In Their Own Words: CIO Visions About the Future of In-House IT Organizations

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Abstract

This research investigated CIOs' view of the changes driving and occurring in their in-house IT organizations. Results of interviews with 50 CIOs and IT leaders from 22 organizations in Canada and the U.S. suggest three main drivers of change for in-house IT organizations: rapid strategic business change, pervasive IT with an experienced user community, and e-business and technology complexity. These drivers are creating changes in all parts of the IT organization: structure and roles, application development, technology architectures, and skills and knowledge of IT practitioners. According to CIOs, their virtual, global IT organizations need to move even closer towards the strategic centre of the company, requiring increased business knowledge, improved ability to influence and negotiate, and a renewed focus on standardized architectures, metrics, and value creation.

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Introduction

Several years ago, John Dearden predicted that the activities of the information technology function would be decentralized and/or outsourced to the extent that there need not be a senior executive in charge (Dearden, 1987). His arguments were compelling: technologies were getting easier to use, outsourcers were skilled and saved precious operational dollars, and unit managers needed control of their own information and applications.

What was unforeseen was the dramatic rise of the Internet and the need for organizations to manage information across units, companies, and countries. A few years later, due to the need for consistent systems across organizations, the swing back to centralized infrastructure and policy-making began, and this trend is now entrenched (Benda, 1998; Talia et al., 2000).

A decade later, articles representing the views of CIOs and academics suggest that the CIO's influence is growing and that the role has an unprecedented opportunity to provide leadership and company-wide vision for the use of technology and information (Ross and Feeny, 1999; Maruca, 2000). As Ross and Feeny suggest, the CIO "surely has a better opportunity than ever before to influence the organization at the highest level."

Positive Support Review found that the average pay last year for CIOs at midsize and large companies, including base salary and bonus, was $211,182. CIOs salaries have reflected their changing role, showing a 19.6 percent increase in the salary range average since 1997, according to RHI (O'Donnell, 2001). Harris Miller, president of the Information Technology Association of America, says the higher average pay demonstrates that most businesses have come to view their CIOs as senior, strategic executives. In the past, he says, many companies viewed CIOs in a technical-support role. "The CIO has assumed a different level of responsibility in the company, similar to a chief financial officer," Miller says. Victor Janulaitis, CEO at Positive Support Review, says CIOs have the potential to earn substantial performance bonuses, often via stock options. This demonstrates how vital IT execution has become to large companies. "CIOs are no longer just the top IT people," Janulaitis says. "They are the top business people who understand IT." (Murphy, 2000)

At this time, it seems clear that the CIO title is here to stay and that the potential role is larger than ever. As the CIO role evolves, it is inevitable that the organizations these executives lead will also evolve. This study examines, from the perspective of CIOs and other senior IT leaders, what is driving transitions in in-house IT organizations (IT organizations in companies whose primary product or service is not IT), and what these executives believe the future will bring.

Most of our existing knowledge about CIOs comes from practitioner sources, such as Gartner and Forrester Group, or from profiles of individual CIOs in magazines such as *CIO* and *ComputerWorld*. Very little academic research has been done to understand the issues and constraints that CIOs are currently dealing with and what this critical group believes they will be struggling with in the future. By gathering these data directly from CIOs and senior IT managers, we hope to identify long-term trends and derive implications from these trends for future IT management, governance, and organizational structure. We then identify the key constructs that warrant development and study, and to lead practice rather than follow it. This research is also motivated by the need to develop IT leaders in our classrooms, and to teach our students skills they need for the future.

The remainder of this paper is presented in four sections. First, we describe the sample and the methodology used to capture and analyze the data. Then, we present two findings sections – one on the

Drivers of change, one on the expected Transitions that in-house IT organizations will experience. In these sections, we outline the themes and illustrate them with IT leaders' words. Where possible, we use citations from literature that predicted or reported these themes. In the final section, we draw conclusions from these data and suggest ways in which CIOs and academics can be successful in a world in which the only constant is change.

Sample and Research Methodology

This study analyzes interview data from 50 interviews in 22 organizations from the U.S. and Canada. The U.S. sample began with a convenience group of CIOs (Stone, 1978) and expanded using a "snowball" technique (Shanteau, 1987; 1992). The Canadian sample was selected from the Conference Board CIO Council, a national organization of medium and large companies. A description of the sample can be seen in Table 1.

Each interviewee was sent a list of questions (Appendix A), in advance, soliciting their views on past and future transitions, drivers of change, executive management support, and retention and recruitment policies for their internal IT group. This process gave the respondents a chance to reflect on the issues in the study and to gather any data or examples they wished to share with the researchers. The study used open-ended interviews with probes (Rossi, Wright, & Anderson, 1983). The researchers encouraged elaboration rather than looking for specific pre-determined constructs or frameworks. Each interview, either in person or by phone, took approximately 45 minutes, and was taped and transcribed. Summaries of the interviews were sent back to interviewees for them to review and change in order to capture their ideas completely.

For this article, the sections of the interviews on drivers and future transitions were used. The transcribed interviews were analyzed as follows:

1. The first author read each interview, compiling a master list of the issues raised and illustrative quotes. The second author repeated this process, extending the set of issues and compilation of quotes.

2. An MIS MBA student who had not participated in the research took the set of issues and created, for each interview, a list of the issues in each interview.

Org. No.	Industry	Size of IT Organization	No. of Interviews	Title of Interviewees
1	Energy	1500	9	CIO, User Manager, IT Directors, HR Director
2	Food and Entertainment	1200	7	CIO, IT Directors, HR Director
3	Military/police	800	4	IT Directors, User Managers
4	Manufacturing	1900	4	IT Directors
5	Government	715	1	CIO
6	Reinsurance	230	5	CIO, Directors, Service Director
7	Business Services	215	2	Chairman, CTO
8	Financial Services	270	2	CIO, Vice President
9	Education	170	1	Director
10	Medical Services	23	1	CIO
11	Military/police	1500	1	CIO
12	Mining	70	1	CIO
13	Education	n/a	1	Dean
14	Utility	200	1	CIO
15	Government	2250	1	CIO
16	Financial Services	900	1	CIO
17	Transportation	800	1	CIO & Manager, IT Strategic Planning
18	Financial Services	80	1	CIO
19	Manufacturing	270	1	IT Director
20	Consulting Services	300	1	Vice President
21	Manufacturing	4000	3	Vice President (former CIO), Director, Senior Manager
22	Insurance	1500	1	CIO

Table 1. Demographics of Interview Sample

3. To alleviate the concern that multiple interviews from a single company could influence the themes and inferences drawn from the data, a summary list of issues was prepared for each organization that had multiple respondents.

