evolve and change in nature over time.

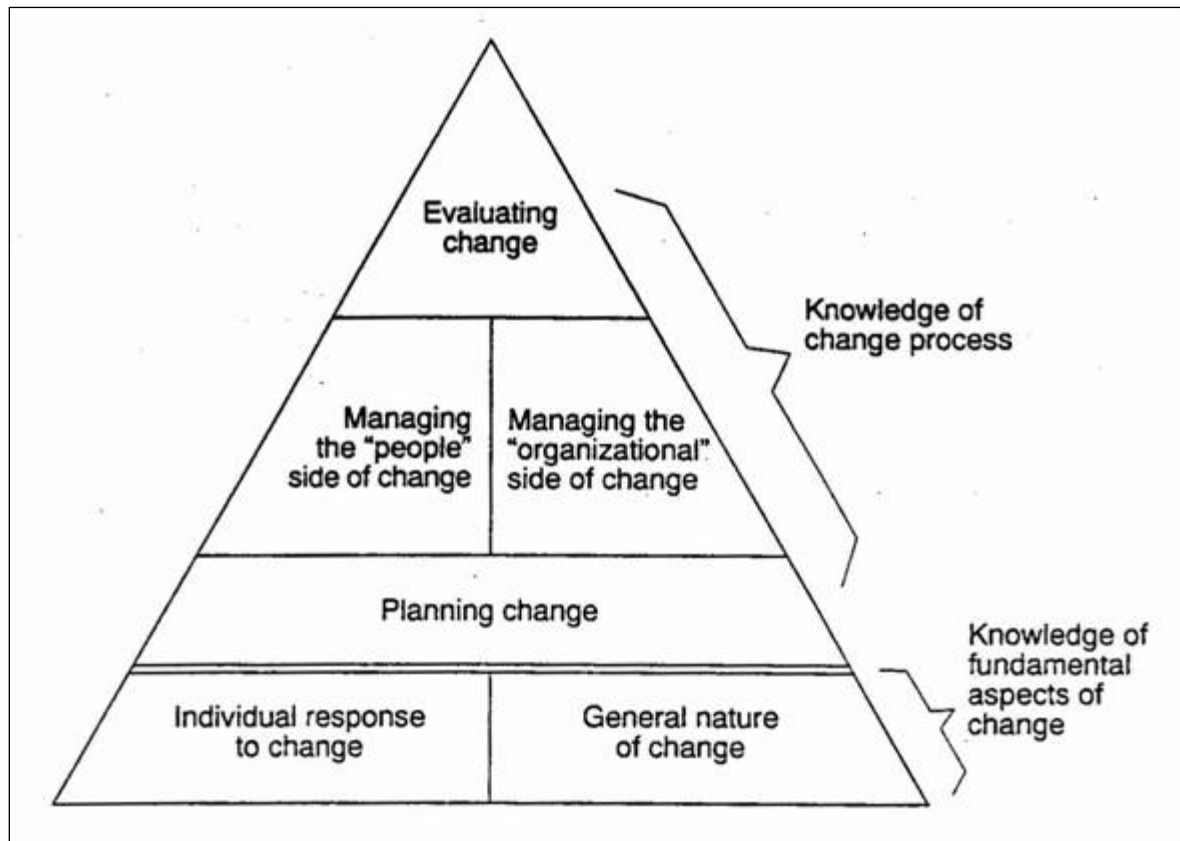
From a slightly different angle, Bridges [1986] focuses on the psychological adjustment that individual members of an organization must make during a change. He presents a three-part individual transition process that parallels Lewin's three-stage model of change. The first stage involves letting go of one's old situation and identity. The second stage is described as the "neutral zone," where change targets move through a period of ambiguity and contradiction as they search for a new framework and identity that they can use to establish themselves in the changing organization. The third and final stage of transition cannot occur until the various losses experienced in the first two stages are recognized, accepted, and resolved.

Employees' perceptions of the organization's readiness for change are another important factor in understanding sources of resistance to large-scale change. Defined as "the cognitive precursor to the behaviors of either resistance to, or support for, a change effort" [Armenakis *et al.* 1993], these perceptions can facilitate or undermine the effectiveness of a change intervention. In fact, most models of organizational change suggest that building momentum, excitement, and buy-in are critical components of any change. Furthermore, they suggest that employee attitudes toward a pending change can affect morale, productivity and turnover intentions.

### AN INTEGRATED CHANGE MANAGEMENT FRAMEWORK

Taken separately, the three perspectives above do not provide a comprehensive or integrated understanding of the organizational change process that is useful for managers who find themselves in the position of planning and/or implementing change [Siegal *et al.* 1996]. The Change Management Framework [Burke 1988; Burke and Spencer 1990; Burke *et al.* 1991] offers just such a perspective. This framework integrates the strengths of the theoretical perspectives presented above and incorporates other important issues involved in evaluating overall effectiveness of the change process. As shown in Figure 1, the framework consists of six dimensions, two of which relate to fundamental knowledge about change and four of which relate to knowledge of change processes:

