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Critical Competencies Required for the Role of the Modern CIO

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Abstract

The role of the chief information officer (CIO) has become increasingly challenging and complex as information communications technology (ICT) has become critical infrastructure for most large organisations. However, there has been a lack of research which has empirically examined the role of the modern CIO. A set of initial critical competencies were identified in the existing literature. An online survey of CIOs confirmed the importance of these competencies and identified other competencies which are considered critical. The key findings show that the role of the modern CIO has become increasingly business focused and strategic. Soft skills dominate the critical competencies. Ultimately, how a CIO leads and manages his/her ICT staff will greatly influence how successful a CIO is in the role. However, the CIO still needs to have high level understanding of key technology knowledge so personal knowledge of or access to hard skills is also critical in the role.

Keywords

Chief information officer; Information Communications Technology, Competencies; IS Leadership

Introduction

The role of the chief information officer has become increasingly challenging and strategic as information communications technology (ICT) has become critical infrastructure for most modern organisations. The management of ICT in large organisations is complex and challenging. In the last decade, businesses have experienced significant change due to globalisation and deregulation of markets, and acquisitions and mergers of organisations. In response, the way ICT can be delivered has changed significantly. Hence, it is not surprising that the role of the Chief Information Officer (CIO) has become increasingly important and challenging (Rockart 2000). ICT is constantly changing and evolving and tends to be cyclical in terms of spending and investment. Organisations have become increasingly reliant on ICT, but at the same time there is an expectation from senior executive management that ICT delivers more measurable business value for money. Over time, the role of the CIO in the organisation has changed significantly from being largely the technology steward of an organisation to being a senior management executive who helps to shape and realise an organisation's strategy through the use of ICT (Korn/Ferry International 1998; Broadbrent & Kitzis 2005). Given the increasingly vital and strategic role of the CIO in organisations which are heavily reliant on ICT, a better understanding of the critical competencies required for the role of the CIO warrants the attention of business and academia. This paper investigates the extent to which the critical competencies identified in existing literature are relevant to the role of the modern CIO and whether there are other competencies which are critical for the role of the modern CIO.

This paper is structured as follows. First we define the role of the chief information officer, drawing on a number of different definitions from the existing literature. Then, we highlight and discuss the critical competences required for the CIO role which have been identified in the existing literature. Next, we present the general research question investigated in this study. Subsequently, we describe and justify the methodology used to collect and analyse empirical data to provide answers to the general research question in this study. Next, we present the results of the data analysis and discuss the key findings of this research. Finally, we present the conclusions and implications of this research.

Background literature—Chief Information Officer (CIO)

Chief information officer (CIO) is a term that emerged in the 1970s as a result of the increased importance placed on ICT by organisations (Rockart, Ball & Bullen 1982; Stephens & Ledbetter 1992; Gottschalk 1999). CIO is a job title commonly given to the most senior IT executive in an organisation responsible for the management of the ICT infrastructure that supports organisation goals. Broadbent and Kitzis (2005) offer a more recent definition: 'the most senior executive responsible for identifying information and technology needs and then delivering services to meet those needs'.

However, the title of CIO can mean many things to different organisations. The role of a CIO can vary greatly from someone purely responsible for the technology and with little interaction with business groups and management to someone with a senior management role, active in the strategy development and having a great deal of influence on an organisation's strategic direction, organisational structure and culture (Lepore 2000).

Role of the CIO

In discussing the role of the CIO, it is useful to first define the terms, role and competencies, and other related terms for a job position such as the CIO. A role is the set of responsibilities and/or expected results associated with a job. Complex positions in an organisation such as the CIO may include a large number of tasks, which are sometimes referred to as functions (McNamara 1997). Typically, competencies are general descriptions of advanced knowledge, skills and abilities needed to perform a role in the organisation. Competencies are typically built up over time through experience. Competencies can be described in terms such that they can be measured. Obviously, the modern CIO has multiple roles and responsibilities and needs to have a broad range of critical competencies to carry out their key roles and responsibilities.

