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CIO roles and responsibilities: Twenty-five years of evolution and change

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ABSTRACT

We investigated how the CIO's job has changed over the past years and found that the CIOs' role has evolved to reflect both the firm's IS infrastructure and strategy. This has led to two versions of the role: an executive-level manager focused on the firm's strategy and processes, and a technical manager focused on minimizing costs by rationalizing and leveraging the existing IS infrastructure. The degree to which a firm has standardized its IS architecture infrastructure, and the degree to which IS enables core products, services, processes, or competitive advantage of the firm impact the nature of the role.

1. Introduction

As the role of IS within business organizations has grown in importance, so has the role of the CIO [8,25]. Some CIOs have assumed the role of business strategists and process innovators [22]. Thus CIOs are becoming executive-level leaders rather than mere service providers. They generally report directly to the CEO. Their managerial competencies impact the business through IS adoption within the socio-technical environments [26]. Today's CIOs are deeply embedded in business organizations, helping CEOs strategize and business unit leaders to implement strategies.

On the other hand, some CIOs have chosen, or been forced, to maintain a traditional technology-centric role. They then report to the COO or to the CFO and are typically responsible for managing a division that is perceived as a cost-center. In this role they are responsible for leveraging the organization's existing technology infrastructure to reduce cost.

The original role of the *data processing manager in the 1950s and 60s* has changed from one of technology management to that of an executive dealing with the use of IT from a social, economic, and strategic management viewpoint. In the 1990s the role further changed and CIOs began focusing on business imperatives, interpreting external IT success stories, managing IS executive relationships, communicating IT value, managing IS development, and building an architecture for of the firm's IT. In the period since 2000, then there have been several debates about the effectiveness and appropriateness of the CIO role. Some have argued that it is obsolete [e.g., 4] while others have argued that CIOs are ideally positioned to succeed CEOs [e.g., 15].

In recent years a number of developments have impacted the roles and responsibilities of the CIO. They include:

1. COO (and other C-level executives) have begun to assume responsibility for the strategic thinking around IT deployment and use, taking over many of the responsibilities previously allocated to senior IT executives. This is especially true in firms where IT has become deeply woven into the fabric of business processes and operations. However, the COO may not have the IT knowledge or skills needed to understand the implications of technological changes or the implementation of IT initiatives internal and external to the firm.
2. A new executive position of "Chief Technology Officer" has emerged. People in this position have assumed some of the technology architecture planning, infrastructure planning, and operational responsibilities of the CIO.
3. The introduction of new laws and regulations, such as those in the USA: the 2009 Banking Act, the Sarbanes-Oxley Act, and the Health Insurance Portability and Accountability Act (HIPPA) have forced firms to engage in governance and compliance activities around their IT resources and activities.
4. There has been a significant growth in IT outsourcing. At the extreme, the work of entire IT organizations is being transferred to external service providers. Three variants of IT outsourcing are currently receiving attention: utility computing, business

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process outsourcing, and off-shoring. Together, these have significant impact on the nature of the activities that fell within the CIO's domain.

5. Many organizations are now inclined to buy, rather than build, IT applications. Developing systems on time, to specification, and within budget was traditionally one of the primary management responsibilities of the CIO.

Against this background, researchers have proposed that the roles, responsibilities, and work behaviors of CIOs have significantly changed. Numerous recent practitioner articles suggested the dilution of the CIO role [e.g., 23].

Intrigued by these developments, we embarked on a project to examine the ongoing evolution of the CIOs role and responsibilities. The goals of our study were threefold: (1) to identify whether the nature of the CIO's job has changed from the criteria and characteristics suggested by previous studies; (2) to determine if different categories of CIO profiles have emerged; and if so, (3) to identify a profile of the attributes of CIOs who have successfully adjusted to the changes.

2. Literature review

Internally, companies have integrated their technical resources with their business operations to develop capabilities and to establish a competitive advantage. Externally, new competitive challenges and opportunities, including the start of the 2008 global recession, have motivated business executives to rely on the IS executive to use the company's IT resources to drive strategic change within and outside the organization.

2.1. Early days—data processing

The original IS manager's role was that of a computer knowledgeable technician managing a relatively unimportant "Electronic Data Processing" service function. By 1977 the arena had matured and a study of MIS [16,35] found strong differences in the roles of MIS executives, related to two of the IS functions: (1) *operations*, a closed and stable, and mechanistic environment that required the use of formal policies and procedures, and (2) *development*, an open, adaptive, and organic environment where managers had to function in a flexible, decentralized, decision making, and autonomous mode. MIS managers tended to list their primary objectives and motivations as those related to measures of system efficiency and cost reduction. Further, these managers exhibited less need for social interaction than managers in other parts of the organization.

By 1980, Rockart [27] interviewed to executives of major organizations and initiated the concept critical success factors for major resource planning: thus noting that the IS manager should help the CEO by providing important information on scarce resources and to make it possible for the organization to adapt to a changing technical environment. He further noted that there were four critical success factors for IS executives: (1) *Service*—ensuring the effective and efficient performance of the IS and creating positive user perception of IT operations; (2) *Communication*—understanding the world of key users and top executives and helping them understand the IS environment; (3) *IS Human Resources*—assisting executives in finding IS talent to develop and use information data bases; and (4) *Repositioning the IS Function*—managing the technical, organizational, psychological, and managerial aspects of the firm's IS.

Thus, the senior IS executive had started to evolve to serving the organization by acquiring, implementing, and maintaining the technical infrastructure to process and store necessary information within the firm.

2.2. The CIO's role in the 1990s

The title of CIO was introduced in the mid-1990s to describe a new type of IS executive who had been elevated to a C-level position within forward-thinking firms; they were given stewardship of the firm's entire information resources. The early CIOs had to transform their role from technical manager to that of a technical and business manager capable of leading efforts to deploy IS in ways that generated value-adding information for the firm.

