THE EVOLUTION OF THE HIGHER EDUCATION POLYMATH:

HOW THE ROLE OF THE CHIEF INFORMATION OFFICER IS BEING IMPACTED BY INFORMATION TECHNOLOGY INDUSTRY FORCES

Jerome P. DeSanto

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Supervisor of Dissertation:

_____
Blake Alan Naughton, Senior Fellow in Education

Dean, Graduate School of Education:

_____
Andrew C. Porter, Dean

Dissertation Committee:

Blake Alan Naughton, Senior Fellow in Education
Laurence Moneta, Adjunct Associate Professor of Education
Rodney S. Tosten, Professor of Computer Science, Gettysburg College

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DEDICATION

To Lynn:

For your countless sacrifices, encouragement, and support.

My success to a substantial degree is due to your love, patience, and positive influence over my life in innumerable ways.

To Erica, Rebecca, Jay, and Jeffrey DeSanto:

Thanks for showing faith and confidence in me and expecting me to excel.

Every day you make me proud.

and

To all my colleagues and friends:

For your unwavering confidence in me and for providing me assistance in achieving success in this educational and scholarly endeavor.

ABSTRACT

THE EVOLUTION OF THE HIGHER EDUCATION POLYMATH:
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Jerome P. DeSanto

Blake Alan Naughton

The role of Chief Information Officer (CIO) in the higher education space is receiving increasing attention of late. Relatively nascent and sometimes mysterious, the individuals occupying this role need to possess an ever-evolving set of talents that could characterize them as renaissance men and women, or polymaths. The information technology (IT) industry that is principally responsible for defining the work of the CIO is changing at exponential rates with no respite in sight. How is this hyper-changing IT industry impacting the individual with overall responsibility for providing vision and leadership, as well as delivering a portfolio of mission-critical services to their college and university? Undoubtedly, this phenomenon elicits descriptors like uncertainty, agility, adaptability or even controlled-chaos. In recent years several emergent forces have prevailed, which promise to change the IT industry in profound ways, and the CIO role in ways never before imagined or experienced. These forces and how the CIOs react to them could very well permanently alter the CIO profession propelling it on a trajectory to an unknown destination. This research focuses on the higher education CIO role and examines its evolvement over its relatively short history. Furthermore, this study considers the group of IT industry factors that are most influencing the evolution of the role, and assesses how the higher education CIOs are reacting to them. This study offers evidence-based assessments about the role in current day, and traces its

projected advancement amidst the uncertainty of what lies ahead. Ultimately, the future relevance of the role is analyzed and evaluated.

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CHAPTER 1

INTRODUCTION

> The Polymath tries to exercise all parts of the brain. It is more than just acquiring general knowledge, not essentially memorization although some ability to remember is required. The polymath seeks to develop a highly tuned mental processing unit, which is really the computer everyone should be most concerned with. The polymath seeks to preserve consciousness. It is the mind in control of emotions, but also the genuine integration of feelings and sensibilities with thought. So the polymath is also a poet, a composer, an artist, or a novelist perhaps (Polymath Society International, 2011).

There are myriad ways of describing the role of the CIO in higher education. A polymath, who is an individual of multiple, complex talents, seems apt. A moving target for sure, the role is evolving at a pace that has never before been experienced, and the Information Technology (IT) industry factors serving as catalysts for momentous change are multiplying and gaining increasing traction.

"The CIO role is undergoing a significant shift brought about by the recession, globalization, the advent of cloud computing, the explosion of big data, shifting business demands and the omnipresence of consumer technology" (Levinson, 2011). So, how is this shift impacting the CIO role, specifically in higher education? What does the future have in store for current and aspiring higher education CIOs? Who is best suited to take on this responsibility as CIO in the higher education realm? Is the higher education CIO really an endangered species (Carr, 2003)? This research project is intended to address these as well as other related questions.

"As today's workforce transforms into a highly mobile and collaborative environment, the line dividing consumer and professional technologies blurs" (O'Brien, 2011). Individuals on college campuses are purchasing smart phones, laptops, and tablets expecting to mirror the experience on campus with that in the consumer space (O'Brien, 2011). This is known as the consumerization of Information Technology (IT)

and is significantly impacting the continually evolving role of the higher education Chief Information Officer (CIO), who is broadly responsible for technology adoption and integration on college campuses.

The genre of consumer technologies is beginning to redefine teaching, learning, and recreation on the typical college campus (Perry, 2011) (Gawelek, Spataro, Komarny, 2011). Consumer grade technologies are also beginning to flood into the administrative functions of the college enterprise. Secondarily, but a very critical component of this movement is the consumer familiarity and knowledge development that accompanies this movement. No longer are these devices considered “black boxes,” foreign to everyone but IT professionals. The users of these technologies have become quite sophisticated in a relatively brief period of time, and their learning curve is shortening making technology adoption much easier.

Microsoft’s take on the movement is quoted as follows:

> The reality is that many of us have powerful computer systems at home, and social computing tools like MySpace, Twitter, blogs, etc. are part of our everyday lives. As technology plays an increasingly important role in our personal lives and we become accustomed to the power, convenience, flexibility, and connectedness of consumer technology experiences, we want those same capabilities to help us at work. However, in most cases we aren’t being given the tools (Foley, 2010).

Notwithstanding this critical movement, the higher education CIO role is also co-existing with a number of other striking changes and pressures such as budget constraints due to the current economic downtown, virtualization, the cloud, and information security. The role is functioning amidst these swiftly emerging and swirling forces and thus are worth major consideration in this research.

This study is being undertaken to address the following research question: How is the rapidly evolving role of the higher education Chief Information Officer (CIO) being influenced by the explosion of the Information Technology (IT) consumerization

movement as well as contemporary IT influences such as budget constraints due to the economic downturn, cloud computing, virtualization, and information security issues. Ultimately, through synthesis and analysis, this study will also address the controversial issue of the continued viability of the role, and whether the role operates fundamentally in the strategic realm or operational realm.

The CIO role in higher education has evolved and adapted substantially since it was initially founded and launched in the mid 1980's. The progression of the role has paralleled the hyper-changing IT industry, from which it derives its relevance. The higher education CIO role has responded to the call of higher education leadership, which sought to integrate IT into its essential teaching, learning, research, and business activities.

The current aforementioned IT industry pressures on the role present a unique opportunity to gauge its current status as well as its hypothesized future state. Although this role and the variety of forces affecting it are being increasingly discussed and written about, present-day studies delving deeply into attempting to understand the perspectives of those closest to the action and most invested in the future of the role are few and relatively inconclusive and incomplete.

As a higher education CIO, I have witnessed considerable change over a twenty year period. During this time I've observed and experienced much about IT and the CIO function. The most paramount of these lessons is the fact that the profession is continually in a state of flux and that many external, uncontrollable factors emerge rapidly and have been instrumental in impacting the role. The current set of forces as articulated in my research questions are poignant and interrelated. There is an unmistakable complexity to them when viewed as a group, which makes this study timely and intriguing.

This study will advance understanding and appreciation of this profession for those particularly interested in the recruiting, retaining, and positioning of this role in the higher education enterprise. In addition, and equally important, this study will produce findings that will influence and encourage senior higher education leadership to plan for the future progression of this role as opposed to simply allowing it to morph to new forms as the winds of change persist. If the profession is leveraged in a deliberate, planful manner it can without doubt continue to contribute greatly to advancing the mission of the higher education industry, which is currently experiencing unprecedented levels of scrutiny and pressure. The CIO role is synonymous with change, and change is being demanded of higher education as an industry, where change is perennially elusive (Goldstein, 2008). So first understanding and appreciating the role, and then leveraging it optimally should generate great benefits for higher education.

CHAPTER 2

REVIEW OF LITERATURE

This literature review synthesizes applied research, the variety of assessments, and writings that relate to the Chief Information Officer (CIO) in higher education profession, as well as the major IT industry factors currently impacting this profession: the consumerization of Information Technology (IT); cloud computing; virtualization; information security; and budget constraints. The IT industry is quite young and the CIO is an adolescent role. However, the velocity of change affecting the industry and this role makes for a very wild and unpredictable ride to a destination that is yet unknown. Much has been chronicled to date on this topic, but gaps in the literature will also be revealed and discussed in the appropriate sections of this review.

The CIO Role in Higher Education

The CIO is a unique higher education institutional profession much akin to the CFO (Chief Financial Officer) or CAO (Chief Academic Officer). Most campuses have only one CIO with the mandate to be technology scanner, evaluator, and gatekeeper (Earl, 2000). As a scanner the CIO must maintain currency in the IT field by being ever vigilant of new developments that might impact the internal environment. When faced with a decision, CIOs typically have many options to choose from. Careful evaluation of choices based on such factors as vendor reputation, industry analyst recommendations, price, serviceability, reliability, scalability, fit, and instinct characterizes the CIO's role as evaluator. The CIO as gatekeeper, once a critical role, is waning somewhat in significance as customers are increasingly becoming more engaged and independent IT procurers and users. However, CIOs are still relied on to author and enforce policies designed to ensure the access to and operation of information systems, and protect the

information assets of the institution they work for. The CIO role is embryonic relative to the long, storied history of higher education. Existing for only about 35 years this role has evolved at an unprecedented rate. Although there isn't definitive data on how many higher education administrators hold the CIO title and possess the requisite portfolio of responsibilities, Wayne Brown of the Center for Higher Education Chief Information Officer Studies (CHECS) estimates that there are approximately 1500 American colleges and universities that currently have a Chief Information Officer (CIO) (Brown, 2009). The position is extremely complex and the professionals serving in this capacity are equally complex (Brown, 2009). Technical prowess aside, the successful higher education CIO has a foothold in almost every aspect of the university enterprise, and therefore is required to possess a certain level of fluency in multiple fields across the enterprise.