The role of CIO has evolved in four distinct stages. In the first instance CIOs were seen as 'glorified DP (data processing) managers' (Andrews & Carlson 1997). In the second stage of evolution, CIOs were cast as technocrats. CIOs became business executives in the third stage of evolution. The fourth stage of evolution characterizes CIOs as technocrats and business executives. Furthermore, a number of more recent studies suggest that the role of the CIO has changed significantly from the technology steward to the senior executive responsible for aligning ICT with the business goals and leveraging ICT to achieve the strategic vision of an organisation (Korn/Ferry International 1998; Deloitte 2004; Broadbent & Kitzis 2005). Indeed, the technology steward role has been split from the CIO role with many organisations having a chief technology officer (CTO) responsible for the planning and implementation of ICT and reporting directly to the CIO. Hence, the CIO role has become much more strategic, with the CIO often sitting on the executive management board. As ICT has become more important, the CIO has become a key contributor in formulating the strategic goals of an organisation. In many companies, the CIO reports directly to the Chief Executive Officer (CEO). In some companies, the CIO sits on the executive board (Korn/Ferry International 1998; Deloitte 2004). Typically, the CIO delegates technical decisions to employees more familiar with details. Usually, a CIO proposes the ICT infrastructure that an organisation will need to achieve its goals and then works within a budget to implement the strategic ICT plan.

For those IT executives holding the title of CIO, their position in the organisational structure chart in multinationals may be indeed one of a number of CIOs. In such a situation, job responsibilities can vary widely from the corporate CIO for operations, CIO for functional leadership, business unit CIO and regional CIO (Cash & Pearson 2004). Laplante and Bain (2005) described five primary roles of the CIO which were previously identified by Cash and Pearlson (2004) as (1) CIO as a business strategist; (2) CIO as IT strategist; (3) CIO as a change agent; (4) CIO as technology advocate; and (5) CIO as functional leader.

Critical Competencies Required for the CIO Role

Periasamy & Seow (1998) identified five critical success factors for the CIO to successfully deploy IT to promptly deliver optimal value to his organisation. These were: (a) requisite business knowledge; (b) being versatile and nimble; (c) maintaining a level of technical competence; (d) ability to manage, interact and motivate staff; and (e) good working relationships with bosses, peers, staff and external parties. Tagliavini et al. (2004) identified three dimensions of critical capabilities and competencies for the role of the CIO, extending the work of Bresciani (1996) on the concept of competence to the CIO role. The three dimensions of critical capabilities and competencies, and key attributes of each dimension, are presented in Table 1.

Table 1: Dimensions of critical capabilities and competencies required for CIO role

Dimensions of critical capabilities and competencies	*Attributes of each dimension*
Soft skills, abilities and qualifiable knowledge	
1. Know how to be: mental, physics and basic sense attitudes, value system, factors linked to personal identity	Interpersonal skills Holistic vision Long term vision Effective leadership Propensity to innovation
2. Know what: knowledge of the work, tasks, methods, own role, the context, the company	Managerial knowledge Internal business knowledge External business knowledge Technical knowledge
Hard skills, abilities and quantifiable knowledge	
3. Know how: knowledge of the practices and solutions (technical knowledge and skills required to perform ICT management activities	Technical expertise Planning capabilities Capability for organisational impacts assessment

Research Questions and Method

This study investigated the following general research question: *What are the most important competencies required for the role of the modern CIO?*