In the early 1990s, the characteristics of IS executives had undergone further changes over those of the previous decade. They were now adding functions such as strategic technology planning and control, IT architecture management, IT standards development, and human resource management [1,11]. In many studies, researchers found that an increasing number of CIOs had begun to report directly to the CEO, and that over half had become senior managers. The IS executives were valuable to the company because they brought a broad perspective to the position. They also implemented development strategies within their organization that ensured that other IS professionals were able to move into higher levels of management [32]. However, soon after their rise in importance, the CIOs began to encounter problems in their efforts to prove their value to their CEOs and other senior managers [3]; they were in charge of a function that consumed major resources but offered little proof of their value.

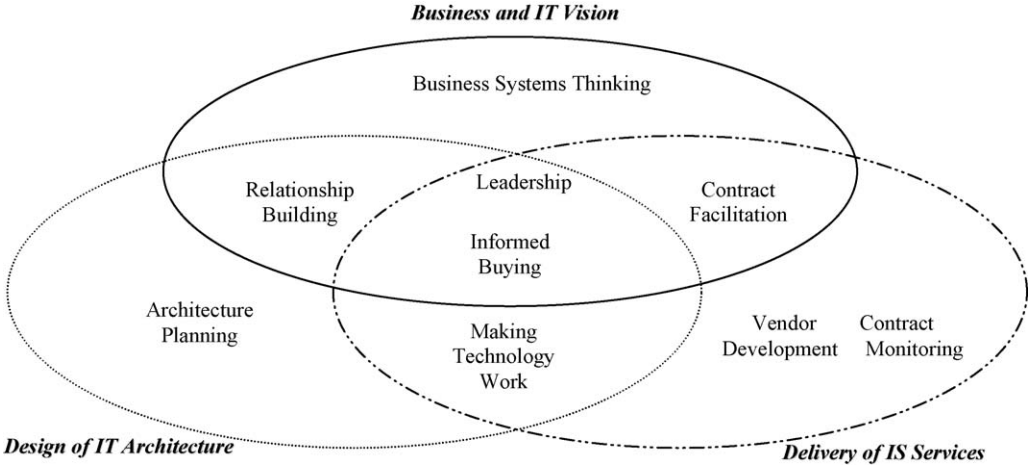

Fig. 1. Adapted from Feeny and Willcocks [12].

Also during the 1990s studies on the CIO [e.g., 28] argued that the primary issues influencing and shaping the CIO's role arose from factors that were primarily *within* the firm. Only towards 2000 did researchers begin to address the effects of *external* factors, arguing that the firm's business functions had became heavily dependent on IT from an operational and strategic standpoint.

In a 1998 article, based on interviews with 61 CIOs, Feeny and Willcocks identified nine IS capabilities that CIOs needed. These fell within three main domains of responsibility see Fig. 1.

The IS capabilities identified were: *leadership*—integrating IS efforts into business activities; *business systems thinking*—defining the business processes that technology makes possible; *relationship building*—working with business managers to improve IT usage; *architecture planning*—creating a blueprint for a technical platform that will be responsive to current and future business plans; *making technology work*—achieving timely technical progress; *informed buying*—managing the IS purchasing or outsourcing strategy to meet the needs efficiently; *contract facilitation*—managing contacts for IS services; *contract monitoring*—watching the business's contracts; *vendor development*—identifying and assessing the added value of IS service providers.

CIOs began to take notice of external factors that influenced their firm and soon began to diversify their responsibilities by establishing a closer partnership with their business units in order to or take advantage of opportunities in the marketplace. This is illustrated in Fig. 2.

In summary, research conducted in the 1990s relating to the roles and responsibilities of the CIO reflected an ever increasing responsibility for organizational growth and the development of the CIO into a business strategist and visionary.

2.3. The CIO's role in the 2000s

Over the past eight years, many practitioner-oriented commentaries on CIOs have argued that they have failed to provide value to their organizations and have become obsolete [eg., 31]. However, others have argued that the role of the CIO has evolved into one responsible for providing the IT infrastructure and capabilities to ensure effective business operations [6,20]. Thus the CIO's role has become more strategic in nature initiating and provoking businesses to change processes and strategies through the use of IT.

Obviously, to achieve this change in role, CIOs were had to possess skills in both technical and business areas; key *technology* issues included technical spending and budget allocation [21], IT architecture and capabilities development [13,33], security, delivering value [17,18], relationship building [2], and governance [34], while key *business* issues included managing shareholder wealth [5], performance [14], and influencing executive peers to design and to implement strategic initiatives [9,10].

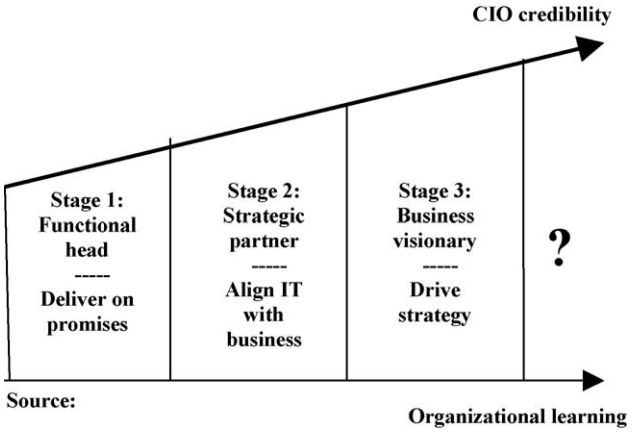

Fig. 2. The evolving role of the CIO: adapted from [30].

The current body of literature on the roles and responsibilities of the CIO has little information about how the different skill-sets of the CIO match the IS environment and architecture of their firms. This gap suggested a need to investigate the evolving role of the CIO with respect to the firm and to understand the CIO attributes that might be appropriate for different IS environments.

3. Research approach

Our research was carried out as an exploratory multiple-case study. This allowed us to observe the phenomenon in a natural setting and to engage in theory-building.