The higher education CIO must meet the needs of myriad stakeholders with much less resources than his corporate counterpart (Lineman, 2007). Implicit in this assertion is the idea that the higher education CIO is faced with competing priorities for scarce resources, therefore producing tougher choices. CIOs are ever mindful of stretching limited resources and engaging their customers in meaningful conversations about choices, which is commonly dealt with through an IT system of governance, where priorities are commonly discussed and consensus reached (Weinstein, 2002).

The role is multifaceted and the demands and expectations of a higher education CIO are immense (Lineman, 2007). Typically this role in higher education includes overall leadership responsibilities for the following: Administrative Computing; Academic Computing; Research Computing; Networks and Telecommunications; and Instructional and Media Services. At many institutions additional functions such as central printing, ID card systems, and campus mail can be found under the aegis of the CIO. Whatever the

final complement of responsibilities, the role requires a unique blend of knowledge and talents to execute optimally.

There are numerous factors that can be studied that are directly and indirectly impacting the evolution of this role. To provide proper context it's important to examine where this profession originated from, where it stands today, and what drivers are most shaping its future. This literature review attempts a construction of such a historical and contemporary mosaic.

The Evolving Profession

CIOs in the higher education industry began to appear in the early to mid-1980's (Penrod et. al.,1990). The role developed rather logically and naturally as a result of the convergence of rapidly emerging technologies, heightened institutional desire to leverage IT in teaching, learning, and management of business processes, appreciation for the need to centrally coordinate such activities, and control the precipitous escalation of IT related costs. Early CIOs were typically appointed as colleges and universities saw the value in merging administrative and academic computing organizations into a single, unified structure (Penrod et. al., 1990). Telecommunications, instructional technologies, and numerous other related functions were incrementally drawn in. At many institutions IT director-level positions were upgraded to assistant vice-president, associate vice-president, and vice-president level positions in acknowledgement of the augmentation of the scope of the position (Penrod et. al., 1990). Central coordination made sense since so many of these functions occurring across a college or university campus were related, many of which could be shared. The campus network is a prime example of a critical shared resource. Managing multiple technology infrastructures and service catalogues with associated staffing and organizational support systems would otherwise result in unnecessary redundancies that would only serve to support the notion of

provincialism, not to mention the duplication of costs and effort. Higher education is no stranger to either of these occurrences.

The role of CIO began to receive some earnest attention from interested observers beginning in the early 1990's. Limited primarily to higher education IT advocacy and think-tank organizations, the emergent research was fundamentally focused on the presence and anticipated growing significance of the role. A defining early paper entitled "The Chief Information Officer in Higher Education" published in 1990 by *CAUSE*, a predecessor organization to *EDUCAUSE*, set the stage for a few more studies spotlighting this role. Penrod, Dolence, and Douglas spearheaded the most comprehensive survey of higher education CIOs ever conducted, and then reported their findings in this paper. Signifying how nascent the role was at this time, the authors estimated that there were approximately 200 higher education administrators in the CIO role in 1990.

The authors highlighted a framework introduced by Linda Fleit in the 1988 *EDUTECH Report* that could be used to categorize and define the role of the CIO through an institutional lens. This framework described the varying CIO roles in three types of colleges and universities: Information strategist/architect, custodian of machines and data, and technology problem solver. Even in these early days the role was being birthed and nurtured along a continuum that ranged from strategic (strategist/architect) to tactical (custodian) to operational (problem solver), largely dependent on the institution where the role was being established. Rounding out this framework were the title/position, reporting line, influence, responsibilities, background and experience, and degree requirements.

This paper further spoke of the evolving nature of the role, the paradigm shifts that were occurring in leadership and management of higher education IT, and the

unique qualities and functioning of this role that were largely circumscribed by individual institutional needs and perspectives. Fundamentally, the purpose of this paper was to report on a new rapidly emerging profession. With the accelerating expansion of information technology on college campuses occurring, it followed that a competent professional with considerable power and influence would have to be appointed to lead and manage these efforts.

Despite the mounting supporting evidence for the validity of the role the Penrod paper did identify a minority of dissenting opinions. The dissenters posed such arguments as: the forces of decentralization are so powerful that the role would never stick; the role was a reflection of mere title inflation; the role was a figment of technology vendors who wanted to sell more enterprise-level solutions at luxury prices; and colleges have issues with “chief” roles, which are antithetical to the higher education culture (Penrod et. al.).

Another way of looking at the CIO profession is through the lens of a researcher’s framework. Barley’s 1992 paper entitled *Technization of the Workforce and the Occupationalization of Firms* offered a framework that described the characteristics of professions, crafts, and technical occupations (Barley, 1992). The coincidence of this paper with Penrod’s study is interesting in that Barley’s characterization of technical occupations appears to be spot on with respect to the CIO role. Most prominent of Barley’s assertions are: “People in technical occupations possess esoteric knowledge and skills, and tasks that involve heavy mental and analytic components” (Barley, 1992). Although there have been studies that examine the management and leadership attributes that lead to CIO success, this is an area of inquiry that is worth further exploration.

In more recent years the role of the CIO in higher education continues to garner considerable attention based on the increasing volume of writings about the profession that appear in a variety of professional higher education trade journals. This is largely due to the ascension of the role in the higher education administrative hierarchy, the influence and weighty financial oversight the position wields, and the institutions' heavy reliance on the products and services the CIO and his organization provide. Despite the attention, much like the traditional mystique surrounding IT, this role is still not universally understood.

Another framework for describing the dominant role of the higher education CIO surfaced from an annual survey sponsored by the Center for Higher Education Chief Information Studies (CHECS) (Brown, 2009). Dr. Wayne Brown used the results of his survey to build an alternate framework, which attempted to describe the roles of higher education CIOs by the following six categories: business partner, classic IT support provider, contract oversight, informaticist and IT strategist, integrator, and IT educator (Brown, 2009). All higher education CIOs are known to perform these functions in varying degrees. Business partner refers to the alignment between business functional needs and IT solutions. The classic IT supporter speaks of the traditional role of deploying technology solutions to solve problems. CIOs increasingly are expected to possess the skills to navigate complex technology contractual provisions. The informaticist emphasis deals with the CIO as information classifier, organizer, and producer. Strategist roles are synonymous with planning and execution. Integrators take disparate systems or solutions and make them interoperable. Finally, the IT educator describes the never-ending practice of providing guidance and instruction to customers on IT technical topics. Brown's 2009 survey ranked each of these roles by relative importance and effectiveness. The survey respondents included CIOs and the

primary customers that CIOs serve. The results singled out classic IT support provider and contract oversight as the most important CIO roles. However, according to Brown's research, CIOs would rather spend their time in the roles of integrator and IT educator (Brown, 2009). This illustrates an incongruity between what higher education CIOs are spending their time on and what higher education CIOs would rather be spending their time on.

Reflecting on the findings in the Penrod study and the Brown annual surveys, one can readily deduce that the role has similar but not precise sets of responsibilities across different institutions of higher learning. However, one could reason that the role is as diverse as the institution it serves. The evidence supports that the overall portfolio of CIO responsibilities has expanded in scope, depth, and importance. Finally, it's obvious that the early dissenters were misguided about their assertion that the CIO role was simply a fleeting fad (Penrod et. al., 1990). On the contrary, the role had become meaningful, vibrant, and respected, evidenced by its rapid growth and escalating influence on college campuses (Penrod et. al., 1990).

Other studies like the popular 2003 ECAR study "The CIO in Higher Education: Leadership, Competencies, and Effectiveness" mapped the higher education CIO through the lens of activities, competencies, and leadership dimensions. This research begins to identify and support the increasing contention that individual CIO leadership tendencies are a major factor in defining the role at a particular institution. The takeaway here is that the higher education CIO has a degree of influence and latitude in shaping their individual role. Additionally, it signals that college and university leadership should be particularly diligent at recruiting a CIO that embodies distinguishing characteristics that best align with the needs and culture of the particular institution. This match of institutional needs and expectations, and CIO skill sets and qualities, now

trumps IT technical expertise, which at one time was the key trait for which CIOs were recruited.

Compiled by Diane Frank, the *CIO Executive Council* in early 2011 published a Field Guide entitled “The Future State CIO Journey.” This forward-looking piece is part of a comprehensive programmatic effort geared around the development of future CIOs across all industries. This white paper brands CIOs in a three tiered framework. The main descriptors identify CIOs as functional, transformational, or strategic. This framework is presented as a ladder indicating that CIOs should endeavor to climb the ladder from the low rung as functional leader to the high rung as strategic leader over some period of time. This framework aligns more directly to contemporary research being generated about the imperative of CIO value creation for the business enterprise, which is discussed later in this review. Insightful and industry non-specific this framework seems to aptly capture the essence of the progression of the CIO role. The three stages expertly frame the functioning and progression of the role illustrating the dependency on the specific organization. See Appendix IV for a graphical depiction of this framework.

The theme of value creation is further bolstered by the recently published “The 2011 CIO Agenda” by Gartner where their analysts boldly proclaim, “CIOs must re-imagine IT to support growth and competitive advantage” (Gartner, 2011). The “reimagining” connotes the kind of transitional steps in the IT enterprise that are undoubtedly impacting the CIO role in substantive ways.

Not to diminish the significance of all the aforementioned frameworks and descriptions for the higher education CIO, the most recent framework introduced by Meredith L. Weiss can be aptly characterized as an amalgamation of all contemporary analysis and reporting on this topic. The two tables that follow reproduced from the

ECAR report entitled “Technology Leadership: Today’s Higher Education CIO,” poignantly illustrate the higher education “polymath” description used in the title of this dissertation (Weiss, 2011). The first table delineates the myriad of roles that the higher education CIO has been known to play. The second table illustrates traits, abilities, and skill sets that have reportedly helped the higher education CIO perform their role successfully.