An online survey was used to collect quantitative and qualitative data to determine the important competencies for the role of the modern CIO. This was considered an appropriate method for collecting data to answer the general research question from a target population—namely, chief information officers who are typically time poor and extremely difficult to contact in person because of their extremely busy work schedules and commitments (Emory & Cooper 1991). An online survey was developed from the existing literature (Cash & Pearson 2004; Laplante & Bain 2005; Tagliavini et al, 2004) and current practice. The survey asked the respondents to rate the importance of sixteen statements which described critical competencies required for the role of the CIO. Each of the critical competencies was rated on a Likert scale from 0 to 4, with 0 being not relevant, 1 being not important, 2 being somewhat important, 3 being important and 4 being very important. A copy of the online survey is available on request from the authors. The respondents were also given the opportunity to make open-ended comments about each critical competency and to indicate whether other critical competencies should be included for the role of the CIO. This allowed to us to gain a deeper understanding of what and why individual competencies are critical for the role of the modern CIO. An invitation to participate in the online survey was sent out to 350 CIOs by email and formal letter which contained the URL address of the online survey. The CIOs that responded to the survey represented a broad range of industry sectors, including education, finance and banking, government, health, IT, media, mining, and retail. A response rate of 20 percent and 46 valid responses was achieved after an adjustment was made to the sample size for incorrect email addresses and postal addresses, and where the targeted respondent no longer worked for the organisation (Dillman 2000; Neumann 1994; Zikmund 1997).

The quantitative data collected from the online survey was analysed using SPSS and descriptive statistic techniques. The qualitative data collected from the online survey was analysed using NVivo to identify common themes and issues in relation to the list of critical competencies covered in the online survey and to identify other critical competencies in relation to general research questions. SPSS was used to rank the importance of each critical competency evaluated in the online survey using means, mode and standard deviations (Neumann 1994). The use of the qualitative data analysis software package NVivo allows researchers to rigorously analyse, summarise and abstract large volumes of textual data (Gibbs 2002; Richards 1999). The analysis of the qualitative data allowed us to gain a deeper understanding and explanation of why specific competencies were considered critical by the survey respondents for the role of the modern CIO (Gable 1992).

Results of the Data Analysis

Table 2 shows a summary of the responses of the CIOs that participated in this survey in evaluating the importance of 16 competencies for the role of the CIO.

Table 2: Summary of critical competencies for the CIO role in order of importance

Critical competencies for the CIO role	*N*	*Missing*	*Mean*	*Mode*	*Std. Dev*	*Min*	*Max*	*Qualitative Responses*
Leadership in CIO Role	46	0	3.98	4	.147	3	4	12
Strategic Planning of ICT	46	0	3.85	4	.363	3	4	9
Business Alignment & Innovation with ICT	46	0	3.80	4	.453	2	4	10
ICT Human Resource Management	46	0	3.65	4	.526	2	4	13
Managing business relationships with ICT	46	0	3.52	4	.836	0	4	6
ICT Budgeting and Control	46	0	3.48	4	.809	0	4	9
Corporate governance of ICT	46	0	3.35	4	.766	1	4	6
Vendor/supplier relationship management	46	0	3.13	3	1.024	0	4	9
Information security/business continuity	46	0	3.09	4	1.071	0	4	11
Business process management	46	0	2.98	3	1.105	0	4	13
Project management	46	0	2.96	3	.868	0	4	11
ICT architecture management	46	0	2.93	3	.929	0	4	10
Knowledge/Intellectual Capital Management	46	0	2.93	3	.998	0	4	8
Measuring business value of ICT	46	0	2.93	3	1.063	0	4	11
Managing ICT globally outsourcing, off shoring	46	0	2.89	4	1.140	0	4	9
Supply chain management	46	0	2.41	3	1.107	0	4	9

Note: *Importance was determined by Mean, Mode (most common rating), Variance (standard deviation and low and high rating)*

The majority of the competencies were considered important by the CIOs who participated in this survey, except for supply chain management which is a competency relevant to specific industries such as manufacturing. The competencies were ranked in order of the mean scores of the importance given to each competency by the CIOs. The standard deviation scores indicated where there was significant variance in the responses of the CIOs to an individual competency. Any variance in responses to individual competencies was further explained by providing the mode (most common rating given by CIOs) and the minimum and maximum rating scores for each competency. The last column in Table 2 shows the number of qualitative comments provided by CIOs who participated in this survey for each competency.

Discussion of the Key Findings from the Data Analysis

In the order of the most important competencies identified from the analysis of the survey responses, the key findings for each competency are discussed. A number of pertinent comments made by CIOs who participated in this survey in relation to each specific competency are also included and commented on in this section.