Data collection was triangulated: it involved several methods of collecting data, which, in turn, helped to establish construct validity and reliability. Extensive prior research documentation, in addition to the availability of key actors for interviews, made this study possible. The data were collected in two phases over a 16-month period.

3.1. DATA collection Phase 1

We first found secondary data sources, such as CIO job postings and reviewed both academic and practitioner-oriented journal articles on the roles and responsibilities of the CIO; then, from the secondary data and literature, we compiled the general categories, responsibilities, and roles of the CIO.

3.2. Job postings

We collected job listings for CIO positions from various sources, including *CIO Magazine, Information Week*, and a few other publicly available sources of information. All postings were for CIO positions for firms headquartered in the United States. To ensure that we captured a diverse set of job responsibilities and characteristics, we collected the job listings from many industries, including (but not limited to) education, high-technology firms, multi-national distribution firms, and healthcare companies. Using the job listings, we coded the qualifications, attributes, skills, duties, knowledge, abilities, and responsibilities listed for CIO.

3.3. Literature search

We reviewed articles related to the CIO role in academic and practitioner-oriented journals from 2003 to 2009 and identified the key roles and responsibilities of the senior IS executive. We then categorized these data to develop a generalized framework for the evolution of the CIO role over time. This framework was used to develop an interview protocol.

3.4. Data collection Phase 2

3.4.1. CIO interviews

We conducted 60-min interviews with 17 CIOs drawn from several different businesses. All interviewees were either employed by firms considered leaders in their industry or by organizations that were considered expert in their field. A brief description of the firms, the location of their headquarters, the gender of the CIO, and the CIO's prior training are shown in Table 1.

The interview format was semi-structured and used open-ended questions (see Attachment 1). The interviews provided primary data on the CIO's perspective, his or her interpretations of the current role and responsibilities, and perspectives on the attributes required to be successful in the role. The interviews were recorded, transcribed and then coded. These data were kept in a

Table 1
CIO firm descriptions, responsibilities, and attributes.

Company description	CIO responsibilities	Important CIO Attributes	Anticipated role change for CIO
Company A: National Non-Profit Healthcare	Deliver value to the business Investment analysis	Solid technical Understanding	Strategic planning Large-scale business manager
Firm headquarters: *USA*	Financial decision making	Project management	Professional business manager
Gender: *Male*	IT governance	Ability to prioritize	Leading technology expert
Education: *Bachelors degree*	Compensation policies	Corporate leadership	C-level manager influencer
Prior training: *Technical*	Training policies Change management Legal Influence C-level managers		
Company B: Japanese Multi-National Automobile Mfg.	Security Business resumption	Ethical Builds relationships	Knowledge management expert Increased ethics compliance
Firm headquarters: *Japan*	Adding business value	Good communication	Increased consensus manager skills
Gender: *Male*	Strategic planning	Team player	Priority setting skills
Education: *Masters degree*	Strategic processes	Visionary	Wireless/remote facilitator
Prior training: *Bus. Operations*	IT network management		Complex security expert
Company C: National Comic Book and Toy Manufacturing	Strategic direction setting Change agent	Vision for strategy Implementation skills	Supply chain integrator Seek innovative ways to reduce cost
Firm headquarters: *USA*	Technical leader	Ability to negotiate	International technology specialist
Gender: *Male*	Business driver	Good communication	Leading technology expert
Education: *Masters degree*	IT architecture	Influencer	
Prior training: *Bus. Consulting*	Security Governance Regulations enforcer HR staffing	Understand business operations	
Company D: Digital Content and Entertainment Provider Firm	Systems management Customer management	Prioritization Mentoring/coaching	Better leverage employee resources Thread cross-department info needs
Firm headquarters: *USA*	Operations management	Negotiation	Digital content distribution channel expert
Gender: *Male*	Supply chain optimization	Ability to manage relationships	Business process expert
Education: *Masters degree*	Process improvement		New technology expert
Prior training: *Technical*	Budgeting Community service Networking Policy integration		
Company E: Entertainment digital content provider	Business manager Technology enabler	Analytical Able to influence	More profound influence on the CEO Business process expert
Firm headquarters: *USA*	IT purchasing and architect	Accountable	Empower employees with info.
Gender: *Male*	Process engineering	Financial knowledge	Leverage the IT infrastructure for new business opportunities
Education: *Bachelors degree*	Change culture	Capable of negotiations	
Prior training: *Technical*	Supply chain improvement Security Develops strategy Corporate structuring HR sourcing		
Company F: Aerospace research firm	Networking infrastructure Negotiator	Relationship building Strategic influencer	Expert on line-operations Unite business silos
Firm headquarters: *USA*	Contract manager	Problem solver	Relationship builder
Gender: *Male*	Regulations enforcer	Morale builder	IT governance
Education: *Doctorate degree*	Governance	Strategy developer	Standards enforcement
Prior training: *Technical*	IT architecture Security Policy implementation IT representation		Knowledge management expert Strategy influencer Leverage IT networks