Table 1 The Roles Identified for the CIO in Higher Education

Academic	Consensus Builder	Innovator	Public and Media Relations Manager
Administrator	Contract Overseer	Leader	Public Speaker
Advocate	Decision Maker	Liaison	Researcher
Author	Educator	Manager	Resource Allocator
Business Partner	Enabler	Marketer	Salesperson
Central System Provider	Entrepreneur	Mentee	Secure Service Provider
Change Agent	Evaluator	Mentor	Security Provider
Coach	Facilitator	Monitor	Spokesperson
Coalition Builder	Financial Manager	Motivator	Standards Developer
Collaborator	Fundraiser	Negotiator	Strategic Planner
Committee Leader	Informaticist	Policy Maker	Student
Committee Member	Information Manager	Politician	Support Provider
Communicator	Infrastructure Provider	Presenter	Team Builder
		Project Manager	Visionary

Note. From “Technology Leadership: Today’s Higher Education CIO,” by Meredith Weiss, 2011, *ECAR Research Bulletin*, 11.

Table 2 Skills, Abilities, Attributes, Expertise for the CIO in Higher Education

Ability to Align IT and University Goals	Alliance Building Skills	Innovation	Political Savvy
Ability to Align IT and Individual Goals	Boundary-Spanning Ability	Institutional Commitment	Pragmatism
Ability to Align Planning and Assessment	Business Acumen	Interpersonal Skills	Relationship Management Skills
Ability to Build Alliances, Coalitions, and Strategic Partnerships	Change Management Ability	Knowledge of Academia	Respect for Colleagues
Ability to Build and Retain Talented Staff	Collaboration Skills	Knowledge of Marketing	Self Confidence
Ability to Enable the Success of Others	Communication Skills	Knowledge of Organizational Culture	Strategy Development Skills
Ability to Engender Trust in Others	Creativity	Leadership Skills	Strong Work Ethic
Ability to Focus on Outcomes	Credibility	Listening Skills	Technical Knowledge
Ability to Prioritize	Decisiveness	Management Skills	Trustworthiness
Ability to Secure Financial Resources	Evaluation Skills	Networking Skills	Understanding of CEO's Outlook and Direction
Ability to Set Direction	Expectation Management Skills	Organizational Behavior Skills	Understanding of Fellow Executives
Ability to Sustain a Viable Governance Structure	Financial Management Skills	Organizational Skills	Understanding of User Satisfaction
Adaptability	Flexibility	Planning Ability	Vision

Note. From “Technology Leadership: Today’s Higher Education CIO,” by Meredith Weiss, 2011, *ECAR Research Bulletin*, 11.

One could reasonably argue that the optimal CIO role is evolving as a hybrid where this leader focuses both on business strategy and IT delivery (Earl & Vivian, 2000). In this model it follows that successful CIOs must rely heavily on relationship

building and nurturing both within their IT organization and external to their IT organization (Earl & Vivian, 2000). In earlier times it simply wasn't important that CIOs possess intimate business knowledge. Their main purpose was to ensure essential business functions were being performed. This activity was almost completely divorced from business strategy. It focused on inputs, processes, and outputs. Today, running an IT organization in isolation from the rest of the business enterprise and its corresponding strategy elements is a certain way of truncating the tenure of the CIO.

In 2010 the Leadership Board of Higher Education CIOs (LBCIO), with the assistance of the *Chronicle of Higher Education*, launched its inaugural CIO-only survey. The fact that this assessment is CIO-only is an important determinant in ensuring the accuracy, richness, and integrity of the data collected. Many other surveys are known to be completed by subordinates of the CIO, whom one would assume are expressing their views and not the views of the actual CIO. The 2010 LBCIO survey, completed by nearly 250 higher education CIOs, yielded many interesting observations. However, there were two findings that are particularly meaningful to this research. First, Dr. Michael Zastrocky, executive director of LBCIO and coordinator of the organization's survey, concluded that "CIOs need to be active leaders in building teams of knowledge workers across campus to work on solving institutional problems, thus creating value through a form of transformational leadership" (Zastrocky, 2010). Value creation once again emerges as a critical CIO goal. Second, mobile computing was voted by participating CIOs as the highest ranked emerging technological trend that CIOs need to recognize to be successful. The consumerization movement, which is a primary focus of this research, is fundamentally mobile-driven, thus CIOs are taking particular notice.

Further study on the role of the higher education CIO yielded a few other remarkable findings. According to Brown's 2009 study, almost 50% of higher education

CIOs plan to retire within the next ten years (Brown, 2009). This is illustrative that a high percentage of higher education CIOs, and their respective staffs for that matter, are members of the baby boomer generation (Goldstein & Pirani, 2008). The same study noted that although higher education provides an environment conducive to female technology leadership, a paucity of female IT leaders actually aspire to the CIO role (Brown, 2010). But is this a female-only inclination? Dr. Tom Davenport, Babson College's Distinguished Professor of Management and IT, recently quipped, "I hardly get anybody that wants to be a CIO anymore" (Wailgum, 2010). Another very recent publication reports that aspiring IT leaders' ambivalence about moving up the IT career ladder is due to the fact that "they don't see IT leaders getting a lot of respect in their enterprise. Instead they see IT leadership banging their collective heads against the wall to get anything done" (Levinson, 2011). So, it's at least worth considering that the CIO is not a profession to which people flock. Another explanation is that the CIO position might seem unreachable to many. Moreover, if one looks through the information security and privacy compliance lens, which is getting more complicated and time-consuming each day, the CIO role seems far from appealing. Finally, some real pessimists, tongue in cheek, might believe that CIO really stands for Career Is Over, a saying of unknown origin that CIOs smirk about. Additionally, as occupational preferences change it's possible that there will be a shortage of many skilled IT workers in the near future (Goldstein & Pirani, 2008). This projection certainly extrapolates to the CIO role.

The various higher education CIO assessments unquestionably advance understanding concerning the evolvement of this role. However, none of the assessments probe deeply enough to uncover what specifically CIOs are pondering. This is where qualitative analysis must be relied more heavily upon.

The Economic Recession and Budget Constraints

An overarching factor that higher education CIOs must deal with is the effect of the economic downtown that commenced in approximately 2008 and continues into the current day. Although it appears no industry is immune from the impact of the recession, the loss of jobs, the flattening or decline in economic growth, and the sharp receding of tax revenues used to fund state and federal programs, has sent particularly devastating shockwaves through the higher education industry. This major set of cascading events has called into question the entire economic model that higher education operates under and triggered increased scrutiny on the cost of delivering higher education and its expected outcomes. States have begun to cut funding to publically supported institutions while record numbers of families are seeking federally backed loans and grants.

On college campuses endowment investments experienced a major setback, and operating budgets are getting squeezed resulting in budget cuts, salary freezes, and marginal tuition increases at many institutions. The resulting ripple effect has impacted almost every area within the typical college and university, including IT, where generous levels of financial support are needed each year to remain competitive (Education-Portal, 2010).

Higher education CIOs feel the pinch of budget austerity measures quite acutely since the demands for services continue to rise while the level of funding has flattened out or decreased (Zastrokey & DeSanto, 2011). But, is this upheaval really impacting the evolving role of the higher education CIO? Or are CIOs simply taking this in stride and adjusting to the new financial realities? The literature on this topic is scarce to non-existent, therefore leaving this question to be answered solely through the quantitative and qualitative portions of this study. The issue of budget constraints will inform and

weave its way through much of this study and will be most relevant as the discussion turns to CIO value creation in the chapters ahead.

Emerging IT Paradigms Impacting the Higher Education CIO

The Tsunami of IT Consumerization

Tsunami is a fitting description for the IT consumerization movement. This movement can be defined as “the increasing influence that our technology experiences as consumers—both hardware and applications—have on the technology that we expect to use at work” (Foley, 2010). This phenomenon, also known as the spearhead of disruptive technologies, is occurring in seemingly never-ending waves that engulf the higher education IT community. It is monumentally disruptive in that it is triggering change to a lofty degree. Some industry watchers would argue that this movement has been around for several decades, but, the vast majority would contend that it really took hold with the advent of mobility in devices such as smart phones like the iPhone and tablet devices like the iPad.

Information technologies are continuing to multiply, converging with industrial technologies so that the lines between them are blurring (Earl, 2000). Some sage IT industry observers are forecasting that there will be about 1 Trillion Internet-connected devices by the year 2013 (Golden, 2011). Currently, it is reported that 296 million smart phones have been sold world-wide (Crair, 2011). These staggering numbers underscore the attractiveness and exponential growth rate of such devices globally. The consumerization of IT movement was actually foretold in Brown and Duguid’s “The Social Life of Information” published in 2000. The authors observed that the plummeting costs of hardware and software coupled with the strong desire of people to establish work environments at home would spark a substantial IT consumerization movement. In the same work the changing educational delivery paradigm to more distance and web-

based education was also highlighted, facilitated by the progression of “anywhere” access, which is a distinguishing characteristic of wireless-enabled consumer devices.

It’s apparent that today’s high-school students, the so-called Millennials, expect their educational futures to be built around technology (Van Der Werf & Sabatier, 2009). Restlessness pervades their world, and their expectations are that the highly mobile electronic tools that are omnipresent in their lives, such as smartphones, laptops, and iPads will be accommodated and incorporated into their learning (Van Der Werf & Sabatier, 2009). Understanding the new generation of college students is essential to appreciating what’s driving their impatience with traditional IT organizations. Millennials place a huge emphasis on their communities and social interactions to learn and work (Baker, 2010). Thus, the tools this generation prefers to use facilitate this edifying interaction. Their hunger for real-time information, and accompanying social interactions, fuel the frenzy for more varieties of faster, mobile solutions.

This educational and social paradigm shift indeed beckons a sea change in our ways of thinking and knowing, teaching and learning. To seasoned professional educators and administrators there must be an understanding that this rising tide of newer technologies and interactions will not recede despite all of its strangeness. “Rather academe should look to fuse the best of the old solutions with the new” (Dede, 2007). Mobile platforms are extending into where and when learning is taking place. Even gaming and simulation technologies advance problem-solving and hands-on learning. Student engagement is an essential ingredient to learning, and these are technologies that students are passionately attracted to (Gonick, 2011).