1. Leadership in the CIO Role

Leadership is considered to be the number one competency required for the CIO role. The mean (3.98) and standard deviation (.153) scores for this competency indicate almost total agreement by survey respondents. A number of comments by CIOs indicate that leadership of the CIO in the business is absolutely critical and the number one competency required in the CIO role. The following comments by CIOs who participated in this survey emphasise how important leadership is in the CIO role:

- 'Absolutely essential. Leadership/visionary skills are pivotal'.
- 'Leadership is the primary responsibility of the CIO'
- 'Critical to the success of the role. Must be able to lead and have a strong strategic focus rather than daily management'.

2. Strategic Planning for the Organisation's Information Communications and Technology (ICT) Infrastructure

The strategic planning of an organisation's ICT infrastructure is also considered to be an extremely important competency by the majority of the CIOs in this survey, and critical and complementary to the leadership role of the CIO role in achieving business goals through alignment with ICT. Again, the mean (3.85) and standard

deviation (.363) scores indicate almost total agreement by the CIOs that participated in this study. Interestingly, the following comments indicate CIOs consider strategic planning of ICT to be part of the leadership role and that successful strategic planning of ICT is dependent on the alignment of ICT with business strategy:

- 'Developing and communicating a strategic plan is a key part of leadership'.
- 'Key is aligning IT strategy with Business Plan'.
- 'Once business alignment is articulated, these skills can be bought in to determine detail'.

3. Business Alignment, Innovation Enablement and Management through ICT

The ability of the CIO to ensure the alignment of ICT with the business is also rated as being an extremely important competency and critical to enabling and realizing an organisation's corporate goals and delivering business value through ICT. The mean (3.80) and standard deviation (.453) scores indicate that that this competency is also considered to be very important by CIOs. This is an interesting finding as the alignment of ICT with the business has been an ongoing challenge for organisations and CIOs for a long time. The following comments by CIOs who participated in this survey emphasise that alignment of ICT with business is critical for success of the CIO.

- 'Understanding of business value drivers and alignment to ICT strategy is essential'.
- 'Business alignment is key for success. Innovation enablement level of importance depends on industry and whether the CIO is part of head office organisation, or subsidiary company'.
- 'Aligning with the business and looking at where you can add value is critical'.

4. ICT Human Resource Management

ICT Human resource management is also rated overall as an extremely important competency, capability, and skill by the CIOs in this survey, as indicated by the mean (3.65) and standard deviation (.526) scores. However, some CIOs noted that responsibility for this competency was directly handled by the human resource function in their organisation and, as such, did not rate this as a critical competency for their role. However, generally, CIOs are very concerned about the management and the composition of ICT human resources as they are dependent on having the right balance of business and technical capability in their ICT team if they are to succeed in their role. The following comments by CIOs who participated in the survey indicate the importance of good ICT human resource management as a critical competency of the CIO role, but sometimes this role is viewed as the responsibility of the HR function with input from the CIO:

- 'Having a team with strong business and technical skills is critical to the CIO success. These people are in short supply and regularly tempted by other offers, so they must be looked after'.
- 'Building a highly capable team is critical'.
- 'Important to be involved in the process but need to work with HR driving the process'.

5. Managing Internal, External and International Business Relationships through ICT

Managing internal, external and international business relationships through the use of ICT is considered a very important competency by the majority of the CIOs in this survey, as indicated by the mean (3.52) and standard deviation (.836) scores. It should also be noted that ICT is an enabler of business and the reach of ICT has extended well beyond the organisation and facilitates business between organisations and across international borders. The following comments by CIOs who participated in this survey emphasise the importance of ICT in managing business relationships internally, externally and internationally:

- 'Relationship management is a key responsibility'.
- 'This will make or break you'.
- 'ICT cannot be seen as an isolated entity'.

6. ICT Costs, Budgeting and Control

ICT cost and budget control is considered to be a very important competency by the majority of the CIOs in this survey, as indicated by the mean (3.48) and standard deviation (.809) scores. Increasingly, given the significant operating and capital expenditure on ICT in most large organisations today, CIOs need to be able to justify and manage their expenditure on ICT wisely and to clearly indicate the business value delivered by ICT to senior management. Indeed, it can be argued that increased emphasis on cost and budget control is a sign of the maturing of the ICT industry. The following comments by CIOs who participated in this study indicate that the importance of good financial management of ICT expenditure is a key responsibility of the CIO.

