The role of the strategic and adaptive Chief Information Officer in higher education

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Abstract The study examined the evolving role of Information Technology executives in higher education with the objective of detailing the skills and experiences necessary to be a Chief Information Officer (CIO), the expectations of the leaders in higher education of these individuals and how leaders in higher education view the role of the CIO. The CIO position is no longer highly focused on technical issues, but has influence on the institution's mission critical strategies, which clearly shows that the position has experienced organizational ascension. The study uses a qualitative methodology — phenomenology — to explore the CIO position in higher education. The results are discussed in the following three dimensions: skills & experiences, expectations of the leaders in higher education of the CIOs, and how leaders in higher education view the role of the CIO. The findings indicated the need for CIOs to have multidimensional personalities, diverse work experience, higher education background with the ability to strategically adapt according to the institution's needs. Therefore, the study has implications for universities in the process of hiring a CIO and addresses an important aspect of higher education administration. Most importantly, the Association of American University's (AAU) CIOs followed the traditional path to the position (Birnbaum and Umbach in Review of Higher Education 24(3):203-217, 2001).

Keywords CIOs in higher education \cdot Higher education \cdot IT management higher education

1 Introduction

In the last quarter of the century, there has been an unprecedented change in the way universities and colleges conduct their businesses — instructional delivery, research,

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services, procurement, sharing information, planning trips and paying bills (Reich and Nelson 2003). The infusion of information technology has prompted many institutions of higher education to follow the corporate model by creating the Chief Information Officer (CIO) position. This study examined the evolving role of CIOs in higher education with the objective of detailing the skills and experiences necessary for the CIO employed in higher education institutions, the expectations higher education leaders have for these individuals and how leaders in higher education view the role of CIOs.

The IT executive position has evolved from that of just being the head of information technology "to that of crucial organizational decision maker responsible for the development and implementation of projects intimately connected to the survival of the organization" (Lima 2006, p. 2). According to Evans (2009a, b), "CIOs are given more strategic roles than ever before, yet they are simultaneously seeing their budgets being cut while expectations remain unrelenting" (p. 25). CIOs are to ensure that the information systems at their disposal provide world-class institution processes, giving an organization a competitive advantage to survive in the rapidly changing world. As the unique and complex higher education environment changes, leaders like CIOs are being challenged in unprecedented ways: to operate within tighter budgets, make accurate and reliable decisions, improve information systems processes and understand the mission, values and objectives of the institution to develop IT strategic plans. The expectations from a CIO are shaped by the needs of the campus community: faculty, administration, students, and board. In an administrative context the CIO can be called to negotiate and influence the campus community on information technology investments.

The implementation of cutting-edge technology helps universities and colleges to "streamline and transform their business processes" to achieve outstanding results (Gillhouse 2003, p. 156). The alignment of business and technology has fueled a high demand for the CIO position with its limited longevity compared to other executive management positions (Martin et al. 1995; Cartwright 2002). The goal of this study was to get in-depth information about the dynamics and complexity of the position, as there is no clear path to obtaining the CIO position or to being successful in the position. Since there is no clear path to the position, the researcher sought to answer the question of how individuals become CIOs in higher education. According to the literature, CIOs, often labeled as Chief Transformational Officers, need to be operationally and strategically sound, creative, excellent negotiators, visionaries and change agents (McGee 2008; Brown 2009; Wailgum 2009; Nash 2009). The modern university requires "eminently rational solution to a massive problem of human and technological organization" (Kahn et al. 1964, p. 4). The CIOs are being challenged to embrace and drive business change and replace old and inflexible computational infrastructure with more robust and integrated ones appropriate for the modern university.

Furthermore CIOs are attempting to change the perceptions that their departments are "cost centers rather than creators of value and accelerators of innovation" (Evans 2009a, b, p. 25). In higher education the CIO must not only be technologically savvy, but must also understand governance, and the real purpose of higher education (Kezar 2004a, b; Birnbaum 1988, 1989). Kezar (2004a, b) defined governance as "the process of policymaking and macro level decision making within higher education"

(p. 36). In higher education there is no expertise-decision making; there is due process to be followed so that all constituencies feel their input is valued (Association of Governing Boards of Universities and Colleges 1996; Kezar 2004a, b). With different cultures dominating higher education, there are lots of unanswered questions about the kind of experience and expertise needed for CIOs to be employed in higher education. The following questions therefore arise from this state of affairs: Is the CIO supposed to be technically savvy, business savvy, or politically savvy? Unfortunately, there is little empirical evidence on how to be a successful CIO in the complex culture of higher education where governance is embraced, unlike the corporate world in which the leadership supports a top-down structure. So for CIOs to survive in higher education, especially in their diffused position, they need to have a vested interest in the notion of social interaction in relation to the different constituencies on campuses. The challenge most of the time is communicating the return on that IT investment, when academic units are being forced to adjust, and in some cases, reduce their budgets.

2 The emergency of CIOs in higher education

The proliferation of information technology in higher education has raised the level of institutional IT complexity (Mcrobbie and Wheeler 2010; Reich and Nelson 2003; Nash 2009; Yanosky and Caruso 2008). Research and education, the core missions of higher education, are increasingly dependent on information technology (Mcrobbie and Wheeler 2010). Thus institutions of higher education are facing challenges in finding an applicable model for IT leadership to confront the mounting demands of technological advancements on college campuses (Mcrobbie and Wheeler 2010). As computing power is increasing rapidly on campuses, universities and colleges are recruiting CIOs to run their complex IT departments (Chronicle Careers 2009, 2010; Overby 2009; CIO-2-CEO 2009; Heller 2009). The institutions are seeking dynamic, innovative Chief Information Officers to provide vision, leadership, and coordinate comprehensive academic, research, and administrative computing services (Chronicle Careers 2010; Overby 2009; CIO-2-CEO 2009; Heller 2009).

The challenge is that there is no clear path to the CIO position, and how institutions should manage IT as it increasingly plays a major role (Mcrobbie and Wheeler 2010; Reich and Nelson 2003; Nash 2009; Yanosky and Caruso 2008). There has been a shift in the structure of the university administration, making CIOs executive members and reporting directly to the presidents, provosts, and in some cases to the chief finance officer. There seems to be a link between the university's ability to successfully enjoy the benefits of Information Technology and the type of CIO the university recruits. CIOs have to build dynamic teams, develop and implement effective objectives and goals to establish systems to meet the needs of the institution and students, and implement appropriate strategies in line with the mission and values of higher education (Chronicle Careers 2009, 2010; Overby 2009; CIO-2-CEO 2009; Heller 2009; Pastore 2010; Curran 2010). In the midst of universities and colleges recruiting the IT Executives, there is no prescribed way of how IT will continuously support the core mission of universities and colleges, and the roles and responsibilities of CIOs are therefore ambiguous. According to Mcrobbie and Wheeler (2010), "...higher education continues to experiment with varied models for Executive IT leadership. In contrast to the more widely accepted and evolved practices for the executive role of chief financial officer or provost, no "best practice" is yet pervasive for executive IT leadership" (p. 1). As observed by Mcrobbie and Wheeler (2010), universities, colleges, and for-profit organizations have experimented and continue to experiment with different "reporting lines, levels of authority, degrees of centralization, and funding models" (p. 1). CIOs are functioning in an ambiguous environment yet they are expected to function at an optimal level as information technology services have become fundamental to the daily operation of universities. These individuals are expected to support a very distributed computing environment, thus centralized coordination is necessary to attain optimal reliability and universal equity of access (Michalak et al. 1999).