Company G: Private University	Security	Network relationships	ERP implementation champion
	Technical liaison	Good communication	Executive influencer
Firm headquarters: *USA*	Education	Integrated in the business	Business daily operations expert
Gender: *Female*	Core decision maker	Collaborator	Corporate communications expert
Education: *Masters degree*	Process improvement		New technology (wireless) champion
Prior training: *Technical*	Information dissemination		
	Standardization		
	Forecasting IT/budget		
	Policy/governance		
	Budgeting		
Company H: Business Intelligence Firm	Project manager	Complex problem solver	Strategic leader
	IT architecture manager	Business transformation	Strategic decision making
Firm headquarters: *USA*	Strategic planning	Analytical	Review process expert
Gender: *Male*	International governance	Relationship building	Change management expert
Education: *Masters degree*	Process improvement		Consensus builder
Prior training: *Technical*	IT and HR sourcing		
	Compensation planning		
	IT evolution		
	Budgeting		
Company I: National Semiconductor Manufacturing Firm	Computing and networking	Ability to educate	Large scale supply chain expert
	Bus. Process reengineering and improvement	Capable of making empowered decisions	Process expert
Firm headquarters: *USA*	Supply chain management	Strategic vision	Negotiations expert
Gender: *Male*	IT security		Strategy connector
Education: *Bachelors degree*	IT investment gatekeeper		Networking and computing expert
Prior training: *Technical*	Project management		Politician among peers
	Business value		
Company J: Regional Insurance Agency	IT governance	Ability to manage relationships	Operation level expert
	Budgeting	Strategic planner	Leverage infrastructure for opportunities.
Firm headquarters: *USA*	Purchasing	Ability to prioritize	Governance enforcer
Gender: *Male*	Financial review	Strong communications	Business process expert
Education: *Masters degree*	Goals planning	Motivator	Outsourcing expert
Prior training: *Bus. Consulting*	Business engagement		
Company K: National Retail Food Distributor Firm	Profit generation	Envision strategic plans	Innovator
Firm headquarters: *USA*	IT architecture planning	Provide IT leadership	Enabler through information and tech.
Gender: *Female*	IT governance	Manager of change	Operations expert
Education: *Masters degree*	Financial management	Active listening	Expert communicator
Prior training: *Bus. Consulting*	Organizational management	Motivator	Leading-edge technology expert
Company L: National Banking and Loan Firm	IT architecture and infrastructure planning	Honest	Business partner
	Organizer of IT staff and other executives	Exercises integrity	External firm board member
Firm headquarters: *USA*	Business value	Values credibility	Strategic thinker
Gender: *Male*	Resource consolidator	Visionary	Consolidation expert
Education: *Masters degree*	Grow the business	Effective communicator	Asset management
Prior training: *Technical*		Knowledgeable in business operations	
Company M: State Construction & Development Firm	Business and regulations expert	Visionary	Governance expert
	Enforces transparency of business and IT plans	Strong communications	Regulations and requirements expert
Firm headquarters: *USA*	Business and IT leadership	Team player	Standards enforcer
Gender: *Male*	Develop IT vision	Supply chain coordinator	Partner with audit and investor partners
Education: *Bachelors degree*	IT Governance	Manage organizational change	Risk management
Prior training: *Technical*	Identifying cost cutting opportunities	Effective financial planner	Organizational development
Company N: State County Juvenile Probation Office	Staff leader	Able to implement and change policy	IT connectivity expert
Firm headquarters: *USA*	Subordinate mentor	Efficient union negotiator	Disaster recovery expert and leader
Gender: *Male*	Enforces policy and regulation	Enforces change	Reliability enforcer
Education: *Bachelors degree*	Multi-department (State) coordinator	Effectively delegates responsibility and power	
Prior training: *Technical*	Negotiates among diverse dept	Understands business	
Company O: Aerospace Firm	Network and infrastructure coordinator	Lives and breathes the business	Expert in external systems
	Supply chain information expert	Financial management	Able to integrate businesses and processes

Table 1 (*Continued*)

Company description	CIO responsibilities	Important CIO Attributes	Anticipated role change for CIO
Firm headquarters: *USA*	Applications, hardware mgt.	Know basic technology	Financial acumen
Gender: *Male*	Financial and budget planning	Leader	
Education: *Bachelors degree*	Security expert	Understand customers	
Prior training: *Technical*	Global business expert	Good communicator	
Company P: State Department of Public Works	Business partner	Consensus builder	Executive conformist
	Revenue generator/cost cutter	Strategist	Consolidations expert
Firm headquarters: *USA*	Internal business consultant	Humble listener	Integrator of business
Gender: *Male*	IT governance	Salesman of ideas and thoughts	Leverage large scale strategy
Education: *Masters degree*	Security and risk assessment	Assimilator of diverse ideas	Hiring of targeted skills
Prior training: *Bus. Consulting*	Policy and regulation enforcer		
Company Q: International Rocket Engine Defense Firm.	IT architecture and infrastructure	Good communicator	Next generation employee expert
	Telecommunications	Savvy on new tech.	Business tactical operations expert
Firm headquarters: *USA*	Applications and IT networks	Learns new techniques	Business operations expert
Gender: *Female*	Risk and project management	Social networker	Change management
Education: *Bachelors degree*	Financial reporting	Able to execute strategy and budget	Cost reduction through IT
Prior training: *Technical*	Outsourcing/off-shoring		Stabilization of business

database, along with the secondary research data, helping us to organize, compare, and analyze the information.

Overall, we found that the results from the multiple sources converged, suggesting validity of our findings. Analytical themes were identified in the data sources and codes created to reflect them. We then coded and matched the data among the three data sets (CIO job postings, literature, and interview data) to identify common threads and to develop an understanding of the changing and evolving CIO roles and responsibilities. Next, we looked for matching patterns of activities across all sources of data. This allowed us to identify qualifications that were consistently required as well as gaps in the list of responsibilities among the three data sets. Patterns in the data were then compared with patterns predicted by the literature. The patterns that coincided also helped us confirm internal validity. Patterns that did not coincide with theory helped to identify potential gaps.

4. Results

During our interviews we asked the CIOs to identify their key roles and responsibilities as well as the attributes that CIOs should possess in order to be successful. The evidence extracted from the interviews was coded and mapped to the nine core IS capabilities. Using their descriptions of these capabilities, we established analytical codes to reflect the themes in the data and to segment it into categories which were used to compute the frequency of events and document the evidence. Capabilities with 40 or more occurrences were categorized as "strong support;" capabilities with 15–39 frequencies were categorized as "some support;" and capabilities with occurrences below 15 frequencies were categorized as "weak support."

Our research data provided strong evidence to support three of the nine capabilities: *relationship building, business systems thinking,* and *leadership* (see Fig. 3). Evidence about these capabilities centered primarily on the CIOs providing strategic and executive-level persuasion and leadership. For example, several CIOs indicated that they spent most of their time ensuring that the technology and process changes supported the strategies that other C-level executives created. The data also revealed some support for another two of the nine capabilities: *informed buying* and *contract facilitation*.