1. **Individual response to change.** This dimension deals with the reasons why people resist change, e.g., loss of personal choice, loss of the tried and true. It also distinguishes between individual resistance and individual apathy.
2. **General nature of change.** This dimension concerns whether effective large system change is evolutionary or revolutionary in nature and the characteristic patterns that typify change efforts in organizations.
3. **Planning change.** This dimension deals with activities in the change process that should occur before a change is implemented, i.e., the prerequisites of change. Prerequisites include such elements as the importance of articulating a vision of a future state and recognizing the power of "turf issues" among and between different groups.
4. **Managing the people side of change.** This dimension is concerned with principles and guidelines for managing people during a change, e.g., how, when and how much to communicate about change and the psychological issues related to transition.
5. **Managing the organizational side of change.** This dimension includes the design and structural issues of systemic and long-term change efforts, e.g., the reward system.
6. **Evaluating change.** This dimension deals with indicators of a change effort's effectiveness, e.g., providing feedback about change milestones, recognizing that complaints can often be a sign of progress and positive energy.



Adapted from Siegal et al. [1996]

Figure 1. The Managing Change Framework

#### IV. METHODOLOGY

To explore what IT specialists know about change and how to manage it, a survey methodology was adopted. A questionnaire was designed to capture information about IT professionals' job type and view of their change agent role and mailed along with the MCQ instrument (see below) to the 2,211 Quebec members of the Canadian Information Processing Society (CIPS). This sample was chosen because CIPS members represent a wide variety of IT jobs and organizational settings. A total of 381 questionnaires were returned to the researchers within an eight-week period; 94 questionnaires were returned unanswered because of incomplete addresses (net response rate of 18%). One questionnaire was removed from the database due to missing data, leaving us with a final sample of 380 respondents.

In view of the somewhat low response rate, it was necessary to determine how representative the sample was of the population of CIPS members in Quebec. It was reported [CIPS 2002] that 78.8% of their Quebec members were men, whereas 84.1% of respondents in our sample were men. With regard to education, 74.2% of CIPS members in Quebec were reported to have a university diploma, compared with 76.8% in our sample. Furthermore, about one third of CIPS members in Quebec hold management positions in their respective IT function compared with 32.6% in our sample. These results indicate that there is no systematic evidence of non-response bias.

Forty-five questionnaires were received after the mailing of a follow-up letter. These were used in order to access the possibility of a non-response bias. A comparison of the responses returned early (first wave:  $n = 335$ ) to those returned late (second wave:  $n = 45$ ) was conducted [Linsky 1975]. T-tests were conducted to determine whether differences in response time (early versus

late) were associated with subscale and total scores associated with the MCQ instrument. These results indicate no significant differences in any of the variables of interest; hence, no significant bias was detected.

Our search for a reliable and valid measure revealed the existence of a single instrument for assessing the degree of knowledge people have about change management concepts and principles. This measure, called the Managing Change Questionnaire (MCQ), is based on the Change Management Framework developed by Burke [1988; 1990]. The MCQ is a commercial, knowledge-based instrument designed originally for use in conjunction with a workshop for enhancing group process and decision-making skills [Church *et al.* 1996]. It incorporates theoretical knowledge and research findings in change management with years of practical experience in helping managers guide their organizations through change efforts. It is grounded in principles and concepts derived from social psychology, organizational development, and organizational behavior<sup>1</sup> (e.g., [Beckhard and Harris 1987; Duval and Wicklaund 1972; Kanter 1983; Lewin 1958; Lippitt *et al.* 1958; Schein 1985; Tichy 1983]). Table 2 presents a sample of the issues addressed in each dimension of the MCQ.

Table 2. The MCQ: Sample Content Addressed by Dimension

Dimensions of the Change Management Framework	Content/Issues Addressed
Individual response to change	Change is not always resisted; apathy can be more difficult to work with than resistance; involvement in the direction of change can reduce resistance.
General nature of change	Certain patterns typify change efforts; effective change requires certain elements of transformation or dramatic steps.
Planning change	The importance of surfacing dissatisfaction with the present state and articulating a desired future; involving people from all areas of the organization in the planning process rather than relying on a single entity or group; the power "turf issues" among and between different groups and subcultures; recognizing the effect that the external environment has on the need to change.
Managing the people side of change	The need to communicate what will and will not change; allowing people to disengage from and grieve the loss of the present state; utilizing the power inherent in groups as a positive force; the importance of involvement as a means for building commitment.
Managing the organizational side of change	The contribution of slogans, signs, and symbols to establishing credibility and importance; preventing "knee jerk" reactions to using structural changes as a panacea; the need to modify rewards systems to support changes in other areas; the need to reduce barrier and restraints to achieving goals rather than applying more pressure.
Evaluating change	Recognizing that complaints can often be a sign of progress and positive energy; the importance of providing feedback to people regarding progress made; awareness that a reduction in presenting problems may often reflect a change in symptoms rather than root causes.