Brown (2009) states that 47 % of CIOs were projecting their departure from their current position by the next decade. According to Parry (2010), 47 % of higher education CIOs were expected to retire in the next decade and there is a shortage of people with the "proper training and mentoring to step into these complicated jobs" (p. 1). In the CHECS' 2009 study the projection was reported at 45 %. The decline could be attributed to the economic meltdown leading to negative impact on retirement funds, or some of the CIOs already left their position (Brown 2009). As this group retires, there should be another pool of up-coming IT executives ready to fill those positions. Former Chief Information Officer at Georgetown University, H. David Lambert said, "The scope and complexity of the role has really grown. It's easy to feel some days like I'm not the CIO but the risk-management officer for the institution, because every element of risk management comes back to IT" (Young 2010, p. 1). The Director of Information-Technology Policy at Cornell University, Tracy Mitrano, acknowledges the complexity of the position as she said, "In the past it took strong, assertive, very traditional leadership... I think a CIO of the future is going to have to be a strong team player and much more of a negotiator, not only within the university but with the vendor community" (Young 2010, p. 1).

President Emeritus of the University of Colorado, John Buechner said, "based on my experience, chief information officers often view their world as distinct from the rest of the academy...From my perspective, presidents want someone who is expert in technology but also a multidimensional person who understands what university cultures are about, what governing boards can or can't do, and the politics of academe" (Buechner 2005, p. 250). In 2003 the first Chief Information Officer at the University of Maryland at College Park, Mr. Donald R. Riley, resigned "after a review of his office's five-year record suggested that his involvement in several national information-technology efforts was obscuring the university's internal needs," regardless of the fact that Mr. Riley had internal and external responsibilities (Read 2003, p.1). Thus, President Emeritus Buechner acknowledged that the CIO job is the most complex position within the university hierarchy in this day and age (Buechner 2005).

According to Boiko (2007), the position is currently mocked by the following acronyms: "Career Is Over" and "Career in Obscurity" (p. 1). This is due to the fact that CIOs are to meet unrealistic expectations, which continuously shift their ground. Thus, CIOs "landed on their feet, some on their butts" as the position still needs to be refined to meet the expectations of each and every institutions' needs (Boiko 2007, p. 1).

To avoid any role ambiguity those aspiring to be CIOs should have access to certain information: expectations, role, and activities to be done to meet responsibilities of the position (Wolverton et al. 2000). Such information needs to be adequately communicated to avoid role conflict and role ambiguity. The changes in higher education have resulted in a complex environment that exceeds the "span of comprehension" (Rizzo et al. 1970, p. 155). The complex environment with technology growing exponentially has contributed to the advancement of the CIO position. The study contributes to the following information gap:

- IT Leadership in Higher Education the attributes of a strategic and adaptive Chief Information Office as well as the kind of leadership CIO's foster or possess within higher education.
- IT Management in Higher Education the ways in which IT should be managed as IT is increasingly playing a major role in higher education.
- Institutions' expectations of a CIO.
- Critical Skills to survive in the position
- Experience the career path to the position.

3 The Burke-Litwin as a conceptual framework

The researcher adopted the Burke-Litwin organizational model (Burke 2002) as a metaphor to understand the distributed and interconnected institution of higher learning environment. The Burke-Litwin model proved to be sufficiently comprehensive to help the researcher diagnose universities with ease and gather parameters to help decide on the different techniques to collect data. An institution of higher learning is a multifaceted organization with several ironies as far as leadership is concerned (Morrill 2007). The Burke-Litwin model has had a significant impact on assessing factors affecting cross-cultural organizational effectiveness, thus was adopted to serve as a conceptual framework, "which describes the relationships between different features of the organization, as well as the context and effectiveness" (Martins and Coetzee 2009, p. 2). The strength of the Burke-Litwin model is that it provides a visual metaphor of the large, unique and complex social system of higher education and "its ability to add value to the outcomes of the organizational diagnostic process" (Martins and Coetzee 2009, p.2). According to Burke (2002), an organizational model can be used to categorize components of an organization, enhance understanding of an organization and interpret data about an organization with efficient language while guiding action for change.

Considering the complex and dynamic nature of institutions of higher learning, such models serves as a guide to choose the appropriate research methodology, especially data collection and diagnosis (Chawane et al. 2003; Martins and Coetzee 2009). Figure 1 depicts the unique and complex higher education environment.

The Burke-Litwin model has its roots in organizational climate (Burke 2002). Organizational climate is about the perceptions individuals have about the functioning of their unit and their working relationship with their colleagues (Burke 2002). In higher education the organizational structure is complex and the needs of all the constituencies are critical to the success of the institution. CIOs are to rethink and



Fig. 1 The Burke-Litwin Model (Burke 2002, p. 187 (permission granted))

retool their institutions IT management strategies through a well-planned and wellexecuted diagnostic process. However, managing the external environment consisting of political, social, economic, and technological factors that affect the overall functioning of the institution is key. In the context of this research, it was imperative to bring a well-researched conceptual framework with applications across cultural contexts, as universities suffer from different cultures. The following models were also considered: Weisbord model, Nadler Tushman congruence model, Freedman Swamp model, Mckinsey seven-S model and Galbraith STAR model, but were found to be either too simplistic or too complex for the study (Martins and Coetzee 2009).

4 Research methodology

The research is not concerned about the consolidation of IT authority and distributed IT, as those are other issues affecting many universities and colleges; the focus here is on the attributes of a strategic and adaptive Chief Information Officer. As such, the aim of this study was to comprehensively examine the position to understand the criteria used to recruit a CIO, learn about CIOs' expectations from Presidents, Provosts, and CFOs, and then learn about the evolving position from the CIOs' perspectives too as the position does not limit itself to the notion of one-size-fits-all in institutions. Since there is no agreed upon method for obtaining and thriving in this

position, in this study, the researcher sought to answer the question of how individuals can become successful CIOs in higher education. Due to the nature of the qualitative study to increase the depth of understanding of CIOs in higher education, we therefore formulated the following research questions:

The general research question is:

What are the unique attributes of a strategic and adaptive Chief Information Office?

More specifically the study addressed the following research questions:

- 1. What are the skills and experiences of CIOs employed in higher education?
- 2. How do leaders in higher education view the role of CIOs?
- 3. What are the expectations of the leaders in higher education of these individuals?
- 4.1 Research approach

The study used several sources of qualitative data collection techniques to achieve triangulation. Creswell and Miller (2000) described triangulation as "a validity procedure where researchers search for convergence among multiple and different sources of information to form themes or categories in a study" (p.126). The multiple qualitative data collection methods balanced the outcome of the study with the rich text captured from documents and open-ended questions as well as interviews (Creswell 2003; Tashakkori and Teddlie 2003; Brewer and Hunter 2006; Creswell and Plano-Clark 2007; Sosulski and Lawrence 2008). Using multiple qualitative methods was important as the researcher sought broader, deeper, and more comprehensive social understanding of the CIO position. This is to confirm findings from different data sources for credibility and trustworthiness in the research, thus offsetting the weaknesses inherited within one method (Creswell 2003; Barbour 2003; Tashakkori and Teddlie 2003). Even though the approach was extensive and time demanding it was worth the challenge as it enhance the validity and credibility of the study. It advanced the dialogue between the researcher and the participants (Greene 2007). The other advantage of applying multiple data collection methods was that, it elevated the integrity and the strength of the results (Sosulski and Lawrence 2008).