4. These summaries were used with lists from single-participant companies and aggregated into the findings framework consisting of drivers and future transitions.

5. An MIS PhD student and each author took the findings framework and re-read the interviews to ensure that other, important issues had not been missed. After this last pass on the data, the article was drafted and refined.

6. Where appropriate, findings were linked back to existing empirical and theoretical research.

We looked for common themes that transcended technologies, industries, and the roles of interviewees. These themes selected were broad in scope, encompassing the structure, roles, skills, and knowledge of the in-house IT organization as well as the architecture and applications portfolio of the organization itself. After the data had been organized into themes, quotes from individual transcripts were selected for illustration.

The next section identifies the Drivers or causes of change.

Drivers

Our analysis indicated that respondents identified three primary drivers of change within IT organizations:

- Rapid strategic business change

- Pervasive IT with an experienced user community

- E-business and technology complexity

While these drivers fall into distinct categories in the data analysis, there are some overlaps in the categories. For example, e-business itself may be driving some of the rapid strategic change in organizations, and the complexity of new technology may be partially responsible for a more knowledgeable user community (Hackbarth & Kettinger, 2000). Each will be briefly discussed below.

Rapid Strategic Business Change

One of the primary drivers of change in IT organizations is the overall acceleration of change in the general business environment. This change can take the form of mergers, acquisitions, strategic alliances, global partnerships, or dramatic economic changes and pressures. The participants in this study were keenly aware of this major driver of IT change.

If you don't cut your costs you cannot compete. The way you cut your costs is by growth from a merger. That's happening in every industry... whether it's airline, whether it's gas pipeline… So, everybody's trying to run their place more efficiently. Growth and volume, that's what we're doing too.

A majority of the sample respondents expressed concern about the relentless nature of change itself. Their concerns reflect conditions that mirror changes in the business units:

I would say the most challenging transition is… the increasing rate of change that they (the IT people) have to address, comprehend, ultimately understand and that's both business change as well as IT change, both in technology and practices correspondingly.

I think we're going to see an absolute explosion of ideas, it's going to be extremely challenging and I don't think people quite get that yet... The old order is about to be overturned and the new order, nobody quite knows what it is yet.

In an earlier phase of this study, in which we interviewed IT analysts for their perspective on transition, the amount and pace of change was also raised as a serious issue (Benamati & Lederer, 2001). IT people and organizations expect change, but they are acknowledging that change is both accelerating and coming from many directions.

Pervasive IT and an Experienced User Community

CIOs face a significantly different business environment than did their predecessors a decade ago. With the majority of Fortune 1000 companies and government entities installing some form of enterprise systems, information technology has permeated all corners of the organization. Users who were just beginning to master basic PC skills in the early 1990s now interface with many sophisticated technologies as part of their regular workday.

Computers used to be a big scary thing…now everybody's got two, three and four in their house. That has a drawback because then they'll come and say well, this is easy... I can do it on my home PC.

Additionally, these users may have participated in business process reengineering as part of enterprise system implementations, and have the skills and savvy to recognize further improvements that technology might enable. In effect, the user community has taken on two additional roles, customer and partner. In the customer role, users have high expectations of flawless execution and little tolerance for botched technology projects.

The things that are forcing some change within the (IT) organization are very, very high expectations our business partners have from us. Expectation is instantaneous delivery at zero cost, with zero bugs and zero defects in terms of the implementation.

As partners, the user community wants an equal place at the table when decisions are made to change either technology or business processes. These user partners often drive much of the non-infrastructure work in IT organizations since they control the budgets that fund new projects.

The money is huge, so all of a sudden executives begin to think about IT in terms of investment portfolios.

At the same time that users are becoming more involved in IT decision-making, technology decisions are becoming more complex. In a distributed enterprise environment, proposed systems or

changes to systems seldom impact only the organization driving the change. In addition, application changes must be evaluated for their impact on shared hardware, network, storage, Internet, and data services. Extending these services beyond the organizational boundary in an e-business environment will make the IT-user partnership more critical, and require greater technological stewardship from the IT organization.

E-business and Technological Complexity

According to our respondents, e-business has impacted the future of in-house IT organizations in three ways. For perhaps the first time in history, e-business has raised the opportunities presented by IT to all levels and organizations of the business. Sales and service organizations are seeing new ways of "touching" customers. Manufacturing organizations are able to seamlessly link to suppliers and customers. Procurement organizations can realize major cost savings through the use of portals and reverse auctions. E-business is driving demand for IT services at an unprecedented rate (Porter, 2001).

> *The change that's related to e-business is we now have more integration of internal and external processes with the context of our Web sites…our old processes aren't made to be integrated that way... so there's a lot of legacy convulsions that we're going through to make that happen.*

Second, e-business is making an already complicated technological environment even more so. With the move from mainframe to client server a decade ago, technology complexity increased. With the move from client server and mainframe to Web-based services, the complexity has again increased substantially.

> *I think the whole e-business paradigm…will radically change the way…our customers will interact with us, the way we think about other businesses, what our core business is and well as completely rip away any sense of consistency in terms of achieving infrastructure at a time when we haven't yet quite figured out how to integrate what we already have.*

Third, the launching of e-business initiatives that cross the corporate boundary has moved security to the forefront of issues. Security becomes not just a technical issue, but also a strategic and potentially legal one (Birman, 2000). When asked what keeps

him up at night, one of the CIOs in this study said "*security, security, and security*".