In EDUCAUSE’s 2011 *Horizon Report*, which is a forward-looking technology commentary with an emphasis on teaching and learning, the authors quite eloquently refer to “the entire ecosystem of teaching and learning changing” (EDUCAUSE, 2011).

Collaboration, e-studying, and content-rich environments that students are tapping into dominate the discussions in this report and support this research.

Society on a whole has also rushed in this direction. Awarding Facebook's Mark Zuckerberg as 2010 *Time Magazine's Person of the Year,* as well as the popularity of the award winning movie "The Social Network," are salient examples of the wide acceptance of the new brand of social networks that transcend all generations. According to Facebook's web site there are currently over 500 Million Facebook users world-wide (http://www.Facebook.com), and this number is growing. This is certainly indicative of a tidal wave of support for social networks.

IT vendors who are inventing and delivering products to market at a pace never before experienced are pleased to accommodate the Millennials' fervent desires. The more devices and solutions technology companies sell the larger the return on investment for their respective companies, so these firms are motivated to accelerate their innovations. This is surely the first time in history that people have more powerful technologies at home and in their pockets than those that are provided by central IT (Wailgum, 2010).

Smart phones or personal data assistants (PDAs) have been available for over a decade, but first began to invade college campuses about five years ago. Palm, Blackberry, and Windows Mobile devices enjoyed immediate popularity. However, at least initially, these devices relied solely on the existing carrier-based cellular networks to function properly. Tunneling in to the campus email system, student services portal, or first-generation social networks was not initially possible. However, quite interestingly, once campus leadership began to see the value in PDAs for communications, efficiency, and productivity purposes, and thus started to acquire the same devices, the integration with campus systems became a priority and in little time an operational reality for all

campus constituencies. This genre of devices was expanded to include the iPhone and Android platforms that now dominate the PDA market space. More robust wireless data network speeds progressed to support these new devices, which now have many of the capabilities of a PC in a much smaller physical footprint. Applications (apps) are being produced and delivered in droves to enhance the capabilities of these devices and make them more attractive to buyers. Though there is a dearth of available data on the topic, anecdotally, student ownership of PDAs is pervasive. Just observe any college campus and witness the invasion of this technology (Young, 2011).

Also, around five years ago, the first Netbooks emerged on the college scene. These small, light, portable, wireless laptops are intended to closely replicate PC functions for a fraction of the price. They are also designed for portability and convenience. Though these devices still persist in the market, there was an explosive technology development that would significantly dwarf the popularity of Netbooks yet to come.

A few short years ago the first of a neoteric generation of tablet computers came to the marketplace. The Apple iPad was an immediate sensation. The iPad, building upon the very successful introduction of the iPhone, combined sleekness, power, versatility, and mobility in a reasonably sized and priced package. This tool was being delivered by Apple, a company whose stature in the IT industry was again soaring, as evidenced by their sales and stock price, powered by their target market of younger professionals. This device and almost seventy other tablet computers that are under development will undoubtedly matter greatly in higher education (Fischman, 2011). Walt Mossberg, influential columnist for *The Wall Street Journal,* commented in Las Vegas at the Higher Education Technology Summit in January 2011, “Students will bring these to campus—and colleges, universities, and publishers will be required to meet their needs.

Students and faculty will just barge in" (Fischman, 2011). Consider the fact that the price points for tablets are plummeting to $200-$300, which makes these devices affordable to almost everyone (Hamblen, 2011). This will fuel the buying frenzy. The new Kindle Fire is a great example of this new genre of low cost, powerful devices.

It's noteworthy that many institutions find themselves disadvantaged by the fact that consumers are buying these new technologies and expecting support before IT staff members on campus have ever touched the new devices (Zastrocky, 2010). Acknowledging a procellous experience, some outlier CIOs have had an emotional reaction to these new devices. As reported in *Computerworld,* Dave Codack, VP of Technology Services at TD Bank Financial Group in Toronto, was quoted as saying, "I have coined this—the tyranny of consumerization" (Hamblen, 2011). Practical questions or worries do persist, however. "What's the business benefit? What's the status of security? Do we have enough network bandwidth" (Kaneshige, 2011)? It is worth noting that the introduction of new technology is usually accompanied by a new set of issues to be tackled. Despite the issues, Gartner analysts project that by 2013 80% of businesses will support a workforce using tablets (Willis, 2011). At least one analyst thinks that the consumerization movement is less about the flood of consumer devices into the enterprise to be used for business purposes, but more about the customers using consumer devices to access corporate applications (Golden, 2011). This thought-provoking twist of sorts introduces a whole new set of challenges for IT.

The advent of electronic books is also remarkable to witness. Although the use of electronic textbooks on college campuses has only enjoyed slow, incremental growth to date, the consumer market has embraced e-books. The Associated Press reported on May 20, 2011 that Amazon e-books are now outselling printed books (Boston Globe, 2011). This has occurred merely four years after the introduction of e-books on

Amazon.com. This event illustrates the speed of adoption of consumer technologies in the market.

Some would posit that academic libraries have resisted the push toward digitalization of collections, and, although physical books are still present, a shift toward increasing electronic resources is undeniable (Howard, 2011). Budget cuts absorbed by libraries and space issues are contributing to this movement. Students who at one time came to the library to obtain a book are now visiting to study and access information digitally instead (Howard, 2011).

Although security concerns with respect to consumer grade devices share common ground with traditional desktop and laptop computers, the light, portable nature of these devices make them prime targets for theft. This fact necessitates the implementation of tools and solutions for remotely wiping the disk storage and memory of these devices and the employment of encryption techniques for sending and receiving data. In addition, there are increasing concerns that the multitude of free and almost free applications for PDAs and tablets are being used by vendors to mine customer data and preferences to be sold to third party vendors, or to push products and services to these customers. If the devices in question are being used to house and distribute proprietary institutional information, this information may be susceptible to security breaches. This problem adds to the CIOs' worries and requires concerted attention (Schuman, 2011).

Many times as new technologies are rolled out, CIOs stand back and observe for a while. However, according to Bob Evans of *Informationweek,* CIOs need to develop a tablet strategy. Evans opines that skeptic CIOs are making a bad decision that could threaten their careers. The reason: "A flood of new applications…By the end of this year, there will be thousands of enterprise-level applications for the iPad that aren't just

dumbed-down versions of conventional enterprise applications. Many of them will enable users to do things they can do on no other device as quickly, as attractively, as productively, and as simply" (Evans, 2011).

There is evidence that the allure of tablets in higher education is triggering programmatic efforts in secondary schools. As reported by Winnie Hu of *New York Times,* several schools including Roslyn High School on Long Island, the New York Public Schools, and Chicago Public Schools have all begun to purchase fairly large numbers of iPads for students and faculty (Hu, 2011). School leaders are enamored with the iPad's sleekness, large crisp display, and versatility as well as the burgeoning number of available applications. These reports prompted a reaction from Dr. Larry Cuban, Professor Emeritus of Education at Stanford University, who believes that "iPads are marvelous tools, but money is best spent to recruit, train, and re-train teachers" (Hu, 2011). Cuban is particularly well known for his books on teaching and technology, the most recent of which is entitled *Oversold and Underused* (2001). As the title suggests, Cuban acknowledges the usefulness of technology in teaching and learning, but asserts through his research findings that leveraging the technology investment in the classroom falls short of the desired mark. Rather, Cuban believes that more money and attention should be paid to teachers and invested in pedagogy (Cuban, 2001). Cuban anchored these assertions in the aforementioned book. Cuban's focus on technology "underused" for teaching and learning deals fundamentally with his observation that a disconnect exists between individual teachers' pedagogical preferences and the technological tools that are made available (Cuban, 2001). So, the mere presence of the avalanche of new technology in the classroom alone will likely not have the maximum impact or effectiveness with respect to teaching and learning. It's reasonable to believe that schools need to sway faculty attitudes and create new incentive and reward structures to

solidify faculty interest. To shift the educational paradigm faculty will need to stretch their imagination to exploit the technology, not just use it to enhance conventional teaching (Massy, 2003).

Responsively, information about an initial wave of CIO sponsored programs to introduce college faculty to tablets such as the iPad is beginning to emerge. In April 2011, on the EDUCAUSE sponsored CIO Listserv a question was posted inquiring about new initiatives to encourage faculty experimentation with tablet devices. Seton Hall University in New Jersey has been a model campus for many years for its ubiquitous computing program, which means that every student receives a laptop upon entering as a freshman. Although it appears that the program is still operational, CIO Stephen Landry posted information about iPad pilot programs in a few of the schools at this private, Catholic university (EDUCAUSE CIO LISTSERV, 2011). Brian Young, CIO at Creighton University in Omaha, Nebraska, shared information about a program where 60 faculty members were granted iPads and are supporting each other by posting about their experiences to a special blog (EDUCAUSE CIO LISTSERV, 2011).

These early developments parallel initial efforts with PCs in the 1980's. Using pilot programs such as these is an avenue frequently taken by CIOs who are attempting to stimulate adoption of new technologies for teaching and research. New members of the academy seem quite comfortable with consumer technologies and are eager to trial anything new and interesting. This is in stark contrast to those who claim that change is uncomfortable and difficult. In *Human Problems in Technological Change* Edward Spicer (1952) concluded his study some sixty years ago with a few cliché-sounding nuggets about change that still resonate today: people resist change that appear to threaten basic securities; people resist proposed changes they do not understand; and people resist being forced to change (Spicer, 1952). Increased understanding of

consumer technologies facilitated by the intuitive nature of these devices, coupled with generational-driven adventurous attitudes, is chipping away at the reluctance to adopt new technologies. So, for a relatively small investment of time and dollars in pilot projects, CIOs can get a sense of the potential traction of new technologies on their campuses.