The study followed a concurrent approach to collect data. The concurrent data collection approach shortens the data collection timeline compared to a sequential approach whereby one method leads the other. The data collection strategies used were: face-to-face or in-depth telephone interviews, review of documents such as public documents, magazines, journals, and newspapers, and an online survey (Creswell 2003). This was done to "confirm, cross-validate, or corroborate findings within a single study" (Creswell 2003, p. 217). The documents provided multiple perspectives, realities and meanings as the researcher built explanations from the themes in the data. The strengths of documents were that they provided multiple truths as well as thoughtful data on how CIOs understand themselves in their world (Creswell 2003).

The online survey captured skills, gender distribution, ethnic distribution, education background, experience and the number of years in the position. The strength of an online survey was that it enabled the researcher to quantify the data and generalize the results from the sample. Firstly, the interviews provided an opportunity to establish good relationships with the participants, thus developing a sense of trust and cooperation. The in-depth interviews allowed participants in the study to give their thoughts on the position. The CIOs provided details of their work experience and the meanings associated with their experience as CIOs in higher education. The credibility of this study depended on the researcher as the instrument and on his ability and effort to sustain an intellectually inquisitive academic focus (Golafshani 2003). The use of interviewing, documents analysis and surveys "led to more valid, reliable and diverse construction of realities" (Golafshani 2003, p. 8). To further strengthen the study analysis and understanding, peer researchers and professional advisors were consulted at different times. The validity of the study was achieved through comparison and reconciliation of different findings. As Merriam (1988) puts it, "the human instrument can become more reliable through training and practice" (p. 206). The credibility of the study was achieved through sufficient data to merit any claims made and a systematic comparison of categories (Charmaz 2006). Thus, the researcher opted to engage documents, surveys, and interviews to generate sufficient data.

4.2 Sampling strategy and participants

The purposive sampling method, as well as the probability sampling, was adopted in the identification process of the participants. The purposive sampling method worked very well with this study because accessing people in executive positions can be difficult. The purposive sampling was used in the process to make sure that the sample would be "information rich" (Patton 2002, p.40) for in-depth analysis (Miles and Huberman 1994; Morse 1994). According to Patton (2002), the information rich data yields "insights and in-depth understanding rather than empirical generalizations" (p. 230). Since qualitative inquiry focuses on a relatively small sample, the purposive sampling were ideal as they "permit inquiry into and understanding of a phenomenon in depth" (Patton 2002, p. 46). According to Merriam (1988), purposeful sampling is based on the assumption that "one wants to discover, understand, gain insight; therefore, one needs to select a sample from which one can learn the most" (p.48). The "information rich" (Patton 2002, p.40) increases confidence in conclusions (Miles and Huberman 1994; Morse 1994).

The presidents, provosts and CFO provided information on how they arrive at their decision to select a CIO. They provided more information on the role and expectations they have for a CIO. The CIOs provided more details on their evolving position in higher education, their career path, experience, and even educational background. The hiring officials also provided details on the characteristics, specific skills, experience, and educational background they look for as they arrive at their decision. There were 8 higher education executives who participated in the telephone interviews: 4 Chief Information Officers, 1 President, 2 Executive Vice President & Provost, and 1 Chief Financial Officer. There were 16 higher education executives who participated in the online survey: 6 Chief Information Officers, 2 Presidents, 4 Executive Vice Presidents & Provosts, 2 Chief Financial Officers, and 2 Chairs of CIO's Search Committees.

In the final stage, people who chaired CIO search committees were contacted, but only two were willing to participate in the online interview. Those chairing the committees cited university policy as the instrument that prevents them from participating in the study, and some cited equity issues, thus declining to participate.

4.3 Data analysis procedures

Bogdan and Biklen (1998) define data analysis as "the process of systematically searching and arranging the interview transcripts, field notes, and other materials that you accumulate to increase your own understanding of them and to enable you to present what you have discovered to others" (p. 157). Data gathered in this research was inductively analyzed by breaking it into manageable units to find recurring themes, thus, further guiding data collection if necessary; no data was unworthy of examination in the approach. There was a thorough analysis on each individual interview before the whole group was considered. The data analysis occurred on both the descriptive and inferential numerical analysis and the descriptive and thematic text (Creswell 2003). The plan was to perform parallel analysis on both data types to provide richer understanding of the position variables and their relationship (Tashakkori and Teddlie 2003). Analyzing the qualitative data comprised of four steps: transcription, phenomenological reduction, horizontalization, and imaginative variation to garner credible phenomenological results. The online survey data was qualified by creating factors or themes so that they could be compared with themes from the qualitative data. Nonparametric techniques were also used to test the survey results. This is a method that does not assume that the structure of a model is fixed and does not require any specific form for the distribution of the population from which the sample comes (Crichton 1998).

5 Results

This section of the article presents the conceptions found during the analysis of the results. The crystallization process was used to compare and contrast the results searching for convergence, divergence, and discrepancy (O'Cathain et al. 2007a, b). In case of any discrepancy or conflict, this was "an opportunity for transformation, enrichment, and explanation, which lead to further understanding of a phenomenon" (O'Cathain et al., 2007b, p. 150). The final step was the synthesis of meanings and essence. The first part of the results section entailed communicating the numerical findings and the second part reports the themes that emerged from the interviews.

5.1 Play it by the numbers

5.1.1 Educational level & number of years in higher education

The educational level for the CIOs varied significantly with a majority of them holding a graduate degree, while only 2 institutions were in the process of hiring a CIO. There were 17 who completed doctorate degrees, 27 who completed master's degrees, and 15 who completed bachelor's degrees. The CIOs field of study varied immensely and the majority of the CIOs had completed their graduate work with significant professional experience in the IT field from both the public and private sector. Those who completed their doctorate degrees had an average of 19 years of experience in higher education prior to being appointed CIOs, and some of them hold professorate positions within their institutions. Those who earned a masters degree

averaged 16 years in higher education prior to their appointment as CIOs and those with bachelors had an average of 16 years in higher education prior to their appointment. The MBA degree dominated the graduate degrees. The claim is that the MBA degree gives aspiring managers valuable knowledge about business strategies and concepts through hands-on training involving rigorous training, assignments, reports, presentations, and group projects, all of which give an individual the necessary abilities to handle real-life business situations (Voboril 2009).

The AAU institutions are in comparison with the research institutions in the CHECS 2009 report (Brown 2009). From the 2009 CHECS report, 91 % of CIOs in research-institutions held a graduate degree (master's or doctorate), compared to 74.2 % from AAU institutions. In the AAU institutions 29.3 % of the CIOs have doctorate degrees followed by 45.9 % with graduate degrees. Individual with a bachelors are not discriminated against, but they must have 15 plus years of experience with extensive management experience.