> *It's a security piece, trying to stay up to speed on what's going on in the outside world. Trying to interconnect with our sales offices in various locations around the world. We have different telecom companies and different regulations and all those kinds of things. A lot of people want to look at the world as one big place where everything works and it really doesn't because you don't have the same controls in place, the same relations, the same everything.*

In summary, our interviewees believe that rapid strategic change, pervasive IT with an experienced user community, and e-business and technology complexity are driving the future of in-house IT organizations. The next section discusses the transitions and issues that result from these change drivers.

Transitions For In-House IT Organizations

Analysis of the data from our respondents revealed four separate areas of transition that CIOs predict for the future:

- Technology and Architecture
- IT Organization
- IT Practitioners
- Application Development

A summary of these findings combined with drivers is presented in Figure 1.

The Transition Environment

Before discussing these four areas of transition, it is important to acknowledge the environment in which they are occurring. Continual pressure from the business affects both IT professionals and IT leaders. One result can be very high workload for IT professionals. According to one company, this is a change that has been accelerating in the past several years. The top concern for this leader was:

The relentless high level of workload for more than 50% of the IT people – most do not go home at the end of the normal business day. This is likely to get worse, to 85%. Before, it was about 10%.
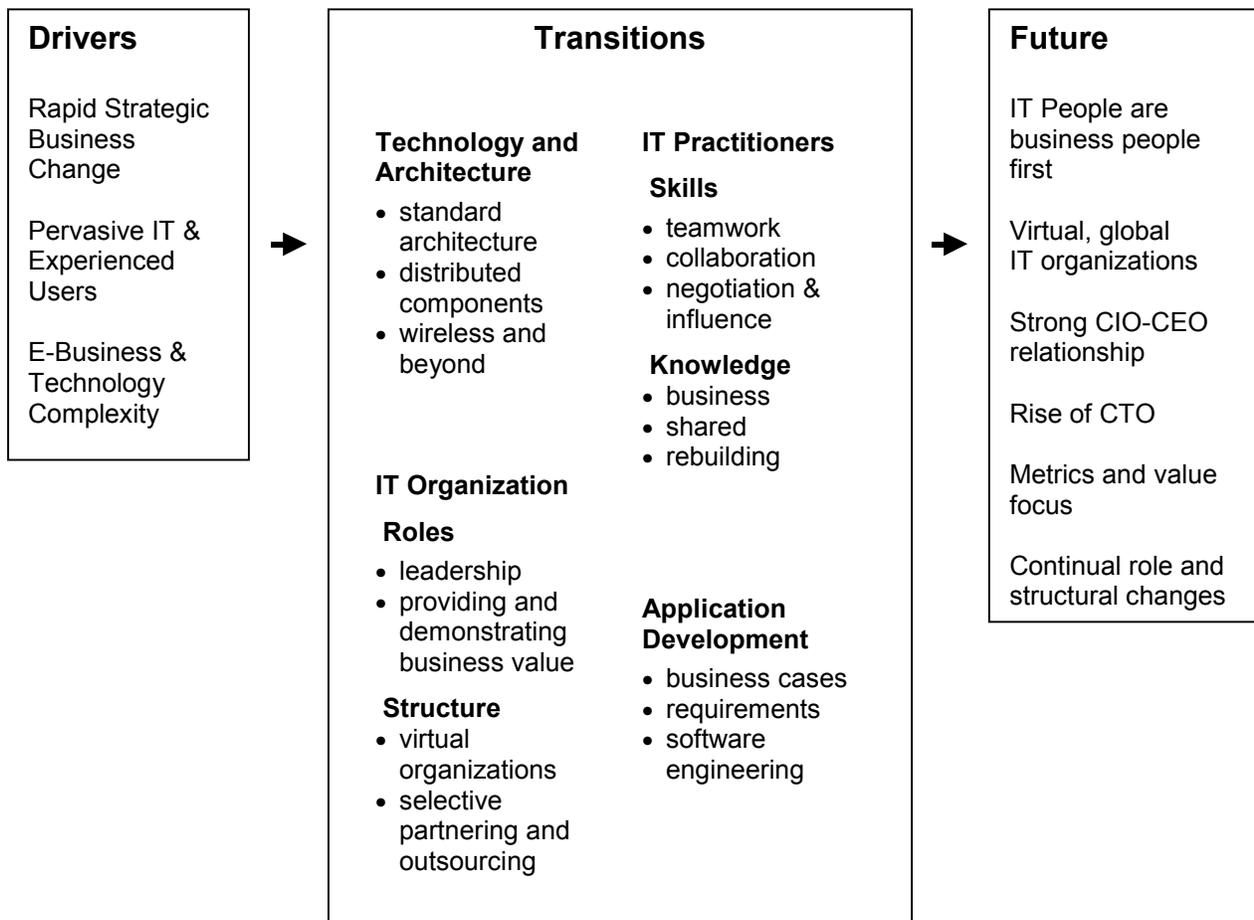
Drivers	Transitions	Future

Drivers

Rapid Strategic Business Change

Pervasive IT & Experienced Users

E-Business & Technology Complexity

Transitions

Technology and Architecture
- standard architecture
- distributed components
- wireless and beyond

IT Organization

Roles
- leadership
- providing and demonstrating business value

Structure
- virtual organizations
- selective partnering and outsourcing

IT Practitioners

Skills
- teamwork
- collaboration
- negotiation & influence

Knowledge
- business
- shared
- rebuilding

Application Development
- business cases
- requirements
- software engineering

Future

IT People are business people first

Virtual, global IT organizations

Strong CIO-CEO relationship

Rise of CTO

Metrics and value focus

Continual role and structural changes

Figure 1. The Transition Environment

In this person's opinion, "*the IT workforce are the coal workers of the 21st century*".