- 'All ICT initiatives are to be costed against agreed value (both tangible and intangible)'.
- 'It is a big piece of most organisations budget. You need to be able to manage finances and show ROI'.
- 'Necessary but it should be about adding value not just cost control'.
- 'Fundamental—shouldn't be here is you haven't got this before'.

7. Corporate Governance of ICT and Regulatory Compliance

Corporate governance of ICT and regulatory compliance are topics receiving a lot of attention and a major concern for many organisations, as executive boards have realized they are directly accountable for the failure of major ICT systems and infrastructure which can have dire consequences for the performance and reputation of an organisation. The mean (3.35) and standard deviation (.766) scores indicate that corporate governance of ICT is considered very important by CIOs in this survey. Australia has been a leader in setting standards for ICT corporate governance with the AS8015 Standard being adopted as an ISO standard in 2007/8. CIOs need to have a strong appreciation of ICT corporate governance, as the backing of a CIO for corporate governance of ICT is considered essential to the success of an organisation. The following comments by CIOs who participated in this study indicate that the relative importance of corporate governance of ICT is driven by industry context and the backing of the CIO:

- 'Degree of governance depends on industry type, risk profile and size'.
- 'Don't see this as critical unless you are in a heavily regulated environment'.
- 'Not optional—usually driven by company culture—but you need to have a working knowledge of Audit compliance, Sarbanes Oxley, etc, etc'.
- 'Must have the backing of the CIO'.

8. Vendor and Supplier Relationship Management

Vendor and supplier management is also considered to be a very important competency by the majority of CIOs in this survey with a mean of 3.13—although there was some variance in the responses as indicated by the size of the standard deviation (1.024). Interestingly, a number of CIOs felt that vendor and supplier relationship management was more relevant for SMEs that do not have the capability and resources to build and maintain ICT infrastructure. Therefore, ICT vendor and supplier management for SMEs is critical to successfully managing their ICT infrastructure. However, generally speaking, there is a well-established trend in business to buy or outsource, rather than build, for many business applications. Hence, it can be argued quite convincingly that managing ICT vendor and supplier relationships is a critical competency of the modern CIO. The following comments by CIOs who participated in this survey indicate the importance of managing vendor and supplier relationships to ensure maximum value is extracted for the organisation, and considered this as a particularly important issue for SMEs.

- 'This should be about extracting maximum value from vendor relationships, so that you get the benefit of the full vendor capabilities and knowledge. It should be a mutually beneficial relationship. Its less about lunches than about value delivery'.
- 'Key competency of the CIO'.
- 'ICT cannot be seen as an isolated entity'.
- 'Critical for SMEs'.

9. Information Security Planning, Business Continuity and Crisis Management

The ability to oversee and ensure appropriate information security planning, business continuity and crisis management is also considered an important competency by the majority of CIOs in this survey, as indicated in the mean (3.09) and standard deviation (1.071) scores. However, there was also the view expressed that this was an operational responsibility that the CIO oversees. The following comments by CIOs who participated in this survey emphasise that the CIO needs to oversee and ensure that information security, business continuity and crisis management is appropriately addressed and managed in the organisation, but it was not considered a direct responsibility. This ensures that the organisation is not over-exposed in terms of risk and the business can remain operational despite the failure of key ICT infrastructure.

- 'A vital responsibility that must be overseen by CIO'.
- 'Shared responsibility but with a large operational component within the I.T. Managers domain'.
- 'Mandatory requirement'.

10. Business Process Management (ICT enabling and streamlining business processes)

The ability to identify opportunities and facilitate business process improvement and optimization through the use of ICT is considered an important competency by the majority of CIOs in this survey as indicated by the mean (2.98) and standard deviation (1.105) scores. A key part of the CIO role is to enable business processes through the use of ICT. Indeed, in many instances, ICT has become embedded in the key business processes of organisations. As three CIOs noted, the whole reason for ICT existing is as an enabler and to support the business (processes): since ICT plays a critical role in the optimization of business processes, it is critical that CIOs know how to apply technology to improve business processes.