Adapted from Church *et al.* [1996]

The instrument can be used both as a reflective and an evaluative tool. It can stimulate thinking and discussion prior to and during organizational transformation efforts, confirming or challenging existing assumptions, to promoting knowledge about fundamental aspects of managing change, and enabling practitioners to view abstract concepts of change in more concrete ways. The

<sup>1</sup> Unfortunately, the MCQ instrument could not be reproduced here because of trademark restrictions. Nevertheless, we attempt to describe, within the limits of these restrictions, what the 25 true/false questions are meant to measure. A copy of the MCQ instrument can be obtained through PriceWaterhouseCoopers, 300 Atlantic Street, Stamford, CT 06901, [www.pwc.com](http://www.pwc.com).

instrument can also be used formally to test or measure practitioners and managers knowledge about the fundamentals of change or change management processes in organizations. In this regard, the instrument has been repeatedly used to formally assess understanding of change management fundamentals and processes.

The MCQ questionnaire consists of 25 true/false items that measure agreement with fundamental propositions in each of the six dimensions of the Managing Change Framework [Burke and Spencer 1990]. The questionnaire was designed with the assumption that "correct" answers – i.e. those consistent with the theoretical and applied approaches cited above – indicate the respondents' familiarity with, or knowledge about, important aspects of change management in organizations. A total score for the MCQ, as well as six unique scores corresponding to the six dimensions outlined above, is obtained by simply summing the number of answers in agreement with the normative propositions, and converting them to a percentage format. Table 3 includes one question, its correct answer, the % of correct answers given by the respondents surveyed in this study and a brief justification for each of the six dimensions of the MCQ instrument.

To our knowledge, at least three empirical studies reported the use of the MCQ instrument in the past. In 1991, results were reported based on responses obtained from over 700 executives and managers who work in several industries. At that time, the average score of the MCQ instrument was 71 per cent agreement [Burke *et al.* 1991]. A few years after the initial survey, the instrument was administered to an additional sample of 1,840 managers from over 12 organizations and five industries worldwide [Siegal *et al.* 1996]. Results indicate that the average score was identical to the one reported in the 1991 study. Both studies showed that managers have not developed an integrated approach to the conceptualization, planning, management, and evaluation of change in organizations based on the specific issues covered in the MCQ. Managers showed two weak knowledge areas in particular: (1) it was difficult for them to interpret what their employees' reactions would be (individual response to change), and subsequently would presumably experience difficulties in guiding their employees through the often complex and confusing process of change (management of the people side of change). More recently, the study was repeated with a group of 357 experts in the change management area, namely, OD practitioners. As expected, OD specialists were found to be quite knowledgeable about the concepts covered in the MCQ, with an average score of 80.3%. The difference in total scores between the sample of OD professionals and the combined samples of managers/executives was reported to be significant at the .001 level [Church *et al.* 1996]. As described in greater detail below, the percent correct varied between the two groups across the six dimensions of the MCQ.

Table 3. Sample of MCQ Questions and Answers

MCQ dimension	Question	Correct answer	% of correct answers*	Rationale
Individual response to change	People invariably resist change	False	30%	What distinguishes change that is embraced from the changes that people resist strongly is the fact that welcomed change is typically understood in advanced and is not imposed, whereas resistance stems from perceived loss. Thus, the degree of people's resistance depends on the kind of change involved and how well it is understood.
General nature of change	Effective organizational change requires certain significant and dramatic steps or "leaps" rather than moderate incremental ones	True	61%	Jantsh [1980] states that to understand the evolution of living things, one must concentrate more on disequilibrium than on equilibrium. The former, he contends, is far more natural, affirmative, and central to growth and change. Perturbations and activities of disequilibrium are signs of positive change that lead to self-organization rather than to decline.
Planning change	The articulation of the organization's future state by its leader is one of the most important aspects of a successful change effort	True	91%	One of the first steps towards change should be articulating what needs to be done differently. A vision for change must put the proposed transformation in the context of the business' competitive situation and provide a rationale for what is being proposed so that individuals will better understand how to align their activities with the company's new direction and also be able to bring to light concerns and insights that might potentially derail or enhance the change.
Managing the people side of change	A common error in managing change is providing more information about the process than is necessary	False	72%	Organizations often underestimate the level of communication that must occur during the implementation of a change. Extensive and frequent information about the effort under way is one effective method available to address all of the personal security and insecurity issues that arise from employees.
Managing the organizational side of change	A change effort routinely should begin with modifications of the organization's structure	False	64%	While environments remained fairly stable, designing a change effort was rather straightforward, because enterprises knew the piece with which to begin. Strategy was always the starting point. Next came a structure to support the new strategy and, finally, new management and IT systems to make the structure work. Today, given the dynamic and complex nature of the environment in which businesses must operate, designing a business change can start with any of the four pieces and then proceed in a dynamic, interactive and continually evolving fashion.
Evaluating change	A reduction in the organization's problems represents clear-cut evidence of progress in the change effort	False	22%	A reduction in presenting problems may often reflect a change in symptoms rather than root causes.

\* Corresponds to the % of correct answers given by the 380 IT specialists surveyed in this study.