Another environmental factor is an increasing amount of stress in the workplace, a topic that was mentioned several times by our interviewees. Examples of their statements include the following:

> *… [continual change] is going to become part of the problem too, in that people get more information than they can handle… it's a matter of teaching the people skills they need to deal with change and information overload...*

> *I think there will be more stress. I mean, it's a stressful area anyway, due to the change, the fast pace of change. Even for people who are comfortable with change, it seems like it just gets overwhelming sometimes.*

Our overall conclusion from these results was that IT people, who are often considered change agents in an organization (Markus & Benjamin, 1996), should be given the support and training accorded to targets of change. In order to bring changes to the company, they are, by default, having to significantly change their personal and work lives.

Technology and Architecture

When asked to comment on the future of their in-house IT department, most CIOs did not spend much time talking about changes in the technology. Many leaders felt that they were at the beginning of the Internet revolution, in terms of delivering content. Web-based services were being built, and no one in the sample group had yet completed the task. Many had Web-enabled their systems in place while they were building true Web architectures.

Many expressed the idea that applications would be distributed, with components living on servers, some of which would be hosted and owned in other organizations. Wireless was seen by most to be "*the next big wave.*" As one interviewee stated, "*Everything will shift to the wireless format and understanding of this will be key.*"

IT leaders are recognizing that the Internet and distributed computing are driving the need for data quality and timeliness in their organizations.

> *We need to get some better clarity around how we're going to do Web-enabled development and cross- platform … skills. We're starting to get better with data modeling but that's a skill we need to get better about.*

> *I call it the need for speed. Information and data, peoples' expectations on how often they get that and how mobile they are when they get that has just continued to go up and up. People used to be satisfied with a monthly report, maybe they want daily now, when they used to want daily, they want real time. They want it current.*

Most of the interviewees spent more time talking about the need to standardize their technology architectures than they did talking about new technologies. These leaders recognize that they cannot continue to profitably embrace new technologies without a quality infrastructure on which to run it. E-business is driving the need for a more standardized architecture throughout the IT organization to insure smooth data flow horizontally across the organization and outside it (Purvis & McCray, 1999).

> *Because, we're spending so much money trying to knit all this stuff together, it's unbelievable! It's insane and it doesn't make a whole lot of sense.*

> *One of the big things now is an adaptable software architecture, so that you can keep up with all of those things. Integration is the biggest thing. Development of new platforms and then their integration.... cell phones, PDA's, etc.*

One CIO describes his attempts to explain this to senior management who do not understand the technological infrastructure requirements to execute e-business:

> *I said, folks, I before E, infrastructure before e-business. If we as a business want to do everything on the Web, we have to have a Web infrastructure.*

One of the primary ways that IT leaders are dealing with rapid technology change, vendor-driven upgrades, and the need for a consistent e-business architecture, is by making a strong business case for standardized architectures. Standardization helps IT leaders hold their organizations accountable for results, and hence helps them demonstrate business value to the executive leadership of the organization. For example:

> *We put together a business case and said, we can save ten million dollars if we buy all 15,000 computers for this company in one shot. …I will reduce labor in my group because it's a standard PC. Now when a [internal] customer comes to me and says, I want to buy a different PC, I say well, you can do that. But .. we're saving ten million dollars by being standard. If your projects says eleven, I'm all for it. But if it doesn't, then we're staying clear …*

The IT Organization

CIOs saw significant changes ahead for their organizations. We have broken these changes into two elements: the role of the IT organization, and the structure of the IT organization.

One interesting side issue that presented itself in several organizations was the transition the IT department had made during the rise and then the fall of the dot-com era. Many IT folks had their initiation in this era in which "geeks were cool" and anything was possible. The result of this roller coaster ride was a letdown feeling within the IT organization, a feeling that we have to "*get back to reality.*" For the CIO, however, the impact can be quite profound:

> *We've seen the whole dot-com revolution come and go and a lot of my folks and a lot of the type of development that we did culturally, we were very caught up in that. ..Those realizations become fairly painful and especially when you're working with younger professionals, with their large egos... The realization that just because they can do something is not necessarily reason enough to do it, is at times a painful one and I deal with that daily, managing expectations and managing perceptions.*

This very recent turmoil that information technology people and companies have gone through is an important backdrop to the transitions perceived by CIOs.

Role of the IT Organization. As noted in the previous section, one of the drivers of change is the increasing diffusion and importance of technology throughout organizations. Another is the pressure on costs and profit. These drivers are causing CIOs to reflect on their role within the organization (Stephens et al., 1992). Most organizations interviewed reported that the role of the IT department had to shift to take on a much stronger leadership role, as suggested by Ross and Feeny (1999). In many different words, interviewees expressed this idea:

A real dramatic change is going to happen to people like me, that after you've done your analysis of the technical needs and all that good stuff we like to do, you have to be better at assessing the impact on people, the organization, the budgets, the user that sits there and uses it every day and be able to really efficiently communicate that to people.

Frankly, if you don't really understand and challenge what the business is trying to do so that you understand it completely, you cannot be responsible enough.

We are in a consultancy role now. We have to move to a leadership role. Step up and help make the changes. Identify opportunities, not just respond to requests. Become influencers.

With the current shrinkage in the economy, IT organizations and their leaders are under pressure to demonstrate business value to the organization. This is a new and challenging requirement for many IT organizations, and many of the interviewees in this study were struggling with how to demonstrate value (Strassmann, 2001).

I think that we manage projects fairly well to the ultimate schedule and the ultimate budget. But, I'm not sure that we clearly know yet how to manage a project, to create periodic, valuable deliverables for their[users] projects.

Several of our respondents saw the alignment of business and IT as one way of managing the "value equation" (Stephens et al., 1995; Kearns & Lederer, 2000).

I think the alignment of IT is the whole message of what is the business value of IT and how can IT be a fundamental component to benefit the company, increasing shareholder value, reducing cost, growing the business and at the same time, providing excellent service.

In terms of business alignment, I think what you're going to see is a tighter and tighter integration of core business functionality with technology. It's not going to be your technology plan is designed to enhance or further your strategic business plan. There's going to be very, very little separation.