5.1.2 Gender

There is gender imbalance and underrepresentation of minority groups in the CIO position. There were only 15 females holding the CIO position within the AAU member institutions. This is about 25.9 % females in the position, compared to 74.1 % males. The numbers from this study show no significant difference to those from the CHECS report. From the 2009 CHECS report CIO distribution was as follows: 24 % females and 76 % males. During the analysis it became clear that white males dominated the CIO position. The CIOs are made up of whites at 91.3 % and minority groups at 8.7 %; specifically the majority of the CIOs were white males at 72.4 %. The gender gap was very wide with female CIOs at 25.9 % and male CIOs at 74.1 %.

5.1.3 Race

There is an underrepresentation of minority groups at the CIO level in the AAU institutions. The group is dominated by Caucasians (93.1 %), more specifically white males (72.4 %). The data indicate a substantial gap in race and ethnic distribution. From the researchers perspective, career pathways and lack of minority cohorts could be the contributing factor. Such imbalance and lack of cohorts could lead to minority groups thinking that the CIO terrain is not welcoming to minority groups.

5.1.4 Professional experience

The CIO in higher education professional experiences included the following: professorship, years working as IT consultants, working for a number of years in the armed forces as well as working both in higher education and industry. According to the 2009 CHECS report, higher education CIOs come "from many different places within and outside the institution; they hold a variety of degrees, and their major studies are spread broadly across the academic board" (Brown 2009, p. 9). This work adds to the available literature on the position, as understanding the type of CIO for higher education would be very helpful to those holding the position, aspiring CIOs, and those institutions currently searching for new CIOs, or in the process of creating the position. The CHECS report asserted that 36 % have held the same role in another organization and the most commonly held position before becoming CIO is that of academic or administrative technology director. In the AAU institutions the majority of the CIOs came through the ranks in higher education as professors from various fields, academic technology directors, IT directors or managers, programmers, as well as systems analysts.

5.1.5 Higher education experience prior to CIO position

About 29 % of the CIOs in AAU had doctorate degrees with an average of 19 years in higher education prior to rising to the CIO position. Those who have doctorates have been working as faculty members in their institutions. Those with masters' degrees account for 44 % of the CIOs and have an average of 16 years in higher education. The majority of the CIOs have graduate degrees with experience as faculty members, industry consultants, as well as military service experience. This is approximately 70 % of the CIOs. The rest of the CIOs, which account for 24.8 %, have bachelors degree with an average of 16 years in higher education prior to their current position. From the data it is evident that the number of years spent in higher education may compensate for the lack of a graduate degree. Experience in higher education is one of the valuable requirements for the CIO position. Those who have been hired as CIOs came through different administrative ranks in higher education and worked their way up to the position.

5.1.6 Number of years as CIO

When examining the number of years of CIOs in the position there was an interesting trend as most of the CIOs' average years in the position were as follows: doctorate (5 years), masters (6 years), and bachelors (6 years). So the average number of years in the position is roughly the same. The CIOs with masters degree dominated the position.

5.1.7 Factors affecting the CIO position

In this study 17 items were identified and ranked by the interview participants. The items were: budgeting, instructional delivery, collaborative workspace, strategic business planning, IT management, management procurement services, customer services & support, distributed IT, leading projects, teaching & learning, research & scholarship, negotiation skills, business processes & operations, integrated information systems, adaptive, building relationships across the university community, and centralizing IT. The Likert-scale was used with five parts: (1) highly important, (2) important, (3) neither important nor unimportant, (4) unimportant, and (5) highly unimportant.

The rankings provided information on the areas of importance that contribute to the hiring or success of CIOs in higher education. The participants were asked to rank the factors critical to the CIO position from highly important to not highly important. The goal was to capture the expectations of the position from the higher education leader and the CIOs themselves. In addition this was to provide detailed information on how the two

leaders understand the position. The factors were based on general knowledge from the pilot study and literature reviewed. Table 1 provides the 5 highly ranked factors by both administrators. These are important insights of how the two leaders view the position.

The top 5 ranked factors by the higher education leaders were extracted to compare and contrast what the two groups (CIOs & Higher Education Executives (Presidents, Provosts, CFOs)) think of the position. There was no difference in their top five ranking factors: building relationships, strategic planning, negotiation, customer service and support, and improving institution business processes and operations. In the CIO section there were a lot of ties compared to the other group. This could be attributed to the fact that the higher education executives were looking for specific areas to make sure the CIOs cover them. From the researchers' interpretation, the ties could be attributed to the specificity of the job on the ground as the executive leaders might be only concerned with administrative and strategic matters from where they sit.

5.2 Interviews extracts and documents analysis

The key extracts from the interview transcripts are presented without reference to participants' gender and ethnic background. The findings are grouped according to three categories specific to the research questions:

5.3 Skills and experiences: Research question 1

The CIOs need to have people skills, good communication skills, and interpersonal skills. They are to develop professional networks and should build good relationships with the

Table 1 Top ranked factors	Higher education executives	Chief information officers		
	Building Relationships Across the University Community	Building Relationships Across the University Community		
		Customer Services and Support		
	Strategic Business Planning	Strategic Business Planning		
	Customer Services & Support	• IT Management		
	Negotiation Skills	 Instructional Delivery 		
		Research & Scholarship		
		Business Processes & Operations		
		 Integrated Information Systems 		
		• Adaptive		
	Business Processes & Operations	• Budgeting		
		Management Procurement Services		
		Distributed IT		
		Leading Projects		
		Teaching & Learning		
		Negotiation Skills		
		Centralizing IT		

campus community. The possession of an advanced degree is key as well as the four attributes "technical knowledge, business knowledge, communication skills, and political skills" (Brown 2009, p. 8). Team development is another most important skill so that the IT department is well positioned within the institution. Learning from the AAU CIOs:

I actually think there are three skills that a CIO needs. I think they need to be good communicators. It's critical in their capacity, to be able to communicate to the broader community about technology issues. Secondly, they need to be able to establish priorities and to develop processes that determine priorities, because obviously, on university campuses, there's high demand for technology and the CIO is continuously being asked to allocate resources to support a variety of different functions. And then the third area is one where I would say they need to also be able to understand when to let go. There are many times where centralization and leveraging of the technology platforms are in the best interest of the university as a whole, but there are also times where allowing people to sort of go their own way, also makes sense. And so I think they have to have that capacity as well.

CIOs are to be good institutional strategist as the university is looking up to them to bring new integrative and dynamic information systems. These individuals are to continuously learn and maintain a reasonable level of technical knowledge so that they help the institution to reach its goal.

...have knowledge of systems and information technology; skills in managing projects, people, resources, and systems; ability to prioritize needs and balance available resources. CIOs have to be good managers to balance all the competing demands in higher education.

In the researchers point of view, the CIOs in higher education should develop a complex leadership perspective with a clear understanding of what the institutions needs are, and how they can be supported through innovative technological means. Having a clear understanding of the institutions' and users' needs enables the CIOs to develop clear roadmaps to optimize the universities' operations, thus, creating value through efficient, robust, and agile processes. Table 2 demonstrates the critical skills CIOs need to have to survive in higher education.

Executives explained that they were not looking for network engineers, programmers, or database programmers, but CIOs who are competent in all technical areas. According to an AAU provost, the importance of technical competence depends on the type of institution and the current IT projects initiated. An AAU Provost insight:

From my perspective, and you have to understand that I think that it's a blend of skills. My belief is that the person ought to be technically inclined or certainly understand all of the technology and how it works together as a tool to support faculty, staff, and students.