We concur with Siegal *et al.* [1996] that the content validity of the instrument as a measure of knowledge and understanding of certain key principles and issues in the management of change in organizations is reasonably defensible. Although the instrument is not intended to cover all aspects of change management, those issues it does cover are based on sound principles and findings from several fields of study. The MCQ yielded an adequate level of reliability. For dichotomously scored items, the Kuder-Richardson 20 (KR20) coefficient is recommended for estimating reliability [Carmines and Zeller 1979; DeVellis 1991]. Dichotomous items are scored one or zero depending on whether the respondent does or does not possess the particular characteristic under investigation. Thus, for the 25 items making up the MCQ test, a score of 1 was given when the respondent answered a particular item correctly but zero if the answer was incorrect. The KR20 coefficient obtained for the present sample of IT specialists is .74. Since KR20 is simply a special case of Cronbach's alpha [Nunnally 1978], the reliability of the MCQ test is satisfactory. Church *et al.* [1996] also reported an adequate level of reliability ( $\alpha = .72$ ) for the MCQ instrument.

## V. RESULTS

Of 25 questions, the average number of correct responses was 16.9, with a standard deviation of 2.5. Using simple arithmetic, this score translates to 67.5% correct (based on a total of 100) or a grade of "C." This result, in and of itself, is not really surprising. Indeed, contrary to OD specialists, IT professionals are not in "the business of change" *per se*. As stressed by Markus and Benjamin [1996], change agency should not be conceived as something IT specialists might do instead of doing traditional IT work. Rather, managing change must be considered as a part of IT work. However, given the rising impact technologies such as ERPs, CRMs and the Internet are having on today's organizations, as well as the paradigm shift being experienced in the IT profession, we assert that change management must represent an essential part of IT work.

### TOTAL SCORES BY JOB CATEGORY

An examination of the individual total scores on the questionnaire across the entire respondent sample in Figure 2 shows that the scores are normally distributed. Clearly, some IT professionals

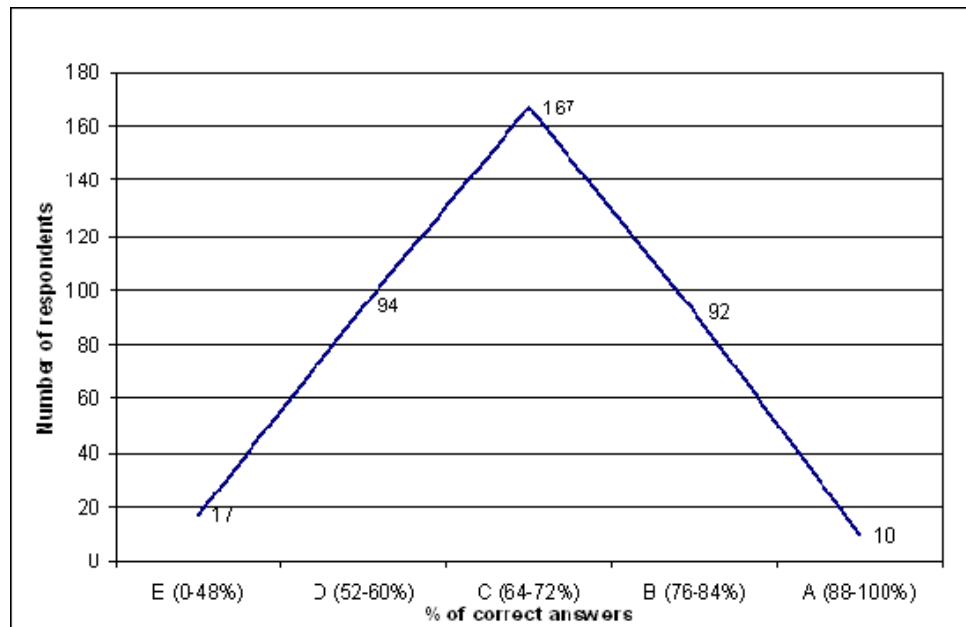


Figure 2. Response distribution for MCQ Score.

are more knowledgeable about managing the change process than others. In this light, additional analysis showed significant differences in overall agreement with the MCQ scores by job type. All respondents who indicated their job function were divided in three groups. The first group (n=124) included senior IT managers (e.g., VPs and IT directors) while the second group (n=96) was exclusively composed of systems/business/BPR analysts. The third group (n=42) consisted of technical personnel (e.g., programmers and network technicians). Perhaps not surprisingly, senior IT managers tended to agree more often with Burke's answers than did technical staff ( $F=3.646$ ,  $p<.05$ ). Figure 3 shows the mean scores for each of these groups.