The IT visionaries in this study recognized the shift they had to make towards taking responsibility for business profitability and success.

I think in the past, there has been a mentality that we had the customers to tell us what to do and we do it and when we do that, we are safe. Now

IT leadership is a far different game. It's much more accountability for us. It's much more us leading the customers to the right thing to do, assuming that we're smart enough and have good enough judgment to define what the right thing is to do.

A few interviewees went further with the idea that IT needs to play a larger role in the organization. Leaders from both public and for-profit organizations acknowledged a move towards a revenue-generation role.

And so what happens is IT is forced to the revenue side, to the top line and not the bottom line and as they move to the revenue side, they need to stand the test of the market because there has to be a buyer for the service…

So the next real transition, and it's one that we're already beginning… is to take the resources that we have, both in electrical resources and capital resources and begin to make money, … provide fee for service opportunities...So we're going to start driving revenue …using those core IT services.

Structure of the IT Organization. These changes in role are happening in the context of organizational structures that are constantly evolving. Key changes in structure mentioned in the interviews were the virtual organization and the need for selective outsourcing (Lacity & Willcocks, 1998).

Almost every interviewee mentioned aspects of a virtual organization. There are two main components of this trend: globalization and telecommuting. Gone are the days when all of the IT people could be found on a floor of head office, or even in the business units. Organizations now have global partners with IT people in them and these people are part of the solution set for the organization. However, integrating them takes deliberate management and technology strategies (Jarvenpaa et al., 1998):

I have people in more than three cities. It takes a long time, usually two years to develop trust in a relationship.

I don't know where my team is going to be at any one day. They're phoning in, they're videoing in, we're connecting electronically and it's really a wide-open world. One of the first questions that goes along with our meeting is.... Where are you …

A second part of the global organization trend is the need to keep the best people engaged, no matter where they live or where they want to work. According

to the CIOs, this will lead to a significant increase in telecommuting.

> *Some of our key developers … are all over the country in different locations that are tied in.*

> *We constantly strive to be accommodating, within a certain framework, to the needs of our folks…we have a very aggressive telecommuting program.*

> *The company needs to change…and start allowing employees to work at home. That would be ... difficult for this company to go through. Our senior management thinks computers are here for people to play solitaire on. So, if you think they're going to send the people home with a computer so they can work from home and they're going to trust them.... that is going to be a real change and that is something that we're going to have to get ready for, but that's something that's coming … I think it's a benefit for the employee and it can be a benefit for the company cause they can empty out these office buildings…*

> *Looking forward for IT I think is going to be more telecommuting. I think more and more people are going to get comfortable with that. And I don't think it's so much a level of trust issue as they're used to a certain style, having their people where they can visibly touch them. I think that's going to change .. with space being such a premium.*

> *I've got 225,000 square feet of office space and parking lots full of cars and everyone who has an opportunity to work from home a couple of days a week, absolutely loves it. So one, you enhance somebody's quality of work life and two, you reduce overhead.*

One way that in-house IT organizations continue to deal with rapid changes in technologies and management concepts is through the use of contractors and consultants. On the question of outsourcing, however, there was not much unanimity about the trends in organizations. Some organizations that had been predominantly in-house shops were planning to increase their flexibility by using outsourced resources. Others, who had been extensively outsourced, were wondering how to rebuild their internal knowledge of the company.

Outsourcing was not seen as a panacea for current problems, but a strategic response to pressures for flexibility and efficiency (Lacity et al., 1996). Some convergence emerged when organizations talked about the types of outsourcing they would support in the future. The common view was that the less creative skills and the changeable technical skills might be the best to outsource.

> *What we're doing now is to look at our operation internally and look at the areas that are lowest value, so to speak, and essentially bundling those together and going out to the street to contract out that specific service.*

> *We won't do full scale outsourcing for 2 reasons – it costs more and it doesn't allow us to strategically differentiate. Specific skills, like firewall maintenance or remote installations, will continue to be outsourced.*

> *A lot of the data architecture areas, data mining... we don't have a huge amount of that expertise and some of what we have is contracted and that's going to be a big push for us.... data warehousing, data mining for our market and sales and for our wholesalers.*

> *We're huge in terms of outsourcing, because it gives us a lot of flexibility....it gives us a lot of pain too.*

It is not unusual in today's in-house IT organization for contractors or consultants to the organization to become employees. Several of the CIOs interviewed in this study started their careers consulting to the IT organizations they now lead.

> *And so over time, we've brought in contractors, we've hired some of them, we've trained some people in-house, we've done all of the above.*

Whatever the organizational forms they were struggling with, there was a very common theme that ran through their future views – that structural changes would be continuous (Benamati & Lederer, 2001).

> *Organizationally, I think we're going to end up continuing to evolve as the technologies change and as the expectations of our business partners change. We're constantly reorganizing and restructuring ... so change is the nature of the game more than anything else.*

IT Practitioners

There was strong consensus that the skills and knowledge of IT people would need to continually evolve to meet the challenges of the future. Training and education would be key solutions to the need for up-skilled people. Through quotes we can see the challenges:

> *I'd like to spend $5,000 or $6,000 a year on technology education because… even with the current technologies.... it takes a while to go and learn it and the problem is once you learn it,*

there'll be something else to come and take it's place.

.. but finding the time, frankly, and sometimes the resources to keep people trained and invigorated is a real, real challenge.

New Skills for IT People. Interviewees emphasized that new skills would have to be developed for IT people to be effective in future in-house IT organizations. IT personnel will need to develop strong teamwork and collaboration skills to function in a geographically and culturally diverse environment. In addition, the visionaries in this study cited the increased need for IT personnel to have the ability to influence and lead in this environment (Nelson & Cooprider, 1996). This ability is seen as above and beyond traditional IT project management skills.

It takes a sense of confidence and an ability to negotiate and influence; an ability to lead, and not just lead by doing good project management.