Up to this point this section of the literature review on IT consumerization has concentrated on devices and solutions. However, there is another essential element of IT consumerization to explore-the consumers' expanding depth and breadth of IT expertise. There was a time in the not too distant past when the CIO and his team possessed superior knowledge about the entire IT space. Esoteric terminology, acronyms, and concepts were idiosyncratic and separated the CIO and the IT staff from the common customer. This intimate know-how engendered an aura of power reserved only for the CIO and his/her subordinates. With such commanding supremacy the CIO was free to decide and rule the IT kingdom as he saw fit. Solutions were acquired to meet business needs, technology standards adopted to enable support models, and policies developed and enforced to assure compliance—all under the aegis of the CIO (Gartner, 2011). If the CIO said "no" the decision was final and rarely if ever overturned. But, with IT consumerization afoot, this archetype has all changed. Mass marketing, affordable price points, and a generation that appreciates the latest gadgets have all fueled this fire. Additionally, children from a very early age are now being exposed to consumer technologies and have learned and adapted to new technologies for entertainment and education without missing a beat. This new movement is not only being embraced by students. Faculty and staff are also on board.

To the chagrin of CIOs the "shadow IT department" is becoming commonplace. A natural result of the disconnect that has perennially existed between those who

provide IT and those who use it, the consumer technology universe has evolved to a point where it may be considered an alternative IT department (Worthen, 2007). What this means is that today's employee may be given a tool by central IT that simply doesn't meet his needs. This employee will instead find a more appropriate tool on the Internet or at his neighborhood Best Buy, and not think twice about procuring it (Worthen, 2007). To support these investments, it's predicted that companies and higher education institutions will be establishing their own internal "apps stores" in the future to provide employees with proprietary access to various productivity tools and other company resources (O'Neill, 2011).

This leaves the IT professionals half-wishing that their customers didn't know so much. The CIO and his comrades are left straddling a shaky fence. Should they abandon the controlling practices of the past that they believe served them and their institutions well, or embrace their more informed customers and their consumer-tested technologies and proficiencies? Should CIOs invite rogue IT into the CIOs' tent? Making peace with the "shadow" has the CIO embarking on a course where he should 1) find out how people really work; 2) say yes to evolution; 3) ask if the perceived threat posed by these technologies is real; and 4) enforce rules, not make them (Worthen, 2007). Without question this will be a hard pill to swallow for the CIO with a large ego. These strategies level the playing field as the CIO shares power and authority with his customers and rarely, if ever, says no (Overby, 2011).

Another angle to consider is that IT consumerization actually creates opportunity for the CIO and his staff to play the role as expert integrators facilitating interoperability, since the consumers expect everything to work together seamlessly. This prospect bodes well for those espousing intentional focus on planned enterprise architecture, which is garnering much attention of late.

One other fruitful opportunity for the CIO and his comrades is worth mentioning. One could argue that despite the fact that consumers have become more sophisticated with consumer technology solutions it leaves open the question as to how extensively the consumers are actually leveraging the technology. This perceptible gap between potential effectiveness and actual effectiveness is a fertile area for the CIO to provide leadership. It calls for enhanced awareness and training on these products and solutions, something that just about every college campus lacks adequate resources to perform. However, to implement such programs IT staff will need to be flexible and versatile IT service providers. Long gone are the days that only a few standard offerings are supported.

Since it appears that CIOs are destined to embrace the consumerization of IT, how does this phenomenon impact the CIOs' tactical planning, support models, budgeting, staffing, innovative programming, teaching and learning support, and risk management? These are currently open questions that have not yet been adequately addressed by the literature.

This section could perhaps be best summarized by the following quote:

> The heart of the consumerization trend is human desire; people want to work the way they live, using the Internet to facilitate relationships and communication. It's also the foundation for the next wave of business. Companies that adapt quickly and thoughtfully to change the relationship between employees and the IT department will be better able to attract talent, execute new business models, and enhance competitiveness. So why fight it? (D'Arcy, 2011).

The Cloud

The migration to the cloud, which has caught popular attention in part due to Microsoft's television advertising, is best described as virtually sourcing IT services to external businesses located beyond the confines of the campus. Since this business model is built around payment for services rendered or capacity created, the college or university is not forced to invest in the infrastructure to deploy the services needed. Rather, much like renting space or leasing services, IT is simply paying for the services it needs over a specified time period. Thus, obviating the need for capital investment these services tend to be less expensive initially and in the short term to deploy. Add to this the notion of downsizing in-house data centers, which results in space as well as utilities savings, and you end up with an attractive, greener solution. Since the reliability and security of cloud solutions have improved dramatically since inception, the last stumbling blocks to adoption have been removed (Ulander, 2011).

Efficiency in this economic climate is a higher education CIO mandate. Since the cloud yields documentable savings, this solution is music to ears of the CFO. Such cloud offerings as email, front-end Enterprise Resource Planning (ERP) applications—ERP referring to the software suite that is used to effectively run the business management of the institution-learning management systems (LMS), and portals as examples, are but a small fraction of what is available in the cloud today. More applications of every variety are projected to be available tomorrow. Software as a Service (SaaS) is a prime cloud offering that obviates the need to license and install software on servers in the campus data center. One could even reasonably surmise that entire ERP suites will be among future cloud-based product offerings (Gartner, 2011). Workday, a company promising such a suite of offerings via the cloud, is already

established in the corporate for profit world and is beginning to make inroads into the higher education space with some functional modules.

The cloud is not limited to software services. Lighting up servers and provisioning disk storage space are two examples of using the cloud instead of procuring hardware for the campus. The possibilities here are endless.

Such deployments do require redundant, robust Internet connections to send and retrieve data between the campus and the cloud service provider's data center. Purposeful, well-planned deliberations and negotiations with vendors surrounding contractual provisions will also be the norm. Because confidential and personally identifiable information (PII) will be moving between the campus and the sourcing site and be stored at least temporarily and perhaps long term at the sourcing location, a stout emphasis on information security is a must when considering the cloud.

Interestingly, the cloud should not be viewed as a separate technology strategic project. Rather, major benefits can be reaped if the cloud is integrated into the enterprise's existing business strategy (Ulander, 2011). In essence the cloud becomes part of an overall IT strategy to deliver services with a favorable return on investment (ROI).

The cloud is also demanding a set of CIO skills that align with the emerging CIO role as "provisioner of IT services." One may wonder why the cloud is gaining such popularity. The cloud as a sourcing strategy provides several key advantages for the CIO, some of which could be strategic. First, deploying solutions via the cloud is customarily less expensive, more reliable, and faster to implement (Goldstein, 2008). In some cases first mover advantage could be achieved by leveraging the cloud. As an example, several colleges and universities have used cloud services to efficiently deploy applications enabling customer mobile devices as recruiting tools, while others try to

catch up by designing and writing their own systems to accomplish similar goals. The use of cloud services has allowed these first mover schools to get a jump on the others who have still not deployed. Many institutions leveraged the cloud first with email services. Cloud providers such as Google and Microsoft have been offering colleges and universities reliable, free email services for several years now saving the schools money and people resources. It has proven to be a bandwagon worth joining.

Cloud services have necessitated new or enhanced CIO skill development including contract management, service level agreements, and the management of policy and regulatory compliance in third party providers (Katz, Goldstein, Yanosky, 2009).

Moreover, much contemporary literature speaks to relationship building as an urgent objective of the changing CIO. Building trust, nurturing relationships at all levels, and being conversant in strategic issues facing leaders in all sectors of the institution will determine how much success the CIO will enjoy (Goldstein, 2008). This relationship building is integral in cloud services as CIOs serve as brokers between institutional leaders and decision-makers and the vendors providing needed services.

One caveat to not take lightly is the CIO underestimation of costs associated with the cloud. It's easy to underestimate the following: cloud server capacity; parallel running of dual environments for a short period of time; and management and monitoring efforts (Carr, 2011). But none of these are considered deal breakers that will interrupt the race to the cloud. Another issue is the need for redundancy. Even the most robust and reliable cloud service providers can fall short of expectations. A case in point is the April 2011 unplanned clouded service Amazon.com outage that impacted dozens of companies dependent on these services (Enderle, 2011).

The cloud is in essence permanently changing the IT business model where shared, commoditized resources will be the norm.

Much like the cloud is another revolutionary development called virtualization, the seeds of which were planted decades ago with the advent of virtual operating systems on minicomputers and mainframes.

Virtualization

Virtualization is a most-welcomed and valuable technology development recently introduced to an IT industry hungry for efficiencies. Servers, desktop clients, and applications are all capable of being virtualized. Virtualization generates efficiencies and cost savings in several ways.

Server virtualization technology provides the capability of running multiple virtual servers on a single physical server negating the acquisition and maintenance costs of multiple servers. Virtual servers also create positive economies with server rack space, cooling and electrical costs, and staff effort (Wong, 2010).

Desktop virtualization removes the large tower or desktop processor and storage units and replaces them with thinner, lightweight units (thin clients) moving the processing and storage functions to servers (virtual or not) and storage repositories in the data center. This yields savings on the purchase of full client, traditional PCs. It also consolidates support efforts in the data center eliminating the need for hands-on technical field support that accounts for a high percentage of total IT staff today.

Application virtualization permits those with mobile wireless and wired devices to access the applications they utilize from a public (anywhere over the Intenet) or private cloud (localized) instead of having the applications installed on individual devices (Schweb, 2006). This development ultimately facilitates maximum worker and student mobility with the prospect of the decommissioning of numerous departmental and public

microcomputer labs. This brand of virtualization results in financial savings with the reduction of numbers of PCs to support on campus, while allowing IT users to benefit from device independence and maximum mobility. However, CIOs need to be wary of software licensing costs, which can easily diminish expected savings.