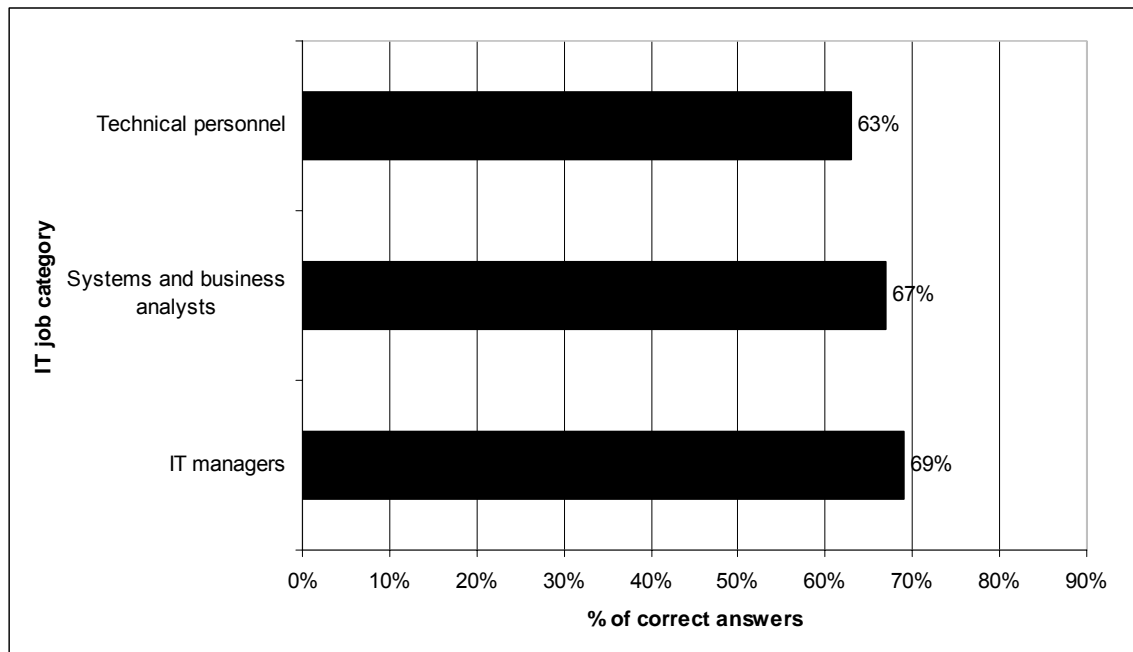


Figure 3. Total Scores by IT Job Category

### MCQ SUBSCALE SCORES

Because the MCQ instrument is based on a theoretical framework, with discrete conceptual components, subscale scores can be generated for different aspects of the model. This decomposition allowed us to refine our analysis by identifying the strengths and weaknesses of IT specialists in specific areas of change management. As shown in Figure 1, the Change Management Framework is represented as a triangle to convey two main ideas.

1. Each of the six dimensions is an integral part of one's overall knowledge regarding change.
2. Each dimension builds on those below it.

Therefore, knowledge of the fundamental aspects of change (individual response to change and the general nature of change) is the foundation for the processes of planning, managing, and evaluating change. For a change effort to be successful, actions and events need to be based on a sound understanding of how people respond to change, as well as how transitions affect and are affected by organizational processes. Burke and his colleagues [1991] state that those who have this understanding are better prepared for managing the process of change than are those who don't understand the underlying dynamics of change.

Our analysis found that IT specialists are more knowledgeable about the process of change than about its underlying dynamics ( $t=62,349$ ,  $p<.001$ ). On one hand, this result makes sense when one considers that IT specialists in general are "doers" who are comfortable with designing and

implementing information systems, processes, and methods. Few of them spend much time contemplating why change occurs or why it affects people the way it does. On the other hand, this result is also worrisome. How can IT specialists be successful at the implementation of change when they do not fully understand the fundamental aspects of what they are causing or facilitating? If IT practitioners do not have a solid understanding of the principles upon which change management is based, then their management of the process is likely never to be optimal. We firmly believe that an important factor in helping organizations to chart and manage a course for change is an understanding of the fundamental aspects of change. As shown in Figure 4, IT specialists' performance on understanding individual responses to change (second lowest score) was similar to that of managers but quite lower than OD specialists. This result indicates that IT professionals experience some difficulties in interpreting what their clients' (i.e. users) reactions to technological change would be. In terms of their understanding of the general nature of change, IT specialists obtained a similar score to OD professionals (a mark below .70). In general, a greater understanding of change management processes than the underlying dynamics of change may be potentially dangerous since IT specialists might be following a set of heuristics for managing change without really understanding why. If so, then their ability to adapt their methods would be limited in the face of obstacles, since they might not know why certain actions are not producing desired results.

In terms of demonstrating an understanding of the process of change, our respondents performed well on two of the four sub-scales, namely, managing the organizational and people sides of change (Figures 4 and 5). Overall, these two dimensions yielded their best scores. The highest number of correct answers obtained was for managing the organizational side of change subscale, e.g., reward systems, organizational structures, and barriers to reaching the end state. As expected, Figure 5 shows that senior IT managers, and to a lesser extent, systems analysts are strongest at managing the organizational side of change ( $F=5.556$ ,  $p<.005$ ). This ability is good news since IT managers are increasingly involved in and responsible for spearheading change efforts and guiding organizations through transitions (e.g., [Smith 2000]).