According to our interviewees, the need for effective team skills has always been a factor in IT departments. However, with an increasingly global, outsourced, and diverse workforce, IT workers have to be effective in virtual teams, with people from other organizations and other countries. As one CIO bluntly put it:

I don't care how good you are technically, if you don't have good attitude I don't need you. Also, if you can't communicate very well and work as a team, [I don't need you].

Another CIO sees this as a continual transition from individual work to team-based work.

The ongoing need for more team-based approach to things… I think people like to work independently, and we have had a real transition of having to work much more closely together each year that goes by, you're just that much more dependent upon each other.

The most important skills CIOs felt their senior people needed were influencing and negotiating. These skills were critical if the IT department was to fulfill its leadership role within the organization.

The [new role is] leadership and identifying business contributions…actually identifying and pushing the agenda into other peoples areas .. that's becoming an accepted expectation. ... the transition is for IT people to do that and start to become influencers and leaders, not just leaders on the IT side, but leaders on the whole team side…

I think some of the skills around influencing.... will need to be bolstered. We have a tradition of being able to control all the levers that we need to for success and when we're working more and more with external partners, you don't have direct control on those levers. You need to bring influence, negotiating skills and basic constructs such as service level and vendor management to the table to really get your stuff done.

One CIO gives us an example of the new behaviors and skills that his people will need to succeed:

There is persuasion.. there's so many times where I try to instill this in people that work for me.. if I want to get to this point and I need these customers or these individuals to cooperate or to approve what I need to get done, then I don't go in a direct route to get there. I will say, why don't I go to this person who knows this person and I know I can convince this person..... get them on my side, get two or three of them on my side. Then I have the meeting and we start the discussion. Influence skills aren't just you know..... talking sweet and being sweet. It's thinking.... it's a game of work. It's saying, I'm going to be smarter. I'm going to out-think this person.

The interesting point of these discussions is that the skills that CIOs need their people to exhibit are usually not taught in computer science or engineering and are often missing in business MIS programs (Davis et al., 2001).

Collaboration to me, is very difficult sometimes for IT folks to do.

True IT people – their strength is their weakness. They are very good at going deep into the technology. We are asking them to back up, to see the forest, not the trees. To look at the value they bring. It's really about behaviours.

Knowledge of IT People. In this analysis, we have split knowledge out from skills as a transition to reflect the significant emphasis that the interviewees placed on it. The most important change was a significantly increased knowledge of the business that was required of IT people. There was also a trend towards more sharing of information, and a need to retain the knowledge that was present within the IT organization.

With the pervasiveness of IT throughout the organization, users have become more knowledgeable about the language and capabilities of IT. However, the complementary business skills in the IT organization may not have developed at an equal rate. Many articles have been written on the need for

business knowledge in the IT organization (Nelson & Cooprider, 1996; Chan et al., 1997; Powell & Dent-Micallef, 1997; Reich & Benbasat, 2000). Our respondents supported this notion, even suggesting that without business knowledge, an IT person might not be able to move up within the department.

I think you can go and get your computer science degree, you come out and you're a programmer or you're a data base administrator or something, you're not going to get the business skills to understand what needs to get done, or how you're going to move up in management ranks…

In a time where it is critical that IT demonstrate business leadership, a lack of business skills and domain knowledge in IT personnel may be hindering IT's leadership ability and the ability of the IT organization to be seen as full business partners rather than mere service providers.

When I look at the kids that are coming in, they're really, really smart and I can use them on the platforms, but they don't…understand the enterprise.

You have to take technicians and teach them to ask questions before they just say yes or no or maybe to users. They need to be more business savvy…So that's been a big transition because generally, they aren't real interested in that topic.

Others suggested that dual tracks for IT people, emphasizing either management or technical skills, were needed. However, the consensus strongly existed that an IT department without strong business knowledge would not be successful.

I go through biannual communications meetings with my group and say, here's our mission statement in MIS operations. And you know what it is? It's lower costs and grow revenue. For an IT group, they're startled. That's what we're all here for. We are not IT people I tell them. We are business people who happen to work in information technology.

I do tend to stress more and more the importance of business education, because I think that technologists really need to understand much more so than in the past, how the technology aligns with the business strategy.

… the senior IT management in the organization has to understand the intricacies of the business. You just can't sort of get the business unit guy to tell me, here's my requirements and you just have to be great at doing IT.

The focus on business knowledge in IT people was almost unanimous in our sample, and, given their expectation that IT needed to play a stronger leadership role in the organization, quite understandable.

Another issue that CIOs were grappling with was the ability and willingness of the IT people to share the knowledge they had. This issue is very important in the context of teamwork, where the cumulative knowledge and skills of the team is a strong determinant of the success of the project.

... .you want the whole team to share and the whole team gets the promotion, or the whole team gets the recognition of it, then the ones who do have that knowledge are more likely to share it and that's what we've been trying around here, is to get the team concept…

Also important was the issue of rebuilding of knowledge after a period of outsourcing.

… we're…moving forward to rebuild IT skills and competencies back in [the company]. …what we're doing is we're replacing.... purchased skills with in-house skills.

In summary, knowledge issues in the IT organization were top of mind for our interviewees. Their future as an integral part of the larger organization depended on it.

Application Development

With IT so closely integrated with the business, the focus in all organizations was on applications and infrastructure projects. They could act as enablers or roadblocks to most corporate and business unit strategies. As mentioned above, flawless execution with zero defects was the goal. It is not surprising, then, that most of the comments made about projects focused around software engineering approaches which allow greater visibility and control. In the interviews, the whole lifecycle of projects was discussed – from an overall process orientation, to stronger policies, requirements analysis, project management and metrics.

One of the organizations that had recently entered into a number of partnerships at the corporate level suggested that their whole project framework had to change;

Adopting more of a process model and becoming more process-driven in our organization has really been one of the big efforts that we've had underway over the last while.... following better methodologies, having more

clearly defined roles in our organization, following architectural models, project management and templates.

Several organizations noted that their efforts in global outsourcing had created a two-tier approach to projects. The local folks had to do the specifications, and the offshore people did the building. The results of this separation of duties meant that the requirements pieces had to be much higher quality and precision than before.