Consequently, the Provost viewed the CIO as a blended person with both technical and higher education skills who understood the focus of higher education: faculty, staff and students. Basically, the CIO should converse on different technologies or

Table 2 Summary of critical skills

Interview	Skills
Participant 1	Technically savvy, business savvy, managing others, people skills, strategic thinker, ability to communicate
Participant 2	Strong technical background, understand the business, understand the organization, understand business processes and how new technologies can impact business processes, needs to be able to work with his or her president, with the board, with other colleagues at the executive level and several levels down, explain technology in plain English
Participant 3	Business Skills, well rounded person, someone who understands higher education or is able to quickly learn the ropes in higher education, technical expertise, governance, flexible & adaptive
Participant 4	Good communicator, establish priorities, and develop processes that determine priorities, and understand when to let go
Participant 5	Good communicators, listeners, problem solvers, and be able to collaborate and understand technology
Participant 6	Strong technical background, understanding higher education business, understand the institution organization, understand business processes, and explain value of technology
Participant 7	Gathering requirements or needs and communicating with people all the time, business analyst skills
Participant 8	Governance, Manage IT, and Building Organization

have a working knowledge of emerging technologies. CIOs offered different advice during the interviews to those aspirants on how to stay informed on new technologies:

There's never enough hours in the day, because a CIO has to understand the technologies that are out there, has to understand his or her own institution and where they sit on the broad spectrum of the use of technology. They have to understand their users and what students, and faculty and staff, want and need. They need to understand how to put all those puzzle pieces together, and still keep the old systems up and going till you get the new ones in. It's a huge, sort of vicious cycle.

Beyond technology they must have a good understanding of how the institution functions as it is key in the decision making process. This applies across industries: higher education or corporate world.

An AAU CIO stated that like any other executives CIOs need to learn the organizational structure and adapt accordingly:

CIO's really need to understand the business. I don't care if it's in higher education, or manufacturing, or book selling, or whatever. It doesn't matter your organization. You really need to understand the organization and the work that all of the different people do. How do they use technology in their jobs? Understanding the functional side of the house, understanding how to do work breakdown structures to understand business processes and how new technologies can impact business processes and make things more efficient and effective is extremely important. Those are skills you don't necessarily learn in computer science class. Understanding the business of the institution and committing to all functional units to make things more robust and efficient is important. Thus CIOs need to be attentive to what is going in the IT world so that they continuously bring new innovative ideas on adopting new emerging technologies. Those skills cannot be learned in the engineering school. The challenge to those with solid technical background is to develop soft skills or solid non-technical skills so that they are able to meet all users' needs. Beyond the skills and relationships with the various stakeholders in higher education, CIOs need to build good rapport with the president, board members and other executives. To achieve this it takes "trust and honesty with your counterpart" (Schaffhauser 2011, p. 30). A provost from an AAU institution added:

CIO really needs to be able to work with his or her president, with the board, with other colleagues at the executive level and several levels down, as well as be able to manage their team through thick and thin, because we all know how difficult IT can be. It's a very difficult job. So they really have to have – I guess the third piece is really those people skills.

For CIOs, it is important to be exposed to institutional wide issues; the data showed it was important that people in these positions hold positions outside their niche first (Schaffhauser 2011). Thus, they will develop "empathy for all areas early on and repeatedly" (Schaffhauser 2011, p. 30). CIOs have to be open-minded, adaptive, build a user driven IT department and be able to sell technology to IT governance committee as it is a representation of multiple campus constituencies (Schaffhauser 2011). The researcher decided to engage with the EDUCAUSE findings of the CIO position. EDUCAUSE is "a nonprofit association whose mission is to advance higher education by promoting the intelligent use of information technology".¹ Lang et al. (2009) cited the following skills and capabilities as key to the CIO position (p. 4):

The ability to develop and maintain a strategic perspective that grounds IT in the institutional mission and strategic objective. Communication and outreach capabilities that enable the CIO to frame IT issues clearly, concisely, and in terms relevant to the institution as a whole. The ability to collaborate effectively to leverage shared needs and resources within and beyond the institution, and thus maximize IT's value in advancing higher education.

From the researcher's interpretation, those aspiring to be CIOs need to have a broad understanding of technology and its capabilities, understand business processes and acumen, as well as have experience in higher education. The CIO's characteristics and the institution's business strategy should align to avoid conflicts with competencies. The type of CIO to be hired by an institution is dependent on what the institution needs at that point. As the executive stated earlier, his university needed somebody technical to take the institution to another level. The researcher continues to chronicle in Table 3 the type of experience needed to be hired as CIO in an institution of higher learning. Coming through the ranks as a professor teaching, researching, and publishing is an added advantage to work in an executive level position in higher education. Solid experience in higher education, together with

¹ (n.d.). What is educause? Retrieved from EDUCAUSE website: http://www.educause.edu/

Interview	Professional experience
Participant 1	University work experience of comparable size
Participant 2	Higher education experience
Participant 3	Wide range of experience in the technical field, higher education experience on different levels, strong technical experience in public and private sector
Participant 4	Have a diverse background in terms of being able to understand business processes and being able to understand how to develop technology platforms that can meet a variety of different constituent needs. Strong business acumen is critical
Participant 5	Business analyst type meeting with customers and translating business requirements into technology
Participant 6	Have experience in higher education
Participant 7	Senior IT professional with experience in large-scale project management and be conversant in finance, and policy
Participant 8	Faculty member go through the ranks in higher education

 Table 3
 Summary of expected experience

creativity and good people skills could prove to be critical in navigating the academe. The experience in higher education makes people believe that the CIO subscribes to due process popular in higher education; thus, the aspirant is viewed as a scholar or someone committed to the academic and research mission of the institution.

CIOs have to understand the functions, missions, and priorities of the institution. These leaders have to see the big picture and make sure their priorities and investments are inline with the priorities of the institution. It is vital for those aspiring to be CIOs to have opportunities "early in their careers to develop an enterprise view of the institution; the learning curve is too steep for someone to develop that perspective late in their career" (Lang et al. 2009, p. 5).

5.4 Leaders' perspectives: Research question 2

There are a lot of issues being raised as far as how other executives view the position. The IT departments should not be at all cost centers even though cutting-edge education, research, and administration are dependent on IT advancement. From the data it is evident that the role of the CIO is viewed as a major steward of the university resources. AAU institution executives:

...because of the proliferation of data, and the risks associated with having large data warehouses, university CIO's have had to take on a much more extensive role in managing the technology, and managing the data that is maintained on these platforms, because of the risks that they represent to the university, but also because of the risks they represent to the individuals. I would argue that the Chief Information Officer is no different than the Vice President for Human Resources, or the Vice President for Facilities, in terms of being a major steward of a university resource that is critical to the operations and needs of the community in a broader sense.

Just as good architects produce houses that are far more than the sum of their parts, good IT architectures leverage common standards and consistent strategies to produce more agile, cost-effective IT solutions...I don't expect that process to be easy, but I do think that with the right set of guiding principles—such as a transparent and open, deliberative process—it is possible to be successful.

IT costs a lot of money. It costs a lot of money to buy, to put in and implement, and to maintain over time. So, being able to do all that mathematics, and really being able to sell the projects to get the investment...