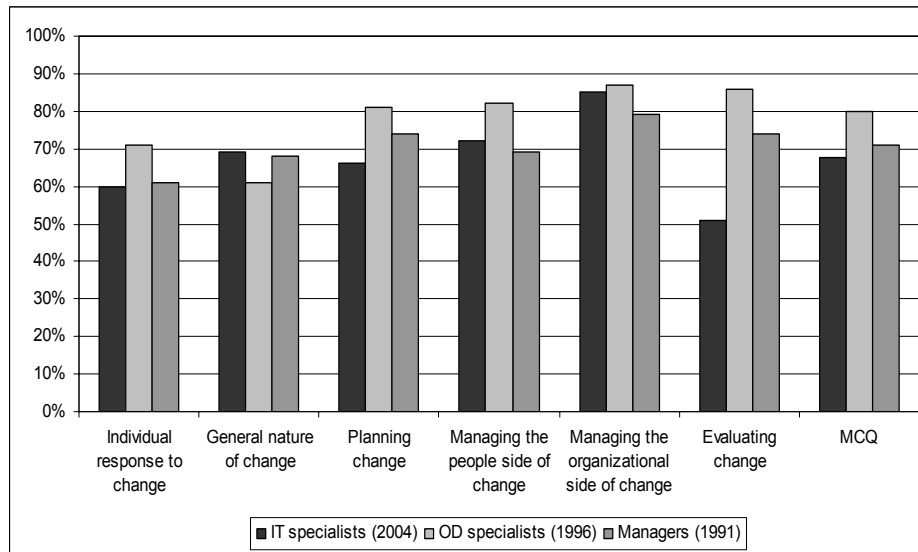


Figure 4. A Comparison of Scores on the MCQ: IT Specialists Versus OD Specialists Versus Managers

In terms of managing people issues, one would expect IT managers and systems analysts to be more familiar with these elements of change management than are technical personnel. Although the results associated with this sub-dimension are not as high as those for managing the organizational side of change, they reflect a similar pattern (Figure 5). It seems reasonable to



suggest that this outcome is based, at least in part, on technical personnel's fewer interactions with the targets of change (i.e., systems' users) in organizations.

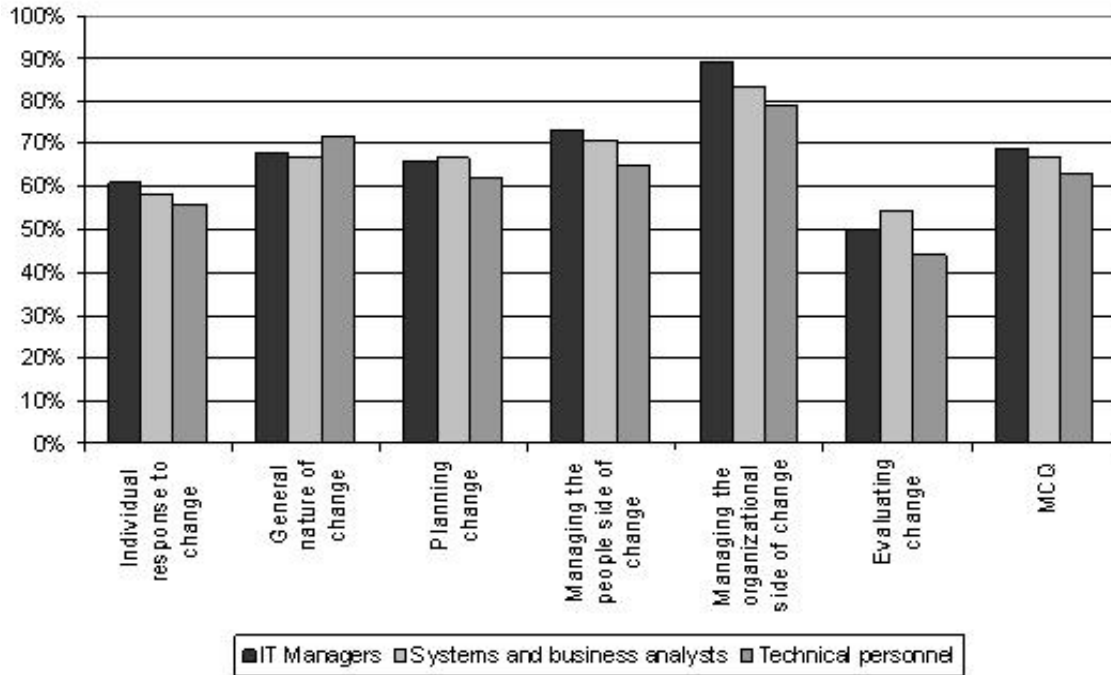


Figure 5. MCQ Subscale and Total Scores by Job Category

The final two sub-dimensions, namely, planning change and evaluating change, received average or poor responses of 66% and 51% correct, respectively. Results in Figure 4 clearly indicate that, compared to OD specialists and managers, our respondents are not well versed in the planning of change, a component which emphasizes such elements as the planning and articulation of the future state, surfacing dissatisfaction and overcoming the mire of organizational politics. These findings also show that IT specialists are not particularly familiar with the importance of continuing to manage change on an ongoing basis. The evaluating change dimension deals with such concepts as keeping momentum and positive energy directed toward the change goals, monitoring progress, and providing feedback to members about any change milestone that is reached. Overall, we expected better of IT professionals. Possibly, this low score reflects the fact that IT specialists are not kept on teams to deal with the long-term implications of systems but instead are reassigned to new work as soon as possible after an implementation [Markus 2004].