As is apparent, the previously cited IT developments are geared towards efficiencies and savings, certainly a mandate that today's CIOs are quite cognizant of. However, this value proposition does not deal solely with cost savings. Virtualization provides for enhanced information security since less critical information resides locally on an individual's PC. Rather, the information sits behind firewalls in the data center stored on IT managed hardware assets. This information security advantage adds to the motivation of the CIO to use virtualization strategies. However, there are many more information security concerns for the CIO to consider.

The Information Security Imperative

Information security is a primary CIO apprehension, and this is reflected in CIO decisions regarding personnel and budget for security (Zastrocky, 2010). Information security issues first surfaced on college campuses in about the year 2000 with the infestation of computer viruses, frequent incidences of copyright infringement, and denial of service attacks on unsuspecting businesses perpetrated by growing numbers of mischievous computer hackers. Although these threats still persist today, albeit to a lesser degree due to the development of appropriate safeguards and remedies, major attention has been shifted to the threat of identity theft through the pilfering of personally identifiable information (PII) from campus databases and file systems. Campus communities once known for fairly loose stewardship and relaxed, indifferent sharing of such information are now being compelled to treat such information with the highest levels of confidentiality. One information security breach could damage an institution's

reputation for years to come and cost the institution potentially millions of dollars to deal with reputation loss and financing technical remedies. Alarmingly, through 2016 it is predicted that the financial impact of cybercrime will grow 10% per year, due to the continuing discovery of new vulnerabilities (Gartner, 2011).

CIOs, who have ultimate responsibility for watching over an institution's information assets, are particularly at risk if breaches occur. CIOs have been known to lose their jobs in the wake of a security breach. The most infamous of such cases was the 2006 Ohio University breach where hundreds of thousands of alumni and student records were compromised resulting in the firing of several key IT leaders including the CIO (Weiss, 2006).

The 2010 LBCIO survey illustrated that the number of institutions appointing a Chief Security Officer (CSO) and increasing budgetary resources for information security were significantly on the rise. In the previously cited Ohio University breach, upwards of $10 Million was spent after the fact to secure the University's very susceptible information assets (Weiss, 2006). Such cases have spurred the offerings of cyber insurance, which is used to defray the expenses involved in dealing with the aftermath of a reportable breach.

Although cloud computing applications are gaining favor and mobile applications embracing common consumer technologies are ratcheting up, CIOs continue to lack confidence that institutional data stored in locations off-campus or being transmitted via mobile devices anywhere are being adequately protected (Brenner, 2010). Consequently, this concern creates a puzzling dichotomy for CIOs. CIOs are feeling pressured to move applications into the cloud and acquiesce to the onslaught of consumer technologies, but at the same time CIOs can't unconditionally guarantee the safeguarding of personal information.

Given the ever-looming threat of a security breach and the dire consequences (financial costs, job loss) that result from such breaches, higher education CIOs are forced to spend much more time in the information security realm; thus it is a major contributing factor to the evolvement of the role (Zastrocky, 2010). CIOs don't relish this change that forces them to function as data guardians, policy experts, investigators, enforcement coordinators, and compliance officers. But, according to some industry watchers and based on the *2010 CIO Magazine* survey, it won't end there. A striking revelation came to light that 55% of the CIOs surveyed believe that they will be responsible for their entire company's security program, including physical and workplace safety, within five years (Nash, 2011).

Accountability issues and compliance with laws that ensure privacy and protect business interests remain front and center on most CIO plates today. Higher education CIOs have the daunting tasks of dealing with music, video, and software piracy over their networks while still allowing the freedom and functionality that are hallmarks of a University's teaching and research agenda (Young, 2010). Likewise, protecting University community members' rights to privacy as articulated by such laws as FERPA (Family Educational Rights and Privacy Act), HIPAA (Health Insurance Portability and Accountability Act), and Gramm, Leach, Bliley Act dominate compliance conversations today and represent very time-consuming initiatives. CIOs must frequently navigate data canals that flow between University divisions to affect compliance. One such example is PCI DSS (Payment Card Industry Data Security Standard), which deals with securing credit card transactions over a network. To ensure compliance CIOs must facilitate legally acceptable solutions that wed the entity taking credit cards for payment, like a continuing education department, with the financial services department (IBM, 2007). Another common example focuses on music and film theft where the CIO

performs the role as the enforcer and mediator between the external entities protecting the rights of the recording and film industries and the Student Affairs officials responsible for legislating and monitoring student behavior in the residence halls.

Convincing other campus leaders about the importance of information security endeavors requires time and education. Although many would prefer to consider information security as solely within the purview of the CIO and CSO, addressing it with due diligence requires a campus-wide effort that begins foremost with education. Data on campus is ubiquitous and growing. Data needs stewardship at the departmental level beyond what IT and the CIO can practically provide. Unfortunately, many in departments outside of IT unwittingly continue to perform their jobs in a manner that perpetuates a risk to the institution for which the CIO finds himself ultimately responsible. This type of employee behavior prompts many sleepless nights and reminds the CIO that his own employees create the most daunting risk to the institution.

This concludes the section of the literature review that addresses the first research question about how contemporary IT industry forces are impacting the role of the higher education CIO. The next section, which begins with Adding Value, starts to chronicle writings about the second research question regarding the higher education CIO role relevance and persistence, including pegging the role as operational or strategic.

Adding Value—Holding the Key to Higher Education CIO Relevance

Literature concerning the CIO priority to add value to the enterprise is plentiful over the last five years. Stated most succinctly, CIOs need to create business value or face the prospect that their organization will deem them obsolete (Frank, 2011). It's no longer satisfactory for CIOs to concentrate their efforts solely on managing the institution's information technology resources. Higher education CIOs should be

involved in improving an institution's performance and enhancing efficiencies (Auringer, Gomolski, & Aron, 2008). Clearly defining their roles and delivering business value will enhance the long term strategic competitiveness of the institution (Auringer, Gomolski, & Aron, 2008).

To successfully add value in higher education it's advantageous for CIOs to be seated at the cabinet table and be recognized as a member of the senior leadership team (Zastrocky & Schlier, 2000). The CIO is obviously responsible for leading the information technology organization, but additionally his breadth of institutional knowledge should span to include such key areas as teaching, learning, public relations, finance, and marketing. The CIO should also be aware of and participate in the strategy development surrounding the countless challenges facing the CEO and senior leadership team. Such challenges dictate that CIOs be familiar with the institution's general strategy and the business drivers that are affecting higher education (Zastrocky & Schlier, 2000). By training and experience and as perennial agents of change, CIOs are equipped to think outside the box and perhaps see opportunities before others that sit around the typical cabinet table. Their ability to envision a future state and mapping a strategy to get there aligns well with enterprise-level change projects that CIOs are usually engaged in (Zastrokey, 2010). Moreover, there are future states that are architected to be technology-enabled like web-based education and digital marketing, just to name a few. In these cases, the CIO is perfectly positioned to shape strategy and provide leadership.

Keeping the IT trains running on time is essential to increasing influence CIOs need to succeed in the cabinet suite. If the perception is that the IT house is not in order, there is little chance that the CIO will be considered a business leader by peers (Wailgum, 2010). Recent literature focusing on the relationship of the CIO with other

senior administrators underscores the CIO's strong mutual interfaces with finance and marketing. Moreover, getting out of the office and hobnobbing with both internal and external customers has never been viewed as more critical. "Former Harvard Associate Business Dean, James Cash, recommends that CIOs spend 25% of their time talking with internal and external customers" (Beach, 2011).

A key partner of the CIO, CFOs are increasingly inquiring about the return on investment (ROI) associated with IT projects. Though difficult at times to accurately predict the ROI, this metric is factoring into IT decision-making more often than not lately. If there's evidence that there is a strong short term ROI, CFOs are apt to act positively and decisively (Pratt, 2011). Longer term promises of payback are being evaluated with more skepticism in this current economic climate. CIOs increasingly have to become more familiar with the CFOs' worldview. "The CFO is a creature of a lean world where every penny needs to be justified by ROI" (Rosenbaum, 2011). Some have referred to the CIO-CFO relationship as schizophrenic, where they play an ongoing game of chicken with the CIOs asking for more money and the CFOs asking for more justification (Rosenbaum, 2011). In any event it seems important that the CIO-CFO relationship be built on a solid foundation of transparency and trust, especially in light of the economic downturn.

Interestingly, presidential perspectives on IT investments track closely to the type of institution. Research shows that presidents who hail from larger research institutions have the greatest satisfaction rates in IT investments that support research and scholarship and the library. On the other hand presidents who lead mid-sized to smaller institutions are most satisfied with IT investments in teaching and instruction and administrative systems (Green, 2011). The shaping of presidential perspectives on IT investments and the CIO role is largely unexplored territory in need of further study.

With competition for students heating up, given the demographic realities that the numbers of college bound students nationally is decreasing, market positioning for most colleges and universities is becoming increasingly more important. Therefore, the CIO is feeling the pressure to seek ways of adding value to the institution's marketing efforts. Since electronic communications with students and other key constituent groups need to be tailored to individual preferences and interests, IT is nicely positioned to help with such marketing strategies. Social networking applications and Web 2.0 solutions like Facebook and LinkedIn are being increasingly deployed to tailor such communications to develop affinity with constituents (Auringer & Meehan, 2009). Moreover, mobile applications technologies are being used by colleges and universities to market prospective student customers in the electronic space where students spend much of their free time and feel most at ease.