One of the executives argued that the position is no different to that of Vice President for Human Resources, or the Vice President for Facilities, in terms of being a major steward of a university resource that is critical to the operations and needs of the community in a broader sense. CIOs are expected to formulate innovative and realistic vision for IT to provide functional units with cost effective IT solutions. So those individuals aspiring to be CIOs will have to seek mentoring to strengthen their capacity so that they function at a strategic level. The demands of the position are very complex yet attainable with the right skills development, experience, mentorship, and training. Those who are getting ready to retire could also share their wisdom by availing themselves as mentors and advisers to individuals and various CIOs forums or organizations.

With all the training, experience, mentorship and skills, it is imperative that the CIOs "understand technology in the context of the university mission" (Lang et al. 2009, p. 5). Being able to communicate from different perspectives is key so that all constituencies have an understanding of the value of IT investment and the cabinet members can buy in. According to Lang et al. (2009), "we should be preparing future CIOs under the assumption that they will be sitting at the cabinet table, and therefore think about what it means to be at the cabinet table" (p. 5). From the researcher's perspective, as the position is being escalated to the executive suite, those in the position and those aspirants have to dynamically connect with the institutional business and information technology. In the boardroom, it is important that they help all stakeholders within the institution understand the value received than the funding being allocated on various IT projects.

Understanding the unique and complex culture of higher education is important so that navigating the environment would not be so difficult. Such exposure enables those in the position to make necessary adjustments according to the needs of the institution. Those aspiring to be CIOs coming through the ranks in higher education could help them develop an overall institutional view earlier on in their careers and once in the position would understand the importance of creating opportunities for IT professionals to further develop their skills (Lang et al. 2009). Developing such skills earlier on is key as "the learning curve is too steep for someone to develop that perspective late in their career" (Lang et al. 2009, p. 5). The researcher in Table 4 provides the summary of how other executives view the position.

From Table 4 it is evident that the position demands an individual with multidimensional views so that right decisions can be made with limited data. The key is for the CIOs to be visionaries with strong leadership skills so that institutions realize

Interview	Role of CIO
Participant 1	Leaders with extraordinary effects on the followers, the environment, and the social system as the position impacts all constituencies on campus, IT oversight committee, awareness of future trends in IT
Participant 2	Computing infrastructure, compliance, IT management, risk management, IT strategic planning
Participant 3	CIO has to understand the technologies that are out there, has to understand his or her own institution and where they sit on the broad spectrum of the use of technology. They have to understand IT users need. They need to understand how to put all those puzzle pieces together, and still keep the old systems running
Participant 4	Because of the development of large business bay systems, because of the perforation of data, and the risks associated with having large data warehouses, university CIO's have had to take on a much more extensive role in managing the technology, managing the data, and managing Risks
Participant 5	It is an interesting job. Understanding the mission, communicating, understanding the business that we are in and what we are supposed to be doing. Governance is so important to a CIO's success and there is a lot of people who say they don't have time for it or it's too hard or it doesn't work.
Participant 6	IT strategic planning align with university objectives and mission, and keep all technology units running
Participant 7	Change agent, IT visionary, IT strategic planning, support instructional delivery, and research
Participant 8	Be able to manage IT and keep in touch with all IT users campus wide to determine their needs. Be a change agent

Table 4 Summary of views from higher education executives

value-on-their-investments. Bringing the right technology to enhance users' satisfaction and transform business operations of the institution can be a differentiation factor of the institution. The only way to know is through collaborative efforts with stakeholders across campus making sure that technology meets various needs of the institution. Such activities are critical to the institution's success as CIOs "learn how to work together with other people to understand how things work and how to work with other people that we've never worked with before [are critical skills]" (Lang et al. 2009, p. 5). The position is viewed beyond the walls of the IT department. Another emerging theme in this section was that CIOs may be viewed as change agents. Change agents are associated with transformational leadership style and sometimes labeled as Chief Transformational Officers (Bass and Avolio 1992; Shamir et al. 1993; Bass 1998; Avolio and Gibbons 1998). Chief Transformational Officers are supposed to be operationally and strategically sound with excellent negotiation skills (McGee 2008; Brown 2009; Wailgum 2009; Nash 2009).

Governance was another emerging theme in this section, which is a popular concept in higher education. The American Association of University Professors (AAUP), the American Council on Education (ACE), and the Association of Governing Boards of Universities and Colleges (AGB) formulated the institutional governance statement, which is well cited in higher education. The institutional governance statement provides "clarification of the respective roles of governing boards, faculty, and administration" (American Association of University Professors 2006, p. 135). The statement basically advocates for an inclusive decision making process even as colleges and universities are becoming less autonomous. Birnbaum (2004) described the term "governance" as a system that gives structures and processes to an academic institution for "organizational control and influence" (p. 2). The emerging themes provided the researcher with new viewpoints on the CIO position.

The emerging themes confirm that the CIO role is becoming less of a technologist and more of an institution strategist and change agent. Even after landing the CIO position it is important that they continue to adapt and acquire a new set of skills to meet the institution's needs. The cabinet in an institution of higher education views the position as key to transforming IT from being cost centers to a strategic driver. In the last five years IT funding has been the top issue in higher education (Maltz et al. 2005; Dewey et al. 2006; Camp et al. 2007; Allison et al. 2008; Agee et al. 2009; Ingerman et al. 2010). The poor communication of value on IT investments prevents faculty, staff, students, and other executives from elevating the value of IT. Milne (2010) claim, "shifting the strategies for IT executive communication is one key success factor needed to rebuild confidence" (p. 2). CIOs need to provide value measures so that the campus-wide community has a yardstick to perform its own evaluations. One CIO said:

"Over the past three years my role has broadened.... I don't just worry about IT, I worry about things around the entire campus... My focus has shifted towards doing technology work that is aligned with the mission of my university.... The new focus is technology for advancing the mission of the institution rather than technology for the sake of technology"

Schaffhauser (2011) cited the following factors in Table 5 as "The CIO needs from the CFO" and "The CFO needs from the CIO" to ensure a successful relationship between CFO and CIO (p. 30):

The CIO needs from the CFO	The CFO needs from the CIO		
High-level understanding of core technologies and underlying complexities to set realistic expectations and discuss strategic options	An institutional perspective that directs technology decisions toward strategic priorities		
Assistance in gaining buy-in for technology that meets strategic objectives, to assure wide adoption	A complete analysis of new initiatives that encompasses costs, ROI, return on value, options, issues, and potential pitfalls		
Help in managing expectations, especially for projects that address long-term objectives	A proactive approach to communications with others in the institution and use of governance structures to gain consensus		
Approval of funding for proposed solutions, as well as documented analysis of service improvements, investment returned, etc.	Realistic assessment of current IT skills and steps to filling the skills gap		
Acceptance as a strategic business partner and collaborator	A business and entrepreneurial mentality		

Table 5 CIO & CFO interrelationship

From Table 5 it is evident that the relationship between the two executives is imperative. Building those relationships and communicating on decisions being made in the IT department are important. In any institution, the CFO is the steward for all finances, so CIOs needs to be communicative on any IT strategic plan, and the plan should be backed by realistic return on value. Having learned about how other executives and CIOs themselves view the role of the position, in the next section the researcher looks at what is expected from CIOs.