#### TOTAL AND SUBSCALE SCORES BY IT ROLE

On a more optimistic note, we found that those IT specialists who considered themselves to be facilitators or advocates of change obtained better MCQ scores than those who identified with the classic IT missionary orientation (Table 4). To measure this we asked respondents to specify which of the following represented best their main role orientation:

1. *My primary role consists of designing and building information systems that enable and constrain people in business units;*
2. *My primary role consists of promoting change in my organization by helping increase users' capacity for change; or*
3. *My primary role consists of promoting change in my organization by influencing users in directions I view as desirable.*

In line with Markus and Benjamin [1996], item 1 corresponds to the traditional or classic IT role ( $n = 176$ ) while items 2 and 3 characterize the facilitator and advocate roles, respectively ( $n = 198$ ).

Table 4. A Comparison of Scores by IT Role

	Mean		t	p
	Traditional IT role	Facilitator / Advocate role		
Individual response to change	58.9	62.3	-2.1	.05
General nature of change	66.4	71.0	-1.8	.10
Planning change	63.2	67.1	-2.2	.05
Managing the people side of change	71.0	72.7	-0.8	ns
Managing the organizational side of change	85.1	85.7	-0.4	ns
Evaluating change	51.3	51.6	-0.2	ns
<b>MCQ</b>	<b>66.4</b>	<b>68.6</b>	<b>-2.3</b>	<b>.05</b>

As shown in Table 4, although facilitators and advocates performed better than traditional IT specialists on all six MCQ dimensions, the differential outcome in the total score was primarily due to a better understanding of the fundamental aspects of change. Indeed, IT practitioners who identified themselves as change agents grasped issues related to the general nature of change ( $t=-1.8$ ,  $p<.10$ ) and the individual response to change ( $t=-2.1$ ,  $p<.05$ ) better than those who viewed themselves as systems designers and builders. These results make sense to us. One would hope that an IT professional who feels his or her role is to facilitate or infuse change in organizations should be more knowledgeable about change than one who does not. In terms of their understanding of the process of change, both groups performed similarly on three of the four sub-scales, managing the people side of change, managing the organizational side of change, and evaluating change. As expected, however, facilitators and advocates had a better grasp of issues related to the planning process than those who viewed their role as creators of computer applications.

## VI. CONCLUSION

The literature abounds with articles recognizing that IT plays an increasingly vital supporting role in business transformation [Rivard *et al.* 2004]. Over the past fifty years, the role of IT functions and IT professionals in organizations changed from that of providing the organizational information processing backbone to that of a business driver changing the way organizations operate and compete [Zuboff 1982, Davenport and Short 1990; Ramakrishna and Lin 1999; Horner Reich and Nelson 2003]. IT specialists from all industries realize that in today's world to maintain the *status quo* is to face organizational demise. They are also increasingly aware that change management skills are key competencies they must possess [Kakadabse and Korac-Kakadabse 2001] and that they can be effective change agents [Winston 1999; Smith 2000]. In this paper, we reported the results of a study of 380 Canadian IT professionals and their knowledge about fundamental concepts of managing change in organizations. While this group may not be representative of the field as a whole, and whether the data yielded by the survey can be generalized to others, remains to be seen.

## SUMMARY OF KEY FINDINGS

Perhaps the most obvious finding and somewhat disappointing one is that the average score on the MCQ instrument is a 67.5%. This outcome clearly demonstrates insufficient knowledge of some key change management issues. IT specialists know the importance, for example, of involving people and continuously communicating, but they are not as knowledgeable about many of the subtleties of organizational change. Specifically, change management issues that would need further attention are related to the following four dimensions:

1. individual reaction and response to change (e.g., apathy can be more difficult to work with than resistance);

2. general nature of change (e.g., certain patterns typify change efforts in organizations);
3. planning of change (e.g., the importance of surfacing dissatisfaction with the present state at the start of a project); and, most importantly,
4. evaluation of change (e.g., recognizing that complaints can often be a sign of progress and positive energy).

Results in Figure 4 show that IT specialists did almost as well as managers (surveyed in 1991) on the overall MCQ scale but, as expected, their performance was inferior to that of OD specialists (surveyed in 1996). OD specialists did much better than IT professionals on four of the six dimensions of the MCQ, namely, individual response to change, planning change, managing the people side of change, and evaluating change. Historically, IT specialists encountered particularly difficult time with change *per se* [Rochester and Douglas 1990]. They are taught to be highly disciplined. Their tolerance for ambiguity is low and they often shy away from dealing with emotions. As more IT specialists struggle with change on a day-to-day basis, however, they might better grasp the dynamics of change. Through trial and error, perhaps they will get it right. But this analysis would argue that IT specialists and managers need greater awareness of the fundamentals of change and more skills development in how to lead people through change efforts.

In general, our analysis reveals that IT specialists are more knowledgeable about the process of change, especially about managing the organizational and human sides of change, than about its underlying dynamics. We firmly believe IT specialists should be knowledgeable in both areas if they are to help organizations manage change effectively. And, as anticipated, senior IT managers and systems analysts have a significantly better grasp of many of the issues inherent in organizational change efforts than do technical personnel such as programmers and technicians. In particular, IT managers and systems analysts received higher scores than technical staff in five of the six content areas of the MCQ.