There's never been a more opportune time for higher education CIOs to partner with Chief Academic Officers (CAO) on innovative leveraging of IT for teaching and learning. This is an area where the CIO can make a major difference contributing ideas and tools ensuring that the academic enterprise is remaining current with respect to the needs of its faculty and students. IT is uniquely positioned to enhance teaching and learning in significant ways. Three trends that are currently reshaping teaching and learning in the modern university are collaboration, tech-powered, and blended (Mindshift, 2011). IT factors in greatly in all three trends. E-collaborations are being infused into curriculum design everywhere and are becoming commonplace in learning management systems. Tech-powered refers to placing interactive tools in the hands of forward-thinking educators to enhance learning. Using such tools as LiveMocha to learn languages, Skyping to communicate with peers worldwide, and accessing Google-maps for teaching literatures are just a few examples of blended learning and of what is

possible (Mindshift, 2011). Learning analytics are also emerging where the wealth of student information is analyzed to allow institutions to make informed adjustments about the student's learning experience (Johnson, Adams & Cummins, 2012).

Partnerships that encompass the entire complement of institutional leaders seem essential to the CIO who seeks success through value generation. But, understanding the entire enterprise and what particularly is important to senior leaders is crucial to the CIO's success.

> CIOs have to be able to think and communicate from a different perspective, through the lenses of your different colleagues around the cabinet table. 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 (EDUCAUSE, 2009).

There is no question that the contemporary higher education CIO role must encompass activities that help leverage IT resources to have a meaningful impact on many key facets of running the institutional enterprise. It speaks to a level of understanding of the college or university as a business and mandates that the CIO demonstrates his versatility as a "renaissance man" of sorts.

Reporting Lines and the Linkage to Relevance

Interestingly, not much has been written about top management's receptivity to the evolvement of the CIO role. Data from the 2010 CHECS survey (Brown, 2010) illustrates that the numbers of higher education CIOs reporting to the campus CEO grew each year for several years to about 40% in 2008, and then plateaued. One can deduce that this leveling off effect could be a sign that CIOs, despite endeavoring to add value, are neither communicating effectively about their accomplishments, nor effectually articulating IT's true potential as a difference maker for the organization. Or, one could surmise that despite the fact that CIOs are ardently laboring to add value, they are nonetheless falling somewhat short of the mark and losing some cache. It could also be

reasoned that CIOs have reached their ideal organizational levels. In any event, one could deduce that to whom CIOs report is relevant since the organizational hierarchy grants power and influence. One could argue that as a role is pushed lower in the organizational hierarchy the role's stature and authority is eroded.

Notwithstanding the shifting organizational and political sands that most higher education CIOs find themselves in, and the organizational models that prevail, CIOs increasingly find themselves on a slippery slope where action or inaction sets the stage for an uncertain future. Not everyone is optimistic about the future of the CIO role as is articulated in the next section.

The Shrinking Relevance of the CIO?

In a May 2003 *Harvard Business Review* article Nicolas Carr sent shockwaves through the IT industry. After decades of escalating acclaim and importance, IT was being denigrated. In "IT Doesn't Matter" Carr was challenging an IT establishment that was largely revered by the masses. Carr asserted that IT was being commoditized, much like electricity and water, and therefore wasn't strategic as everyone once believed. The author even used the analogy of comparing the CIO role to that of a plumber. Carr contended that those companies that spent the most money on IT were not more successful than those that spent considerably less. Carr seemed to be saying that IT isn't worth investing in beyond the basic operational function. By association the CIO, therefore, is not a strategic, cabinet-level position, but rather is a role that simply oversees commodity operations and provides operational services. Carr ultimately predicted the unimaginable scenario that the job of managing commodity IT will eventually disappear. This damns the CIO and the IT operation to extinction. The reaction of IT professionals worldwide was predictably incredulous and angry.

The fervor surrounding these assertions propelled Carr to publish a series of successful books beginning with *Does IT Matter* and made him a popular figure on the professional speaking circuit. Despite the fact that most IT leaders rejected Carr's theories, his writings did capture the attention of the IT community and gave them pause. Was there some truth in what Carr was positing? (Carr, 2003).

One could not reasonably argue against the statement that IT was indeed becoming commoditized and that consumer knowledge development, coupled with the introduction of consumer technologies in the workplace, was increasing at an unprecedented, frenetic pace. These facts are indisputable. But, do the same facts necessarily extrapolate to relegating the CIO to a less significant role in their respective businesses?

This controversial question might be answered in different ways depending on the size and complexity of the institution. There seems to be growing evidence that larger research institutions are becoming far more decentralized, which results in highly distributed IT decision-making. This lessens the stature and influence of the higher education CIO, who thrives more in a predominantly centralized environment (Young, 2010). Conversely, smaller colleges, which tend to have decidedly centralized IT functions, are more welcoming of a CIO attempting to increase his breadth and depth of influence (Young, 2010). Many believe that power and influence are evidenced by following the trail of money. The more money is consolidated in the central IT budget the more the CIO can wield influence and power. The more money is decentralized, the less power and influence the CIO can harness, and thus will experience a tougher time dictating direction.

Lamenting the plight of CIOs at research institutions, Gregory Jackson, former CIO at the University of Chicago and now a Vice-President at EDUCAUSE, in a

Chronicle of Higher Education piece, posed the question "Will you still need me when I'm 64" (Jackson, 2004)? His compelling article suggests that the answer is "probably not." Jackson argues that university administrators, and in particular Deans with a very parochial view, will lead the charge toward decentralization and consequently wrestle control from CIOs. The rationale offered is that "technological advances have reduced the need for central involvement; and departments now have enough computing resources to achieve economies of scale" (Jackson, 2004).

At University of California Berkeley in the late 1990's, a sense was developing that although there was much energy and activity within IT, innovation and investment should be largely decentralized to those closest to the action in the colleges and their academic departments. Further it was observed that central IT leadership should focus primarily on facilitation, not directing, and instead provide infrastructure and education to users (Trow, 1997). If the higher education CIO loses precious ground due to decentralization, he may have to follow the new rules of management, which delineate strategies to spend less, follow don't lead, and focus on vulnerabilities not opportunities (Carr, 2003). Most current-day CIOs would find this largely unpalatable.

In a recent pilot study contributing to this research, three CIOs representing smaller institutions (less than 3000 students) were interviewed (Moran, 2011) (Aponovich, 2011) (Barlow, 2011). It was interesting to note the high level of IT resource centralization and accompanying control these CIOs enjoyed. With modest budgets and equally small support staff numbers, these CIOs are constantly faced with choices among competing priorities, all of which deserve attention. However, decisions are being rendered in what can be best characterized as in "the best interests of the institution." Many CIOs at smaller institutions also hold faculty appointments, as is the case at Drew University in Madison, New Jersey, where the CIO is also a member of the

Mathematics Department, and at Kings College in Wilkes-Barre, Pennsylvania, where the CIO is also the chairperson of the Computer Science Department (Moran, 2011) (Candiotti, 2011). In other cases the CIO role and sometimes the entire IT staff is outsourced to companies like SunGard. The outsourcing of entire IT operations in higher education is very challenging primarily due to customer resistance and difficulties integrating the non-university employees into the campus culture and community. Hybrids are also prevalent like at Wilkes University in Wilkes-Barre, Pennsylvania, where the CIO is the only true Wilkes employee, while the remainder of the IT department is outsourced to SunGard (Barlow, 2011). Fairfield University in Fairfield, Connecticut outsources its entire administrative computing function, but not its academic computing function, to SunGard. In any event, these are models that persist and play a role in shaping the leadership of these critical functions.

Beyond Carr not much has been written on the topic of the disappearing CIO, thus a perceptible gap in the literature is noted here. Consequently, the question remains: Is the CIO an endangered species, or is the role truly evolving to a different status that maintains significant relevance?

Summary

This examination has encompassed the history and evolving role of the higher education CIO. It has also discussed facets of the ever-changing IT industry from several vantage points and such key contemporary areas of interest including IT consumerization, vitualization, the cloud, and information security, all shrouded by the constrained budget climate.

Although discrete areas of study, each worthy of much further examination, these topics are all interconnected in a matrix that help define the ever-changing CIO profession. They can be viewed as individual connected parts of the CIO's world.

Synthesizing the findings that materialize from this research is challenging. Historical facts and implications aside, this profession is a moving target with many definitions and expectations as defined by the individual institutions and the culture that permeates and defines those organizations. One size, therefore, definitely does not fit all.

However, out of this research a few unambiguous conclusions are apparent. First, this is a profession that is rapidly morphing to properly align with the IT industry and the higher education industry, and the very specific needs of the CIO's home institution. Second, IT is primarily about service, and its customers, representing multiple generations and expressing significant impatience, and their needs are changing rapidly. Third, adding value is an essential part of the long-term viability of the profession, but it's not totally clear how to accomplish, measure, communicate, and leverage this. Fourth, customary IT budget increases of the past appear to be a distant memory. Cost-effectiveness is essential, so as IT budgets trend towards greater decentralization, the customers will find and procure their own solutions. Fifth, technology developments such as cloud computing, information security, and consumerization are all significantly impacting the higher education CIO role and the IT organization, and will likely continue for years to come. They will become the central catalysts for significant changes ahead.

Since inception, the CIO profession has successfully navigated much change and escalating complexity amidst a degree of uncertainty and ambiguity. These reasons are sufficient to propel forward to study this role. The literature to date has made little attempt to delve deeply into the higher education CIO role. Rather, most studies have been somewhat superficial in their treatment of this topic. Therefore, there is a palpable gap in the understanding of the role. There is a paucity of literature that ventures to understand the psyche and discernment processes demonstrated by the higher

education CIO. Discovering and understanding the CIOs' rationalizing and decision-making amidst all of this change is a logical step in this journey that should produce original and refreshing findings for all who want to better understand this intriguing profession.

CHAPTER 3

RESEARCH METHODOLOGY

Introduction

Patton (2002) asserts “in some ways the differences between quantitative and qualitative methods involves trade-offs between breadth and depth.” To mitigate such a trade-off I followed an approach that foremost relies on qualitative methods in the form of personal interviews with carefully chosen subjects. Further, the qualitative portion of the study was enriched by conducting a focus group. Secondarily, the study draws data from a quantitative study of almost two hundred participants. Thus, this mixed method approach provides me with the opportunity to most thoroughly answer my research questions.