I see a lot more outsourcing taking place within the IT organization and to do that, I see a lot stronger software requirements building coming up front, where we become more requirements-oriented than ones and zeros on the coding side.

The IT organization becomes more of an analyst as opposed to a developer.

Another major focus of the interviewees was project management. Even in very large IT shops, CIOs were concerned about the level of skills they had in this area.

The areas that we're most weak …are project management skills, systems integration... and software engineering.

What I would like to see us do, frankly, is focus a little bit more internally on project management and process management.

Nobody wants a project manager that is going to give it their best shot. They want excellence.

Discussion and Summary

Through an analysis of interviews with CIOs and IT leaders, our aim was to shed some light on the drivers of change within IT organizations and elicit predictions for future transitions. Having done this, we now use suggestions from our visionaries and our own experience and research to create suggestions for educators, researchers and IT leaders. We also compare our findings to an earlier model (Cross, Earl & Sampler 1997). The model of transitions in Figure 1 emphasizes four areas of change: technology, organization, skills and knowledge, and application development. Each area will be briefly reviewed and summarized.

In 1997, Cross and colleagues identified transformations occurring in IT organizations. While our visionaries identified some of the same items, it is clear that these organizations have continued to evolve to new forms and roles. For example, project management continues to be an important focus for

IT organizations (Cross et al., 1997). However our visionaries are working to extend the IT value chain, with business cases and benefits realization being key parts of projects. IT personnel in the role of business consultants is clearly prevalent, but has expanded to IT people taking more of a leadership role with respect to identifying and quantifying opportunities for IT to create business value. Cross et al. (1997) stated that IT is moving to the role of an infrastructure planning organization. This is also evident in our sample and this view is being expanded as IT supports and helps to plan new organizational architectures. This role is also leading to the emergence and importance of the Chief Technology Officer (CTO) as the primary technical person in the organization.

Our analysis reveals that continuous change will permeate every corner of the IT organization and that the CIO will need all his/her leadership skills to consistently deliver results to the business. The influence of the IT unit continues to expand in two dimensions - horizontally to knit the company together into powerful processes, and vertically from executives to front line worker to customer and supplier. The impact of IT is changing to the point where the CIO will have a very broad process view of the organization and may become a key sounding board for the CEO. For researchers who study CEO-CIO interaction, the area of deeper interaction and shared corporate governance may be a fruitful one to explore (Slofstra, 2001).

In the face of increasing levels of business and technology change, CIOs are attempting to build robust, standardized, flexible IT architectures and IT organizations. This implies that IT education and research needs to focus on these critical areas, in a way that links the technical architecture to the needs of a flexible organization. One visionary suggested that we need to transcend individual changes and learn to ride the waves:

Transitions occur so often now that the boundaries are a blur and we just end up with a curve that we kind of hop on and we ride. I think that's an important mind set difference because.... once we begin to view the changes that occur, not so much as a transitory state but just as a natural, progression state.... I think the mind set is going to be easier to take.

In the area of organizational change, the IT leaders reported transitions in their role and their structures. The most important role changes were the need from the business for an increased level of leadership and a focus on showing the value of IT to the business.

One CIO is trying to do that by rigorously measuring and managing costs:

You have to have cost credibility… you can't just do that when you're going to go do a budget presentation. It's got to be through the year.

Many organizations reported putting extensive measurement systems in place to reduce project risk, but more importantly to gauge the success of the IT department.

We have pockets of excellent management going on. My position is that's great, but I want to drive it across the entire organization. I want standards, I want metrics… everybody is going to do it and we're going to drive it across the entire organization. I'm extremely into accountability."

For IT leaders to be able to create and manage these business metrics, IT personnel are going to have to have some minimal awareness of financial issues. One respondent suggested:

I would like to have everybody that comes in to an IT organization to have had cost accounting. And why is that? Well, that's because when we go out to provide goods and services or products and services to generate income, what does that really mean?

This suggests that all IT students have some fundamental knowledge of how a business operates as part of their education.

As the IT organization becomes a more virtual, global organization, students will need the skills to interact with diverse teams (Davenport & Pearlson, 1998; Markus & Agres 2000; Hill et al., 2001). While some of this ability can come from liberal arts education and business courses other than IT, these skills should be practiced in both the MIS and computer science classrooms. The IS research community has already begun an active program of research into virtual and global teams, and this study indicates that this research should be accelerated.

With respect to telecommuting, one leader suggested that a change in management mindset would be necessary:

You know, when you talk about virtual management in the organization…trust is a tricky word to define… you're going to have to be more focused on managing the work result than managing the individual and figuring out how to implement whether it's metrics or whether it's communication system or whether it's a fun way to reassure yourself.

This suggestion is being implemented in part, in one organization, which reports that:

We're probably one of the heaviest users of video conferencing now in the industry and we use very heavily all the virtual teaming techniques.

Another emphasis for organizations would be to develop metrics for knowledge work such that expectations for remote workers can be developed and monitored. Software engineering approaches will need to be developed in this area.

Other areas for research are the new jobs and job groups that are emerging based on the new areas of technological change. One IT Director noted, "*in the last 4-5 years, 25% - 30% of my organization are in brand new functions*". The new groups noted were data security, data storage, Internet, and wireless technologies. At a more senior level, the requirement that the CIO function on business and alignment, not the technology, is resulting in the addition of a Chief Technology Officer (CTO) role:

It used to be the CIO was at the top of the technology food chain, but as core business and technology functions have become closer and closer together, the CIO has really become almost the grand poobah of business liaisons and the CTO role has kind of risen to off-load some of the focus on pure technology from the CIO. I think that's a good distinction, frankly, because the needs of business alignment are significantly different than the kind of behind the scenes plumbing needs and you still need plumbers and you still need people that are able to kind of orchestrate an overall plumbing architecture.