### EDUCATIONAL IMPLICATIONS

The general implications for educational programs in IT are obvious. There is a perpetual debate about the place of “soft” skills training in IT curricula. Based on the findings presented here, we concur with Markus and Benjamin [1996] that the IT community should engage the “soft” skills education issue proactively. We firmly believe that not only MIS, but also computer science and software engineering students, particularly graduate students, would strongly benefit from being exposed to various frameworks or theories of change management. Although a comprehensive discussion is outside the scope of this paper, these theories would ideally focus both on a sound understanding of how people respond to change and on how transitions affect and are affected by organizational processes. According to the *MSIS 2000: Model Curriculum and Guidelines for MS Degree Programs in Information Systems* [Gorgon and Gray 2000], a curriculum designed to serve as a set of standards and which reflects current and future industry needs, IT students should understand and be able to implement the changes that an IT project creates. We concur with the MSIS 2000 Curriculum that a course on change management, appropriately tailored to IT situations, should develop skills in the human and organizational implications of change. In Table 5 we present an outline of content areas as well as a short list of relevant readings that we would suggest for such a course. It is our contention that the IT student who has an in-depth understanding of the theories, concepts, and issues presented in Table 5 will be better prepared to act as an effective change agent than the student who doesn’t understand the dynamics of change.

### PRACTICAL AND RESEARCH IMPLICATIONS

We concur with Markus and Benjamin [1997] that “success in IT-enabled transformation is more likely when everyone involved in initiating, designing, or building technology-enabled change accepts that IT is not a magic bullet” (p.66). While change management should not be the sole

responsibility of IT specialists, it must be an integrated and essential part of their work. In fact, change management must be everyone's duty. If the IT specialist is viewed as a change agent rather than a technician under organizational change conditions, the risks of system failure can be reduced. An active change agent can assure better communication with the user and minimize the possibility of misunderstandings.

Table 5. Proposed Outline for a Course on Change Management Tailored for IT Students

Dimensions of Change Management Framework [where applicable]	Topics	Sample of readings
	Evolution of the IT profession	Ives & Olson [1981] Dahlbom & Mathiassen [1997] DeSanctis <i>et al.</i> [2000] Kakabadse & Korac-Kakabadse [2000] Gallivan <i>et al.</i> [2002]
	The role of IT specialists as change agents	Ginzberg [1979] Markus & Benjamin [1996] Bashein & Markus [1997] Winston [1999] McNish [2001]
General nature of change in organizations	The nature of change and IT-enabled change in organizations and the change process	Lewin [1958] Kanter [1983] Beckhard & Harris [1987] Armenakis <i>et al.</i> [1993] Kotter [1995] Orlikowski & Hoffman [1997] Markus [2004]
Individual response to change	The motivations, various forms and consequences of resistance to organizational and IT-enabled change	Joshi [1991] Marakas & Hornik [1996] Martinko <i>et al.</i> [1996] Coetsee [1999] Lapointe & Rivard [forthcoming]
Planning change	The nature and diversity of activities that should occur before a change is introduced & the roles of non-IT actors involved in the change process	Nutt [1983] Beath [1991] Kanter <i>et al.</i> [1992] Conner [1995] Davidson [2002] Marchewka [2003]
Managing the people side of change	The issues of interpersonal relations and conflicts, participation, and involvement in IT-enabled change	Barki & Hartwick [1989] Smith & McKeen [1992] Robey <i>et al.</i> [1993] Barki & Hartwick [2001] Barki & Hartwick [forthcoming]
Managing the organizational side of change	The mutual adjustment of IT, strategy, structure, job definitions, business processes and reward systems	Leavitt [1964] Applegate [1994] Yetton <i>et al.</i> [1994] Venkatraman & Henderson [1998] Rivard <i>et al.</i> [2004]
Evaluating change	The nature and diversity of indicators of a change effort's effectiveness & the process of project evaluation and closure	Keil [1995] Wateridge [2000] Frame [1998] Baccarini [1999] Gray & Larson [2000] DeLone & McLean [2003]

As a change agent, the IT expert stays involved through all stages of the process to assure that “refreezing” takes place, rather than leaving as soon as the technical system is installed correctly. Moreover, in the role of change agent, the IT professional can recognize when his change management skills and the project requirements do not match and take the necessary action to involve others with the required skills in the implementation effort [Ginzberg 1979]. In this line of thought, like Markus and Benjamin [1997] we strongly encourage organizations to create formal change management positions in IT projects and assign both IT and non-IT specialists to rotate into these positions so that various team members can think through and apply change management skills.

Whether or not IT specialists’ understanding of change management principles influences their capacity to manage change and their credibility is still up for debate and research. However, we remain convinced that such knowledge and understanding represents a necessary condition for being effective in helping business unit partners through the often arduous and difficult transformation process.

Additional research on how IT specialists in various job types view their role as change agents is also needed. One could explore further the relationship between IT specialists’ knowledge of change management issues and Markus and Benjamin’s [1996] change agency taxonomy.

In conclusion, our understanding of the relationship between IT specialists and change management is still at a very early stage but we are confident that other researchers will continue to explore this emerging area. For the time being, if the findings of this research stimulate more questions than answers, then we believe we will have done our job as researchers.

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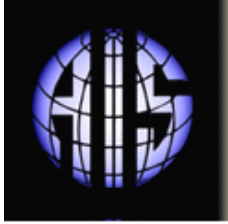
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