- 'CIO must have a keen business brain and will be a proponent in deploying technology to optimise bus processes'.
- 'Critical role of the CIO is optimisation of business processes utilising technology'.
- 'The CIO needs to know how to apply technology to improve business processes'.

11. ICT Project Management

Project management is also considered an important competency by most of the CIOs in this survey as indicated by the mean (2.96) and standard deviation (.868) scores. Again, this competency was considered as something that would be managed by key people under the CIO, but it was also considered critical that the CIO should have a good background and understanding of the principles of project management. Indeed, some of CIOs noted that project governance was actually more appropriate to role of the CIO than hands on involvement in specific projects and the need to recognize the early signs of wayward projects, and possess the necessary skills to intervene to get those projects back on track.

- 'A good understanding of the importance of project management methodology and the various project phases etc. is important but the role of CIO would be to promote the understanding of the value of project management rather than to manage projects directly'.
- 'Special skills on how to put wayward projects back on track required'.
- 'As a CIO I would say Project Governance is more important than Project Management'.

12. Organisational ICT Architecture Development and Management

ICT Architecture Development and Management is considered an important competency by most of the CIOs as indicated by the mean (2.93) and standard deviation (.929) scores. However, a number of CIOs felt that this was a competency of an ICT architect expert under them (in other words, more of an operational responsibility than a strategic responsibility that needs to managed by the CIO). Hence, this competency was not rated as high since a CIO does not necessarily need to be an ICT architect expert. However, a number of CIOs indicated that smart development and management of their ICT architecture also gave them a competitive advantage in the market place.

- 'Arch. is the foundation-stone for everything'.
- 'Developing and managing around an architecture is important. It is ironic that providing structure enables flexibility'.
- 'As CIO you need to set direction and let the architects figure it out—if you let the architects set direction you will fail—so working knowledge is important (also for you to get the respect of the technical people)'.

13. Knowledge Management, Organizational Intellectual Capital Development and Management

The ability to facilitate knowledge and intellectual capital management in an organisation is considered an important competency by the CIOs that participated in this survey, as indicated by the mean (2.93) and standard deviation (.993) scores. However, there were some mixed viewpoints on the practical application of knowledge management. One CIO noted that knowledge management was more of an ideal than a specific focus in an organisation. Moreover, another CIO noted that for knowledge management to be successful the concept needed to be embraced right across the organisation, and was not an ICT-specific domain. However, the CIO needs to have an appreciation of knowledge management and intellectual capital, and the associated knowledge management tools and technologies and, therefore, facilitate knowledge management through use of appropriate ICT technologies.

- 'Corporate knowledge is a competitive advantage'.
- 'Once again others carry out the function—but leveraging the knowledge is facilitated by the CIO'.
- 'Shared responsibility with other disciplines/professions rather than the specific domain of the CIO'.

14. Measuring the Impact and Business Value of ICT using Balanced Scorecard and Metrics

Measuring the impact and business value of ICT using metrics and balanced scorecards is considered an important competency by the majority of the CIOs in this survey as indicated by the mean score (2.93), although there was some variance in the responses as indicated by the size of the standard deviation (1.063). Increasingly, CIOs and ICT groups/functions are expected to be able to justify ICT expenditure and determine whether the business objectives behind ICT expenditure and investment have been realized through the use of quantitative and qualitative metrics. Metrics are also critical to supporting the business case for ICT investment and marketing/communicating the business value of ICT, as indicated by the following statements by CIOs:

- 'Essential—otherwise ICT is a discretionary cost centre, whose value proposition cannot be measured'.
- 'Transparency and scorecard review is a major tool to gain the confidence of peers'.
- 'Part of getting the right message back to the CIO's stakeholders as well as enabling better management of IT resources'.
- 'Measuring and communicating the value of ICT is fundamental'.