5.5 Expectations from university executives: Research question 3

The position requirements are too broad, which can complicate the expectations of those aspiring to the position. In previous sections, the researcher learned how the CIO coordinates events throughout and beyond the boundaries of an institution. As the position experiences institutional ascension, CIOs are to constantly evolve. The position came to being as concerns came up of the disconnection between the institutional needs and information technology implementation widened. More time must be devoted to relationships building, leadership development, and cultivating a healthy environment. Lastly, embracing ambiguity is another expectation, as there is no formula to follow in the position. Brown (2004) cited the position as the "classic IT support provider" so the expectation is that it is the CIO's responsibility to respond to departmental needs (p. 30). For them to navigate such a unique and complex environment, the CIOs need to be in shape: mentally, physically, and spiritually. The CIOs are to maintain a robust IT environment so that the institutions they work in achieve competitive advantage. One seasoned AAU CIO claimed that,

Few higher education institutions have ever consciously decided how IT governance is actually going to work...I think one of the key points to get sorted out is who makes the decisions. I think the second thing with the CIO is being strong enough to be able to influence the conversation at the university. For example, I suspect if you ask any faculty member or student if they think that big paper text books are the wave of the future or they think that E-readers and digital content or more likely to grow over the next three years, I think that you would get a pretty strong answer that most people think that a lot of course materials will go digital. Maybe not all at once, but over the next three years a lot of that is going to happen. So now look around, who's going to lead that, how is that being led?

In cases whereby an institution has not decided on IT governance, it is the CIOs business to make sure there is a strategic plan in place to guide their IT initiatives. As the CIO, waiting for somebody else to do it or sanction it could be a bad decision. Engaging faculty, students, and staff in social dialogue on their IT needs would be of great value as all the projects initiated would be backed by the university community. The position is demanding movers and shakers who have moved away from simply administering hardware and software. These would be individuals on a life long learning track and committed to a career as CIOs. The individuals have to continuously learn from all constituencies. Higher education executives continue to offer some advice:

Work with all constituencies across campus identifying the best way to provide efficient IT solutions...mapping users need to IT capabilities...have to be able to manage contracts and keep up with federal and state legislation so that the institution is in compliance at all times.

Serve as highly visible technology educator, respond to educational initiatives...provide excellent services to students and faculty and be fluent in higher education language.

In this case the CIOs need to continuously listen and understand what the stakeholders are saying is important. The direction of IT investments could be driven by facts as the CIO continues to improve the institution's functional units and establish long-term goals for information systems, thus making sure that the information system infrastructure and services are in sync to meet institutional needs. CIOs should position themselves well in an institution and be effective communicators, accountable for their performance, establish strong teams, translate IT issues and needs into institution business value, build trust across campus, as well as have sound business practices (Quish 2007). From the expectations, it is evident that CIOs must have highlevel knowledge and skills in IT and university wide functional areas. Now it is obvious that coming through the ranks in higher education is critical for those aspiring to be CIOs. Table 6 provides brief summaries of what we learned from higher education executives

Executive leadership in higher education sighted opportunities in leveraging technology to drive the core mission of the university. This can be achieved through

Interview	Expectations of CIO
Participant 1	IT resources management, making sure IT environment is secure, IT centralization, making sure information system is always up and running, bring new technologies to improve university business processes, instructional delivery is very important for eLearning, integrated information systems
Participant 2	Provide strategy and technical directions, secure student information systems, technology to enhance teaching and research, secure network environment
Participant 3	Understand IT users and what students, and faculty and staff, want and need, innovative use of technology in the classroom, improve institution competitive advantage in their business processes, secure network environment
Participant 4	CIO's have had to take on a much more extensive role in managing the technology, and managing the data and ensure the university that the technology is working like it is suppose to.
Participant 5	Change agent, technology to add value to the institution mission and business, secure computing environment, secure network environment
Participant 6	IT strategic planning, IT governance, IT as an agent for change, agility and innovation, secure network environment
Participant 7	IT governance, efficient IT organization, systems always up and running, secure network environment, IT investment decisions
Participant 8	IT governance, managing IT, making a case for money, making a case for consolidation, influence conversation, secure network environment, make decisions

Table 6 Expectations of the CIOs from higher education executives

incremental improvements on the institution's business operations. Mead and Shoemaker (2007) cited two competencies essential to CIO alignment: "strategy and governance" (p. 31). With Mead and Shoemaker (2007) and Table 4, the buzz-words are strategy and governance. The position portfolio demands a highly integrated experience involving business and technical preparation (Mead and Shoemaker 2007). From AAU CIO:

...build relationships with all constituencies on campus; serve all customers (students, faculty and staff) with commitment and passion; and lead, don't be afraid to take some risk.

From Quish's (2007) observation, "the best kind of CIO is a survivor" (p. 3). For CIOs to meet the expectations they have to build formidable IT teams to meet the demands and expectations of the university community. The researcher observed CIOs need to be in the forefront initiating programs, driving agility, cultivating campus wide business relationships, strategic thinking, building great teams, managing IT risk, managing IT resources and continuously learn and develop. Those who hire CIOs value: people skills, knowing when to let go, going through the ranks as faculty, making a case for money, and making a case for authority. All the attributes cited by the higher education executives require CIOs to build trust with all stake-holders, and maintain a positive and fluid relationship with them.

Kellen (2007) stressed that CIOs should possess deeper technical understanding as "those IT executives without some core of deeper technical understanding frequently feel handicapped in assessing situations and shaping the course of action" (p. 7). Vince Kellen, Vice-President of Information Systems and Faculty member at DePaul University, identified nine concepts from the literature that CIOs should master: "governance, communication, collaboration, understanding, influence, relationship building, self awareness, social skill, and service" (Kellen 2007, p. 9). These concepts are consistent with the researchers' findings on the skills and expectations of the CIO position. From the researchers perspective, with all the expectations and requirements of the position, it will take more than training and reading. Those aspiring to be CIOs need mentorship and practice to prepare for the complex position.

6 Discussing the findings

The results show that 94.8 % of CIOs in AAU institutions followed the traditional path to become CIOs in their institutions. The traditional path comprised of scholar and steward (Birnbaum and Umbach 2001). A scholar is someone who has served as faculty then rose through the administrative ranks with increasing responsibility in their institution (Birnbaum and Umbach 2001). According to Birnbaum and Umbach (2001), stewards were "never taught, but their two prior positions were in higher education" (p. 206). There were only 5.2 % of those who followed the nontraditional path to the CIO position. The 5.2 % according to Birnbaum and Umbach (2001) are considered strangers, as they have no prior experience in higher education. The career path seems to be an influencing factor in the appointment of CIOs in AAU institutions. About 74.5 % of those who followed the traditional path have graduate degrees:

30.9 % (Ph.D.), 43.6 % (Masters), and 25.5 % (Bachelors). The CIOs have significant experience in IT from higher education or outside higher education, as well as significant experience in higher education through professorship or stewardship. The professorship and stewardship concepts emerged on the different paths taken by current CIOs to the position.

The CIO position is viewed in the executive boardroom as the strategic business position in the IT functional unit. The position brings a different layer of management in the boardroom, as CIOs are expected to bring the right technology on campus to enhance functional units, research, and teaching. Leaders in higher education are looking for: measurable value for IT in the university, well managed IT, technology that delivers effective and efficient services, accountability for information systems performance, and sound IT policies. CIOs are to provide both business and technical directions in an institution of higher learning and deliver information to users, set priorities for IT project initiatives, evaluate, and improve the functional units through robust and secured information systems. Most importantly, they are to improve instructional delivery, information delivery, and translate IT issues into institutional needs.