The fact that only 7 of the 17 CIOs interviewed said that they were actively involved with purchasing and vendor management showed a that while such capabilities are part of some CIOs' roles and responsibilities, in most cases the responsibilities were delegated to lower-level IT managers. Purchasing and vendor management tasks were included when the IS executive was responsible for managing the firm's IT demand, creating value through existing technology purchases, and ensuring that the software and hardware suppliers had delivered items listed in negotiated contracts.

Finally, we found only weak support for four of the other nine IS capabilities; by grouping these together, we found that 10 of the 17 CIOs were not generally focused on technological issues or maintaining the IS of the firm. In general, these responsibilities were delegated to lower-level employees.

The CIOs indicated that the five most significant attributes required of today's CIOs were: (1) ability to contribute to corporate strategy; (2) competence in business process innovation and design and the ability to anticipate business needs; (3) expertise in managing and demonstrating IT costs and their impact; (4) effectiveness in publicizing and raising IT's profile and position within the company; and (5) strong communication, negotiation, and facilitation skills. The data also showed that the CIOs' top six challenges were: (1) identifying, promoting, and managing IT-enabled business agility; (2) innovating and integrating IT in the enterprise; (3) communicating the impact of business decisions on IT costs; (4) prioritizing and negotiating IT-enabled business

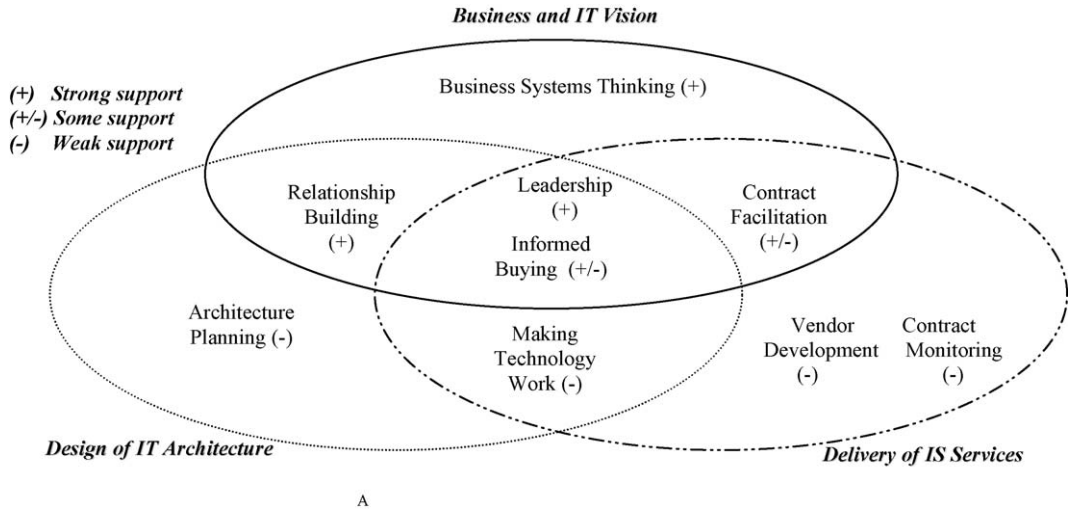

Fig. 3. Empirical support for [11].

initiatives; (5) moving beyond managing the IT utility (supply perspective) to managing IT demand and value creation; and (6) demonstrating IT business value while maintaining IT goodwill among corporate executives. The dataset indicated that four of the CIO responsibilities were considered less important: (1) managing IT security', (2) IT education, (3) IT governance, and (4) IT-enabled process and supply chain transformations.

Overall, our initial findings were consistent with other studies which have found that the roles and responsibilities of the CIO have continued to change and evolve [8]; also our findings agree with