15. Managing ICT in Global Business Environment—offshoring, outsourcing

Managing ICT globally through outsourcing, offshoring was considered important for the role of the CIO as indicated by the mean (2.89). However, the variance in the responses as indicated by the standard deviance (1.140) indicated that outsourcing, offshoring and operating ICT in a global business environment is more relevant to specific organisations and industries. Therefore, this CIO competency is not as generalisable as some of the other competencies evaluated by CIOs in this survey. However, as indicated by the statements below, outsourcing, offshoring and/or operating ICT globally will become increasingly mainstream in many large organisations, such as financial institutions, that do business globally and/or are highly reliant on ICT and looking to reduce the operational costs of ICT.

- 'Necessary in today's market'.
- 'In terms of understanding options and impact. Again would have someone in team who owns and drives from a service delivery perspective'.
- 'Value of this skill dependent on the relevance to an individual business'.

16. Planning, Management and Enablement of Supply Chain through ICT

Planning, management and optimization of the supply chain was considered an important competency for the CIO role, as indicated the mean (2.41). However, there was some variance in the responses of CIOs as indicated by the standard deviation (1.107) score. This was evident in the responses of CIOs in evaluating the importance of supply chain management as a competency for the CIO role. CIOs need to understand and oversee supply chain management when it is relevant to specific organisations and industries such as manufacturing, mining, retail, etc.,while not relevant in other industries such as the financial services sector.

- 'Depends on business model/industry'.
- 'Probably more important to watch for opportunities to partner with supply side vendors through outsourcing'.
- 'Depends on industry—not much use if you work in a bank'.

Additional Comments by CIOs regarding Competencies for CIO role

In the survey, CIOs provided 14 additional comments which were invaluable in identifying critical competencies not explicitly covered in the survey. The most notable competencies which should be considered for inclusion in the CIO role include:

- Change management;
- Change leadership;
- Succession planning for CIO;
- Business acumen;
- Political savvy;
- Ability to communicate effectively, particularly at the board level; and
- Adaptability and resilience in the face of constant change.

A number of pertinent comments by CIOs in this survey highlight why the above list of additional competencies is important for the modern CIO role.

- 'Need to include **Change Management** as a core Management Related competency. It may be assumed in the other components but it is a real skill that is required to effectively transition technologies and associated business practices'.
- '**Change Leadership and Change Management**. 2 different competencies; Envisioning'.
- 'Almost all of the above areas are critical to the successful delivery of IT for a CIO regardless of industry. The only area that I think is important that hasn't been touched on directly is succession planning, which I feel is different to the ICT HR function'.
- 'Other competencies which I believe are needed by a CIO are **sound understanding of the business & political savvy**. Even with all the above listed attributes, unless **an organisation is mature enough to recognise the value of the CIO role**, and willing to **appoint this role as an Executive position**, with the authority to effect change, then all the attributes in the world will not allow that CIO to operate to their full capacity'.

- '**Ability to speak in business terms**, rather than ICT terms to the CIO's customers is critical. They don't want to hear about COBIT, ITIL, technological information. They want to hear how IT can improve their business through risk, cost and profitability changes. **CIOs need the ability to understand and manage from a business perspective**, rather than from a technological perspective'.
- '**Management of benefits**—i.e. if ICT is an enabler, it must contribute to the business outcomes as such the CIO (along with the business sponsor) has a responsibility for ensuring the benefits are achieved - very important'.
- '**Adaptability and resilience** are key competencies of a modern CIO—CIOs must be at the forefront of change in both the business and technology environments, so must be able to work effectively through ambiguity and find a way forward. Often the technology investments are medium-long term, but the business focus is short term and the technology product sets change quickly—so a good CIO has to in effect place "bets" and monitor and adapt the plans as events unfold. Ensuring system operational stability and good internal support service is taken for granted—but if it isn't there it will be hard for the CIO to talk to business stakeholders about the things that are higher up the value chain'.
- 'My role as CIO seems to be evolving into 3 core components: **1. Relationships with other C level execs, key vendors in shaping the future 2. Governance of technology related projects (protecting investments, realising benefits, arbitration) 3. IT People Admin & Management** (I've had 40% staff turnover in IT in past year, including all 3 direct reports after 3)'.