With strong CTOs, the CIO takes on a more strategic role in the organization. There has been some debate about whether the CIO will become obsolete as other C-level managers gain IT knowledge (Earl 2000, Lepore 2000, Maruca 2000, Rockart 2000, Thomas 2000). The results of our interview suggest that this will not happen in the near future – in fact CIOs are gaining organizational importance and are increasingly being designated as officers of the company (CIO.com, 2000, 2001, 2002).

The differentiation between the CIO and CTO leadership roles is one that needs further investigation by the IT research community (Vizard, 2000). For all these new job types, educators need to evaluate the computer science and MIS curriculums, especially at the graduate level, to see which of these role requirements are being covered.

In this study, changes to the skills and knowledge of IT people were mentioned by all organizations. The

most important skills that were needed were the ability to work effectively in diverse, global teams and the ability to negotiate with and influence others, especially business leaders and partners. As we saw earlier, some CIOs deliberately mentor their people, trying to pass along their tactics for negotiation and influence. One company brings in an actor to lead IT people in role-playing to help change their behaviours. One suggestion for CIOs was to expect always to be retraining their people:

It's a little bit like highway construction. I say that the orange barrels never leave, they only change their location… it is a process, not a project.

We used to refer to education as K-12 and then we changed it to K-20, which included graduate school. Then I've heard that in recent years, it was K-80 and the most recent that I heard was K-death, which probably makes more sense. Life long learning is the operative term.

Several respondents stated that the educational community should respond to this need for continuous learning by offering short courses that fit into the working professional's schedule:

I think that the university system is going to provide a different role in education. I've got a bunch of the middle managers that…know nothing about being a middle manager, because it's their first job as middle manager. I've got about fifteen people who I need to take some basic courses on communication and team building and setting priorities and listening skills and some of the things that managers have got to do. I don't want it to take six months.

The gap between the skills needed (negotiation, collaboration, influencing) and the skills normally taught (programming, analysis, decision support) should be a wake-up call for college and university program designers. Although this material may be thought of as a-theoretical, it is precisely those skills that will enable the bright computer science or MIS graduate to progress in his/her career in the workforce or even to initially be hired. Special efforts should be made to incorporate some of these elements into undergraduate computer-focused programs.

I really, really hope that in computer science curriculums we see more and more business training and business teaching coming in.

Interestingly, these changes may be necessary but not sufficient to ensure that computer science graduates are hired by in-house IT firms in large numbers.

It's hard to say computer science majors are exactly what we need. Maybe a math major. Maybe it's an English major that comes in and does a good job.

You need process discipline; you need people that are willing to follow process. You don't need rocket scientists, right.

A couple of CIOs hinted that with selective outsourcing, they might need less high-priced local technical talent:

More and more of our development organization, if we continue to use U.S. talent, is going to be less technically software computer science schooled and more business requirements focused.

Most respondents noted the importance for IT people to be very knowledgeable about the business they were working with, but were not sure how to accomplish that goal. A number of suggestions were offered, including job rotation and continuously focusing on business results within IT.

In a couple of our cities, they (IT people) actually do business work for several weeks out of the year. We are part of running our business operations every day, to the extent that we're scheduling a pipeline, working with customers. We're pretty engaged and over a period of three or four years, we've become proficient.

We need to do more career development science where IT professionals would work in the business units for two years or whatever. At a higher level of management, they would cycle in and manage as director.

We have quarterly review meetings with all IT staff where we share our company's quarterly results with people in a face-to-face fashion. So we hold those all across the whole organization and that helps people see each quarter how we're faring from a market place perspective...what our shareholders are seeing, how our stock is performing.... those types of things.

The fourth change area in IT organizations was in application development. The role of the IT development organization is changing. IT "developers" in the future will be experts at assembling, specifying, and implementing. Their job will start well before the requirements document and will only end when the benefits of the IT project are realized. As one interviewee stated, "*We are not IT people. We are*

business people who happen to work in information technology."

This finding implies that we should begin teaching IT at the source, which is the business problem/opportunity level, and build skills such as requirements analysis from there. It also suggests that teaching a traditional system lifecycle that ends at system maintenance is no longer appropriate. Students should expect to participate in the system until it results in the desired business changes. This is a significant departure from the IT project-centric view of application development. Students may also need to understand IT at the portfolio level, not just at the individual application level.

Many IT organizations are putting their people through courses to grow their own project managers. In this way, they use people with company-specific knowledge to run their projects and give their people a reason to stay.

> *Our preference is just not to hire a project manager that doesn't have certification from the project management institute. That doesn't make them excellent either, but at least it tells me that they understand the concepts that we're going to be challenging them on.*

> *The real leadership people, the lead technologists come to the realization that they need to have project management standards, a common set of practices upon which they manage projects. I think we've certified 136 people in project management.*

This finding strongly emphasizes the need for project management to be part of every IT related program, and for researchers to continue their search for effective project management methods.

In summary, as IT organizations rise to the challenge of business leadership, cost containment, and flawless execution, educators must ensure that students in IT programs are equipped to participate in the workplace of tomorrow. Research programs must keep pace with new organizational forms and new governance structures. We thank our 50 IT leaders for their willingness to share their hopes, dreams, frustrations, and fears with us. By compiling their thoughts into a model of change, we have attempted to map out the future of in-house IT organizations. We wish them well in their endeavours as we, as researchers and educators, do our best to assist along the way.

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Appendix A: IT Transition Study Interview Questions

Past Transitions

1. Looking back, what have been the most challenging transitions for your IT staff?

2. What are the characteristics of the people who most successfully transitioned? What are the characteristics of those who did not?

3. What did executive management and middle management do to support and facilitate these transitions?

Future Transitions

4. What transitions do you think are ahead for IT professionals in your organization?

5. What forces, inside and outside your organization, are driving these transitions?

6. Do you think that the knowledge and attitudes IT personnel will need to make these transitions are different from ones needed for past transitions?

7. Do you see any areas where your current IT professionals are unprepared for what's ahead in the future?

Retention

8. What has your IT personnel retention/turnover rate been over the last 5 years?

9. What specific policies or programs have you implemented to try to retain IT personnel? How have these worked?