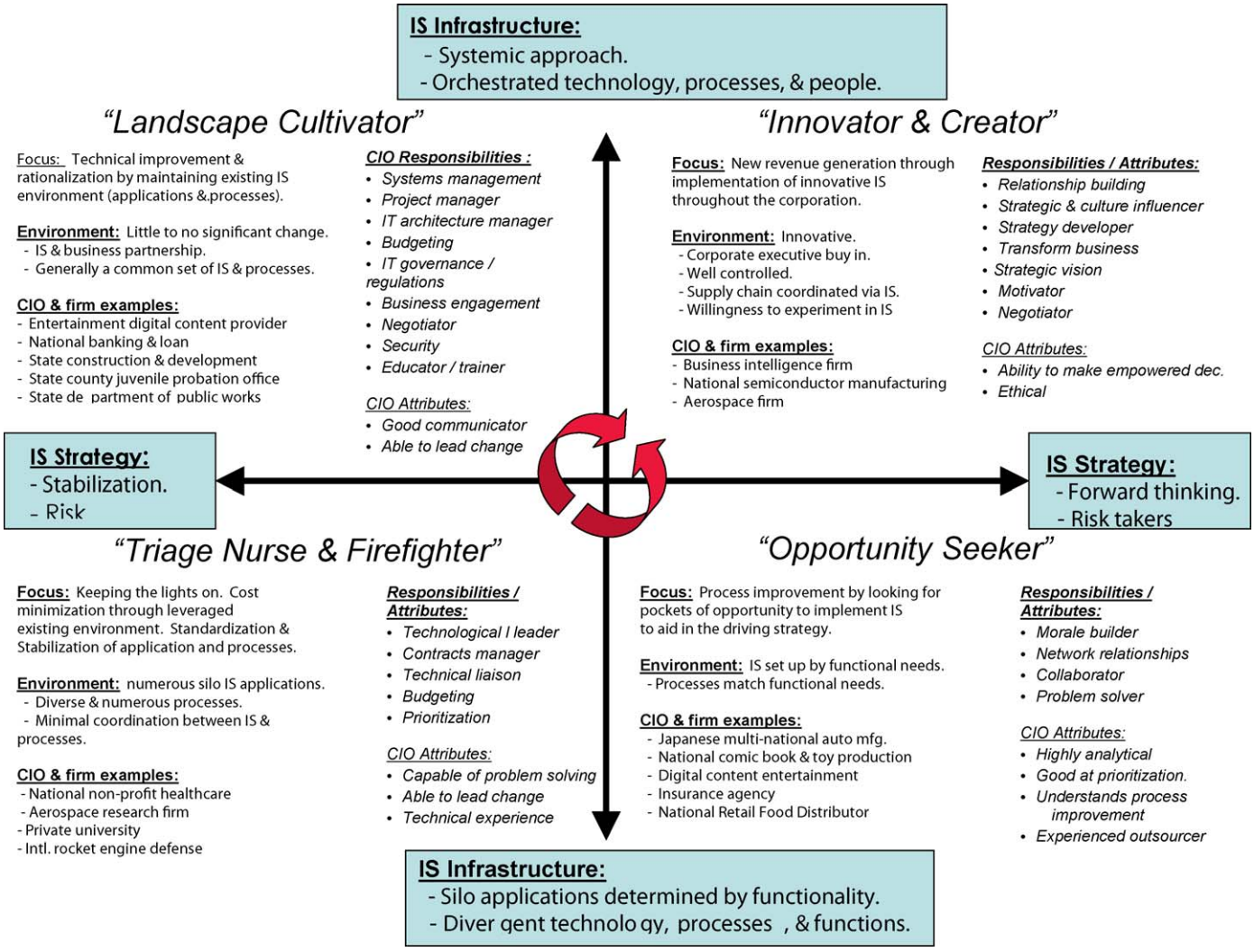

Fig. 4. Four CIO role types.

prior studies that found that firms have continued to change their processes as they leverage and integrate new IT into their business processes [24].

4.1. Findings and discussion

We mapped the CIO profiles onto a 2 × 2 matrix where the *x*-axis represented the IS strategy and the *y*-axis represented the IS infrastructure of the firms (see Fig. 4). The dimensions on the two axes were chosen based on functions and criteria which were prevalent in the IS body of literature related to factors that occupied IS executives' time and efforts [e.g., 7, 29]. The *x*-axis represents a continuum of firms that have implemented a stable and risk averse IS strategy through firms that have followed a forward-thinking and risk-taking approach. The *y*-axis represents a continuum of how firms implemented their IS infrastructures, ranging from those that have many non-standard applications, processes, and functions to those with systemic infrastructures integrated across business processes and organizational units. The data were mapped by the authors, and the results were confirmed by the CIO participants.

Our analysis produced four findings:

4.1.1. Finding 1

CIO's have oriented and tailored their roles and responsibilities to match the IS infrastructure and strategy of the firm, having a profound impact on the evolution of the IS executives' roles and responsibilities.

Examining the 2 × 2 matrix in Fig. 4, we concluded that the roles and responsibilities of CIOs fall into four natural categories:

- *Triage nurse/firefighter*: These are IS managers or executives whose main goal is to fix urgent IS-related problems (e.g., technical bugs, failed systems and disrupted processing). Four of the 17 CIOs interviewed fell into this category. Their type of IS environment involved many stand-alone IS applications and a diverse set of business and operations processes. These CIOs generally are charged with minimizing the cost of IT expenditures and maintenance by leveraging the existing technology and infrastructure of the firm. Thus they have made little or no progress from being data processing managers.
- *Landscape cultivator*: These CIOs have the primary responsibility for technical improvement and rationalization of the firm's data by maintaining and integrating existing applications and processes. Five out of the 17 CIOs interviewed fell into this category. The goal of this category of CIO is to improve the firm's IS infrastructure without causing any disruption of the firm's strategy. The CIOs that fell within this category made little-to-no significant change to the business or IS strategy. The objective was to stabilize the firm's technology. For example, the CIO from the digital entertainment content provider firm was very concerned with maintaining the stability of his firm's IS infrastructure as there were many technological changes that affected the company's industry. The CIOs in this category needed to be forward-thinking. Critical skills therefore included systems and project management, IT architecture management, business engagement, security, and educator and trainer.
- *Opportunity seeker*: The CIOs in this category are opportunity seekers whose main goal was to improve business processes within and outside the firm. Common in this type of environment are firms that have set up IS and accompanying processes according to the firm's technical needs. For example, the CIO of the auto manufacturing firm took advantage of implementing leading-edge technologies in the firm's manufacturing divisions because a technology gap provided the opportunity to save the company money. Five of the 17 CIOs were classified in this quadrant. They were primarily interested in process improvement and were looking for opportunities to implement new IS to assist in implementing the firm's strategy. These CIOs were more forward-thinking. They were willing to engage in testing and using experimental IS applications or to make changes to business processes to take advantage of technical or business opportunities. For example, the CIO of the Japanese automobile manufacturing firm indicated that he recently used portal technologies to improve the way that the firm's salesmen acquired and used sales data in their meetings with dealership owners. Thus the necessary attributes of CIOs in this quadrant included morale building, network relationships, collaborator, prioritizer, and outsourcer.
- *Innovator/creator*: These CIOs primarily focused on innovation and new opportunities, implementing new IS across the corporation. Three of the 17 CIOs fell within this category. To make innovation possible, corporate executives must have agreed that technology is a key contributor to the firm's strategy and there is also a general willingness by employees to experiment with new technologies. A CIO who fell into this category was the CIO of the business intelligence firm. The executive was established as a key leaders in the firm and was given discretion to implement technologies that would aid and support the firm's strategy. Such CIOs were fully aware of the firm's strategy, and have significant influence on other executives. These CIOs were involved in relationship building and were strategic influencers, strategy developers, business transformers, and culture changers.

Our interviewees indicated that they planned to evolve to an innovator creator role in one of two ways.

- To focus on continuously improving the firm's IS infrastructure by stabilizing the environment so that more focus could be placed on strategic issues.
- To rely on technology to provide opportunities to leap-frog infrastructure standardization efforts. This would enable them to address more strategic opportunities.