From comparing and contrasting the findings from the literature and position requirements, it seems that the CIOs need to be very strategic, adaptive, highly educated, and have vast experience in leadership and management. From the two categories (traditional and nontraditional), those aspiring to be CIOs need to figure out where they belong and then seek training to make up for what they lack. The CIO's daily activities are no longer operational, but strategic IT management. They are expected to drive institution business and adopt best practices so that the institution enjoys competitive advantage among other institutions. Leaders expect CIOs to bridge the gap between IT and the institution business operation. The CIOs are to manage IT resources, make sure the information system is always up and running, manage data, IT governance, influence IT value conversation, and sometimes make tough decisions. There is also a demand that CIOs get the finances right, build strong IT teams as well as get the authority right in IT governance.

It is evident that CIOs are to understand higher education as well as be technically savvy, business savvy, well rounded individuals, good listeners and good organization builders. The possession of an advanced degree is key as well as the four attributes "technical knowledge, business knowledge, communication skills, and political skills" (Brown 2009, p. 8). Team development is another most important skill so that the IT department is well positioned within the institution. CIOs are to be good institutional strategists as the university is looking up to them to bring new integrative and dynamic information systems. Basically, CIOs need to be able to transform IT value into institution information to be communicated in the boardroom and the campus at-large. Failure to communicate with the campus community, build rapport, as well as manage risks and every contingency of IT operation could lead to poor performance.

To successfully navigate the higher education environment individuals need to be strategic, adaptive, and open to criticism. With the growing of new robust technology, those in positions of authority could not impose to the university community as that could be viewed as an effort to sabotage the due process in decision-making. For example, the emerging and growing Web 2.0 technologies have a lot of capabilities and could add value to the campus community. The campus community might not understand the value to be added by the Web 2.0 technologies; in that case the CIOs were their IT evangelist hat educating the campus stakeholders on the new tools. CIOs are still to perform the roles cited by Brown (2004): business partner, classic IT support provider, contract oversight, integrator, informaticist, IT strategist, and IT educator. As the researcher mentioned earlier, the CIO position has grown, and in addition to six roles identified by Brown (2004), the CIOs have more roles. The new roles are IT managers, risk managers, resource managers, IT evangelists, chief transformational officers, motivational speakers, budget managers, and systems and financial analysts.

With all the new roles, the CIO position is experiencing evolution, thus from the researchers perspective, the individuals aspiring to this position need to posses both transactional and transformational leadership skills. The CIOs are expected to manage, organize, influence, connect, have high ethical and moral standards, motivate, inspire, empower, and create value (Bass and Avolio 1992; Bass 1998; Avolio and Gibbons 1998; Dvir et al. 2002). In the aspirants quest to ascend to the position, they need to be well versed on modern organizational theories that could be their leadership framework as they promote inclusive decision-making processes, collective participation, trust and mutual confidence between followers and leaders, as well as maintain open communication on different levels of an organization instead of focusing on higher authority (Shepard 1956; Rogers 1995; Valente and Rogers 1995; Valente 1995). Valente and Rogers (1995) observation was, social contacts, social interaction, and interpersonal communication are very important influences on social change.

Higher education experience was highly valued in this role as CIOs work with faculty, students, alumni, staff, States board of regents, provosts, university board of trustees, donors, and presidents. Those aspiring to be CIOs need to have an understanding of how higher education works, especially the decision-making process. According to Schein (2004) the cultural phenomenon is important; "if we understand the dynamics of culture we will be less likely to be puzzled, irritated, and anxious when we encounter the unfamiliar and seemingly irrational behavior of people in organizations" (p. 10). As CIOs engage in an IT evangelical mission to promote technological initiatives that effectively transform both academic and administrative units, they need to have a deeper understanding of higher education culture. Those aspiring to be CIOs could adopt the Burke-Litwin model as their conceptual framework to view an institution of higher learning. CIOs need to make sure that there is a high degree of centralized coordination to attain maximum reliability and efficiency. Most AAU institutions have a significant research mission, so growth and development of technology resources might depend on the support provided by the CIO office.

Table 7 The four career paths tothe CIO position in highereducation	Higher Education	Higher education Scholar	Higher education Spanner	Industry
		94.8 %		
	Higher Education	Steward	Stranger	Industry
		5.2 %		
		Higher Education	Industry	

7 Conclusion

The key themes that came from the study were communication, building relationships, IT strategic management, IT governance, people skills, knowing when to let go, being flexible or adaptive, and budgeting. There was congruence on the skills, experience, roles, views, and expectations of the position from the CIOs and leaders in higher education. The congruence signified an important factor in the executivelevel of academic institutions' understanding of the position. The engagement of executive-level search firms and consulting groups in the hiring process does not make those decision makers passive in their final choice. Based on the position requirements, the skills and experience requirements, expectations, and the role the position plays, the researcher recommends the following strategies to those who are aspiring to be CIOs:

- 1. Finding mentors who are in the position already and learn from them about the position intricacies
- 2. Higher education experience is very important in the position especially coming through the ranks in higher education is critical
- 3. Attend CIOs training institutes, join CIO forums and organizations
- 4. There is no specific formal field of study but a 10 plus years in management is essential with a business-oriented graduate degree to develop strategic thinking skills, team building skills, interpersonal skills, and management skills
- 5. An analyst position with deeper insight into technology would be an added advantage
- 6. Be politically savvy, business savvy and technically savvy
- 7. Experience in IT management in higher education and/or corporation is important

The CIOs must be both transformational and transactional as they govern in higher education. Both leadership styles bring some good characteristics as transformational leaders never leave an environment the way they found it, while transactional leaders believe in gradual and evolutional change (Senge et al. 1994). There is no absolute voice in higher education, so autocratic approach or benevolent autocracy have no room, as they do not support a social system. The participatory approach values all constituencies and is policy-driven, thus suiting the higher education environment. CIOs in AAU institutions followed the scholarly path in the traditional category. A scholar is someone who has served as faculty then rose through the administrative ranks with increasing responsibility in their institution (Birnbaum and Umbach 2001). Those who were strangers in AAU represented only 5.2 % of the CIOs (Birnbaum and Umbach 2001). From the researchers' perspective, there are similarities to the career paths to be an AAU CIO and president in colleges as studied by Birnbaum and Umbach (2001). Table 7 depicts the four career paths of CIOs in higher education.

As the position evolves it is evident that the position will continue to change as the university community demands more advanced and sophisticated computational applications. The IT value forum identified four fundamental challenges in IT investment conversations: "defining value, confronting what is required to realize value, structuring the IT value discussion, as well as measuring and communicating value" (Goldstein et al. 2003, p. 14). The need for transformational CIOs is inevitable

as the IT investments decision requires broader participation and shared accountability. It is important that CIOs maintain the equilibrium between IT investments and the core mission of the university. The results may not be generalized to other institutions as classified by the Carnegie Foundation for the Advancement of Teaching (2010) since the focus was on CIOs in AAU institutions. AAU institutions are dominated by top research public and private institutions. Nonetheless, the results may still be of great assistance in understanding the CIO position in higher education.

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