Table 3 shows the critical competencies confirmed as important for the role of the modern CIO in Table 2, and classifies each competency in terms of the type of primary role and knowledge from the existing literature (Table1) that each belongs to.

Table 3: Classification of critical competencies for CIO based on primary role type and knowledge type

Critical competencies for the CIO role	***Primary role type***	***Knowledge Type***	
Leadership in CIO Role (soft skill)	Business strategist	1. Know how to be	1
Strategic Planning of ICT (soft skill)	IT Strategist	1. Know how to be	2
Business Alignment & Innovation with ICT (soft skill)	Business Strategist	1. Know what	3
ICT Human Resource Management (soft skill)	Functional leader	1. Know how to be	4
Managing business relationships with ICT (soft skill)	Business strategist	3. Know what	5
ICT Budgeting and Control (hard skill)	Business strategist	3. Know what	6
Corporate governance of ICT (soft skill)	Business Strategist	2. Know how	7
Vendor/supplier relationship management (soft skill)	IT Strategist	3. Know what	8
Information security/business continuity (hard skill)	IT Strategist	2. Know how	9
Business process management (hard skill)	Business Strategist	2. Know how	10
Project management (hard skill)	IT Strategist	2. Know how	11
ICT architecture management (hard skill)	IT Strategist	2. Know how	12
Knowledge/Intellectual Capital Management (hard skill)	Business Strategist	2. Know how	13
Measuring business value of ICT (soft skill)	Business Strategist	3. Know what	14
Managing ICT globally outsourcing, off shoring (hard skill)	IT Strategist	2. Know how	15
Supply chain management (hard skill)	Business Strategist	2. Know how	16
Succession planning for the CIO role (soft skill)	Business strategist	1. Know how to be	Nr
Political Savvy (soft skill)	Business strategist	1. Know how to be	Nr
Communication skills – particularly board level (soft skill)	Business strategist	1. Know how to be	Nr
Business Acumen (soft skill)	Business strategist	1. Know how to be	Nr
Change leadership (hard skill)	Technology advocate	2. Know how	Nr
Change management (hard skill)	Change Agent	2. Know how	Nr
Ability to adapt to constant change (soft skill)	IT strategist	1. Know how to be	Nr

*Note: **Nr** = Critical competencies identified as important in qualitative comments and not quantitatively rated by survey respondents*

Table 3 shows that the role of the CIO has become more business focused and strategic as the primary role of business strategist and IT strategist, and the higher levels of knowledge and soft skills (know how to be; know how) dominate the role of the CIO, whereas specific practical knowledge and hard skills (know what) are less

important in the role. This is not surprising given the breadth of technologies and skills in ICT and that it is not possible for one individual to be expert and knowledgeable in the entirety of ICT.

Conclusions and Implications

In this paper we have provided evidence which identifies and confirms critical competencies required for the role of the modern CIO based the quantitative and qualitative responses of 46 CIOs. The evidence presented in the discussion section shows that the modern CIO role has become increasingly strategic and business focused. The results of this study also show that the CIO role is predominately that of a business strategist who formulates the ICT strategy to realise business strategy and goals through the functional leadership of the ICT group in an organisation. The soft skills dominate the critical competency set for the CIO. However, the CIO also needs to have a high level understanding of key technology and management knowledge, therefore, having capable technology and management expertise in their direct reports is critical for delivering and managing the ICT systems and infrastructure for an organisation. Thus, the CIO needs to—in person or through his direct reports—have access to the hard skills in order to operate effectively and make informed decisions about technology. The results of our study also support the current view that the CIO role has become more strategic and, increasingly, the CIO in large organisations with significant ICT infrastructure will become part of the executive management team and should sit on the executive management board. Future work will involve validation and increased understanding of the critical competencies for the role of the modern CIO confirmed in this study with extensive qualitative data collected by the authors in a series of interviews with CIOs.

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