4.1.2. Finding 2

The CIO has settled into one of two distinctive roles: (1) an executive that focuses on invigorating the firm's IT infrastructure to achieve an ROI on the company's IT investments, and (2) another that is tasked with increasing revenue generation and the visioning and implementation of new IS throughout the corporation for business innovation.

For the purposes of our research, however, we termed these two roles the Director of IT and the Chief Innovation Officer (see Fig. 5: bifurcation of the CIO role).

The data indicate that the CIOs who adopted the Chief Innovations Officer role were executives who came from business rather than technical backgrounds. They were tasked with using technology to increase revenue and to provide innovation and process changes. One mentioned that he had to "*learn about his job responsibilities by understanding the existing and new IS technologies*." Our data indicated that these CIOs operated in more stabilized and standardized IS infrastructures: they could focus their efforts on leveraging IS to add value to the firm and were increasingly involved with the development and implementation of business strategy and process innovations. They gained the responsibility of leveraging IT resources to introduce and support process and product innovations across multiple units within and outside the organization. Eight of the 17 CIOs indicated that their roles and responsibilities were strategic and innovative in nature. A CIO from an entertainment company commented,

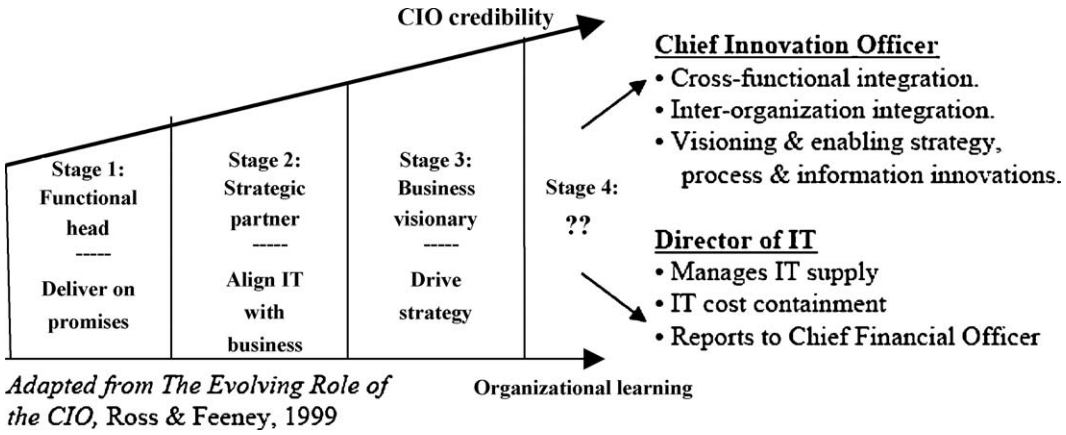

Fig. 5. Bifurcation of the CIO role.

> "I sit on the executive management committee, so therefore I am part of, and privy to, the strategy of the organization... I have under me a business process group; their mission is to understand the business, and the processes that support it, its efficiencies, inefficiencies and opportunities to improve our business."

Three other CIOs indicated that they had recently begun to shift their focus from the supply side (i.e., purchasing, acquiring, etc.) of technology management to the demand side (i.e., creating value). In particular, these CIOs no longer focused on purchasing new technology but wanted to concentrate on enhancing the company's existing IS architecture and utilizing existing technologies to provide better leverage and capabilities for the businesses [19], but also to influence other top level executives.

In contrast, those IS executives who had retained a Director of IT role focused on delivering reliable and cost efficient IS services. Because the focus is on cost containment, this CIO typically reports to the CFO, focusing on cost-cutting initiatives rather than on projects that generated revenue. One CIO who fit this role said:

> Our organization *"had to un-learn what we learned in order to successfully use technology to aid in the management and control of information and enhance knowledge exchange..."*

4.1.3. Finding 3

The degree to which a firm's strategy and processes are IT-enabled has a profound influence on the CIO's ability to change and evolve in his/her roles and responsibilities.

All 17 CIOs believed that they were able to identify and understand the skill-sets that were needed for their job. However, they also indicated that their ability to develop or utilize these skills was either encouraged or hindered by the perceived strategic and operational importance of IS within their firm. We found that when IT was closely aligned with business operations and used as a key source of competitive advantage, the CIOs' ability to innovate and mature was strengthened.

CIOs in firms in which senior management understood the role of IT and where the IS departments had established standardized IS infrastructures were able to transform their roles from a technical to a strategy role since little of their time was spent educating employees on how to use technology. The CIO from the business intelligence firm stated:

> *"We compete in the business intelligence industry where we ourselves have to be an example of how firms should manage their own technology and data. The competitive advantage in our firm is the ability to understand how to use technology to mine a firm's data to better understand its customers. In order to do this, we must operate in a very simple, yet ubiquitous, IT environment... which helped me to implement new strategies for our company and to adapt my role and skills to meet the needs of the firm."*

We found that in firms where technology was already woven into the fabric of the firm's process and operations, CIOs were able to evolve, as opportunities occurred and the company matured.

Eleven of the CIOs we interviewed indicated that because IS was not previously a core focus of the firm's strategy, their primary objectives were to educate all employees on technology initiatives, to stabilize their firm's IS infrastructure, and to recognize cost savings by better integrating the IS applications and processes. However, the employees were often reluctant to change the way they used IS. One CIO commented,

> "The situation used to be that the general business population lacked a sufficient level of understanding or knowledge of technology to operate without the safety net of an IT professional... Our focus used to be on solving technological issues. But now, our problems are not technical – they relate to changing and managing how humans use technology and getting them to change established business processes that just don't work... People are hesitant to change."

These CIOs indicated that much of their time was spent on educating and persuading the organization to better understand and leverage IT resources. The established norms and procedures for identifying, adopting, and maintaining technology significantly contributed to the unwillingness of employees to use technology that was beneficial to the entire organization. Interestingly, in all the interviews with CIOs that came from firms where technology was not a core product, service, or source of competitive advantage for the firm (e.g., car manufacturer and toy producer), the CIOs tended to be associated with the Chief Innovation Officer role.

4.1.4. Finding 4

The degree to which a firm's IS architecture infrastructure was standardized had a profound influence on the CIO's ability to change and expand his/her roles.

All 17 CIOs indicated that they wanted to eventually align their roles and responsibilities to be consistent with those listed in the Innovator and Creator category. However, they indicated that getting there was not easy. Our data indicated that the CIOs 'ability to align their roles (temporarily or permanently) with the Innovator and Creator category of CIO was strengthened if they

were from environments that exhibited very controlled, regulated, and standardized IS. These environments allowed CIOs to modify their roles and to take advantage of business opportunities. The manufacturing firm CIO expressed how things have changed:

> *"IT was viewed as processing back office and data processing. Now we've moved into information, we've moved into intelligence. In the early days, it was all based around efficiency. ... In today's environment, it's using our IT investments to support the business – how do you increase revenues? How do you increase customer satisfaction? How do you increase lifetime owner loyalty, etc. while still focusing on efficiency?"*

CIOs who experienced difficulties aligning their activities (temporarily or permanently) with the Innovator and Creator category of CIO worked in environments of heterogeneous business processes, IS applications, and architectures. They experienced typical problems of non-rationalized data, numerous rogue implementations of stand-alone applications, and divergent IS strategies.

5. Conclusion

From our interviews we found that CIOs described their roles in the 1980s and before to be "behind-the-scenes technicians" Then in the 1990s, the perception of the CIO's changed to "innovators attempting to climb the corporate ladder." Following this at least some CIO were viewed as top level executives responsible for managing and leveraging technology to provide value to the business.

Because of the difficulty in many firms with promoting the need for IT top executives, we believe there has been a split in the CIO role: one is an executive-level manager – the *Chief Innovations Officer* – whose primary goal is to work with other C-level executives inside and outside of the firm to change the firm's strategy and processes. These are closer to what was originally conceived as a CIO in its earliest days having experience and competence in many functions of the organization and possess a diverse set of skills needed to influence the organization. The other CIO role exhibits a traditional focus, the *Chief Technology Officer,* whose primary function is to maintain and manage the firm's existing legacy IS infrastructure and cost-cutting initiatives. They have technical skill-sets and are responsible for both the demand and supply side of IS management.

We found that the ability of CIOs to change, and their roles to evolve, was highly dependent on two factors: the extent to which a firm has decided to standardize and integrate its IS infrastructure; and the degree to which IT was core to the firm's product, service, processes, or competitive positioning.

Our findings were limited by the small sample size of firms interviewed but its implications provide some understanding on how the responsibilities and attributes of a CIO have been influenced by the role of the CIO in the firm.

Appendix A. Attachment #1: Interview protocol and questions

Attachment #1: Interview Protocol and Questions.

Phase 1. Introduction

We are conducting this research to develop an understanding of how the role of the CIO has changed over the last 5 years. Fundamentally, we are interested in find out "who do CIOs do?

I will be asking you questions concerning:

- *Your background and experience*
- *Your roles, responsibilities, and work activities as CIO within your organization*
- *Your perception of how the role of the CIO has changed over the past 5 years*
- *Your perception of how the CIO role will evolve over the coming 5 years*

Phase 2. Details on key informant and firm

First, let me ask you some questions related to your background

Name/title
Position within the organizational hierarchy
Organizational chart
Length of service with the company and industry
Educational background
Nature of prior professional experience
Career progression
Previous professional positions/roles
Firms/industry/company
Philosophy/emphasis on the management of IT

Appendix A (*Continued*)

Firm context
Industry, size, business strategy; global reach;
Level and basis of competition; strategic position; velocity;
Extent and nature of IT resources and capabilities
Information intensity; Strategic and operational dependency on IT;
"Organizational respect" for IT;IT sourcing strategy (build/buy);
IT organization structure (organization chart for IT)
IT governance mechanisms; IT competency of business execs;
Heritage/history of IT capabilities and competencies at your firm

Phase 3. The changing roles and responsibilities questions

The next set of questions is designed to help us understand your role of the CIO.

A) What is your role as CIO?

B) What are your key responsibilities as CIO?
- *Ask for copy of official job description*

C) What do you actually do, i.e. how do you spend your time?

Describe a typical day/week/month
Tasks and activities; amount/proportion of time spent on each
People, key work-related social network, purpose of interactions

If I was to shadow you for a month, are these the tasks/activities that I would see you doing? Any other activities that we have not covered?
Willingness to provide access to diary for verification?

D) If you could, would you change anything about how you spend your time as CIO?
Re-allocation of time between tasks and activities identified above
Additional tasks not mentioned above

E) What are the key challenges for managing IT at your firm?
How do you deal with/ "do" these?
(Key areas will likely include:
Strategic planning for IT;
IT budgeting and resource allocation;
IT portfolio management (infrastructure vs. applications);
IT sourcing and acquisition;
IT performance and impact evaluation;
Technological change;
Planning for future business scenarios;

F) What IT-related decisions and responsibilities do you feel that you are NOT responsible for?

G) Do other C-level executives play a role in the management of IT resources and services within your firm? If so, what roles do they play?
COO; CTO; CSO; CEO, Others

H) Do you consider that you are actively involved in the running of this business? If so, how?

I) Overall, how do you provide value to the business?

J) What motivates you in your role as CIO? (what gets you out of bed in the morning?)

K) How is your performance assessed?

L) Apart from salary, does the firm provide any performance-related incentives?

M) Has the role of the CIO changed over the past 5 years? If so, why? | If not, why not, given the changes that have occurred?
- *Personal experience;*
- *Reflection upon the profession in general*

N) What are the key attributes of a good CIO today?

O) Will the role of the CIO change over the next 5 years?
If so:
- *Why? In what ways?*
- *What will be the key attributes of successful CIOs in 5 years?*
- *Implications for education and professional preparation?*

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