Restated, this study is being undertaken to address the following research question: How is the rapidly evolving role of the higher education Chief Information Officer (CIO) being influenced by the pervasive influence of the Information Technology (IT) consumerization movement as well as other contemporary IT influencers such as budget constraints due to the economic downturn, cloud computing, virtualization, and information security issues? Secondarily, the study will also address the question about the future viability of the role, and whether the role is becoming increasingly operational or strategic.

My research study was conceived as a qualitative phenomenological project bolstered by a timely set of quantitative assessment data, thus it bespeaks comprehensiveness and depth. This mutually-supporting and informing approach is intended to examine the relatively brief historical evolution of the CIO role primarily through the discussion of shared experiences of a representative group of higher

education CIOs. The interviews were designed and orchestrated based in some measure on the results of the 2011 LBCIO national survey of higher education CIOs, which was conducted in April 2011. Patton (2002) discusses the concept of mixed methods triangulation, which describes the use of multiple methods in strengthening the validity of a study. According to Patton (2002) "triangulation is ideal because every method has its limitations."

First I would like to report on the pilot study that I conducted between February and April 2011, which set the stage for and greatly informed the remainder of my work.

The Pilot Study

The pilot study built on the foundational research and evidence derived from the literature review. The pilot study was conducted in two phases. The first phase was a compilation and analysis of discussions stemming from the Leadership Board of Higher Education CIOs (LBCIO) meeting in Miami, Florida in February 2011. At this meeting I moderated a session on the role of the CIO in higher education exploring the main influencers of the role as it continues to evolve. My takeaways from this session, which was attended by about a dozen higher education CIOs and their deputies from a group of diverse institutions, aided in the development of the interview protocol that I ultimately utilized in the next phase of the pilot study.

The second phase of the pilot study was designed and orchestrated as a qualitative exercise that served as a dry run for the actual phenomenological study. In this part of the pilot study I practiced my interviewing technique and tested my protocol of questions with five higher education CIOs, who were selected as a convenience sample due to time constraints (Patton, 2002). The interview technique I selected was a conversational/standardized open-ended combined approach (Patton, 2002). This allowed for a structured protocol of questions with the flexibility to explore areas in more

depth or tangential to the planned questions. Given my knowledge of the profession and the willingness of the participants to share their insights, this flexibility was crucial to gleaning the most out of the interviews.

From a process standpoint I learned that conducting interviews in person offered a richer experience. From observing the office setting to watching for non-verbal cues, these experiences simply conveyed much more overall information. Additionally, I discovered that 60-90 minutes was sufficient to proceed through the protocol without the interview becoming mutually tedious and tiring.

From an information standpoint the combined dual phases of the pilot study prompted me to offer the following summarized findings:

First, my research questions were clearly resonating well with the CIOs. The issues I identified were apparently the major influencers on the role, and the CIOs were eager to discuss them.

Second, despite all of the challenges facing the CIOs, there was a noticeable sense of optimism about their individual professional situations and the future prospects for the role.

Third, the CIOs were ever conscious of the evolution of the role and their mandate for adding value to their enterprise. They seemed engaged in a broader sense at their institutions and felt secure in their breadth of institutional and industry knowledge.

Fourth, there was a matter-of-fact understanding and embracing of the idea of change in their professional worlds, and there was shared comfort with this notion.

Fifth, all participants were impacted by constrained budgets, which was influencing their thinking, planning, and decision-making in varying degrees.

The rich experience derived from the pilot study helped me with the design and execution of the quantitative and qualitative portions of my study. Next, I discuss the LBCIO survey, which, through the generosity of the LBCIO board, afforded me an opportunity that proved to be extremely useful and fortuitous.

The LBCIO Survey and Quantitative Approach

Staging was critical to the completeness and quality of the research data collection in which I was engaged. Having strengthened and refined my literature review, the initial stage of my research included the administering of the Leadership Board of Higher Education CIO's (LBCIO) annual survey of Higher Education CIOs.

Since my research focused solely on higher education CIOs, I was drawn to the relatively new LBCIO organization, where membership is limited to higher education CIOs. LBCIO, originally affiliated with *The Chronicle of Higher Education* in 2010, became independent of *The Chronicle* in 2011 though there still is a loose affiliation. LBCIOs CIO-only 2010 survey was distributed to 1086 CIOs. 236 CIOs ultimately completed the assessment. This inaugural survey yielded some very useful data that reported on a broad range of topics that CIOs are invested in (Zastrocky, 2010). With the decision by the LBCIO Board to repeat the survey in the spring of 2011, I seized the opportunity to seek permission to assist with the development and analysis of the survey, which afforded me the opportunity to insert a group of questions that directly address my research questions.

I closely examined the 2010 LBCIO survey questions to ascertain where the gaps might be in addressing my research questions. Since the IT industry changes rapidly, it is a forgone conclusion that the kinds of questions one might ask CIOs would also change from year to year. Looking through the lens of my research needs, I found the sections of questions on the cloud, information security, the budget, and relevance of

the CIO role offering an adequate baseline, but all in need of more clarifying probing. Thus I edited some of the existing questions and added a number of questions to more specifically address my research needs. IT consumerization was completely absent from the 2010 survey due to the fact that it had not yet begun to be a principal influencer of CIO planning and strategy. Accordingly, I had to construct from scratch the entire section on IT consumerization. Please refer to Appendix I for a copy of the entire 2011 LBCIO survey. The questions I added are highlighted.

In Section I of the survey I added questions #9 and #10 that deal directly with budget constraints impacting CIO decision-making. These questions were intended to deepen my understanding regarding how less financial resources were impacting CIO planning and decision-making. In Section II I inserted questions #15 and #17 that seek perspectives on the strategic vs. operational aspects of the CIO role, and inquire about key strategic relationships for the CIO. These questions were geared towards discerning CIO perspectives on the current relevance of the role, and how key senior management relationships might be impacting CIO relevance I also added the entire section of questions #18-24 on my key research theme concerning IT consumerization. In Section II I wrote questions #41-43 that inquire about the concept of adding value to the enterprise. This theme prominently emerged in the Literature Review and speaks to the future of the CIO role, thus it deserved further exploration. In Section V of the survey I asked question #19 about what factors are influencing CIOs to use the cloud. This question gets to the heart of what's motivating CIOs to place greater emphasis on cloud computing. The entire group of questions on Information Security in Section III was largely unchanged from 2010, since I determined that this set of questions adequately supported my research.

For the 2011 LBCIO survey 965 CIOs were invited to participate. 183 CIOs submitted responses. In each year this survey generated a participation rate of approximately 20% and characteristics of respondents tracked close to the 2010 survey respondent attributes.

This survey was distributed in April 2011 via email to a pre-populated distribution list of higher education CIOs that the LBCIO organization had developed upon formation, and updated recently. At least two reminder notices were sent prior to the closing of the survey in the early part of May 2011. Having access to the entire data set to analyze has been invaluable to this project. Since all of the questions integral to my research produced responses captured numerically, the stratified frequency analysis, based on demographic characteristics captured in Section I of the survey, was ideal to produce measurable results that were useful and informative to my research. In the event that respondents entered answers in the "other" category, these answers have been coded by best interpretation and included in the results.

Chapter 4 of this study chronicles results of the 2011 LBCIO survey. Included in the analysis of these results is commentary on how these results helped establish some foundational evidence, and inform the qualitative portion of my research. Commentary also is offered to shed some light on particular facets of my research questions.

Next I will describe the qualitative portion of this mixed methods study I undertook.

Qualitative Approach

Creswell (2007) asserts that "a phenomenological study describes the meaning for several individuals of their lived experiences of a concept or phenomenon." This method provided me with the opportunity to deeply probe with a group of higher education CIOs and senior officers at the same institutions to better appreciate and

understand their perspectives concerning the issues I identified in my research questions. I followed the prescription that Moustakas articulates regarding conducting this kind of research. I began all of my sessions with each CIO and senior officer by asking a few broad, general questions about their experiences. As I proceeded through my protocol I drilled down into specific topical areas with carefully crafted questions and follow-up queries depending on the responses I was eliciting. Following all the interviews I was able to highlight significant statements, sentences, or quotes that explained how the participants experienced the phenomenon, thus facilitating what Moustakas calls "horizontalization" (Moustakas, 1994). This was followed by my analysis seeking "clusters of meaning" and then developing themes (Moustakas, 1994). The issues that I covered are complex and diverse surrounding the profession and the identified major influencers. I tried not to settle for simple answers. Rather, I followed up many questions by asking each person to describe the thinking surrounding their assertions. On numerous occasions I asked participants to reflect on their experiences by examining their cognitive thoughts about the topics.

I was fortunate in being able to conduct all 16 interviews with higher education CIOs and senior officers (eight each) by October 2011. It was anticipated that eight CIOs and eight senior officers would represent a saturation of the population such that any additional participants would not have been expected to add much more to the analysis. This grouping of participants also fortunately offered the extent of diversity that lent credence to my study. See Tables 3 and 4 on pages 54 and 55.

As Patton (2002) succinctly stated, "The validity, meaningfulness, and insights generated from qualitative inquiry have more to do with the information richness of the cases selected and the observations/analytical capabilities of the researcher than the sample size." My selection of CIOs to interview was essentially based on my goal to

glean experiential information that was thoughtful, rich, unbiased, informed, and inclusive of the various and diverse campuses and individuals that comprise the higher education CIO community. I developed a pre-screening process that endeavored to discern basic demographic information without compromising privacy. This screening was accomplished by email where I determined gender, college/university type/size, and number of years in the CIO position. Although I would have attempted to guarantee generational balance since my experience tells me that views about information technology tend to track in some regards by age, I refrained from inquiring about age, which many consider a private, sensitive issue. However, though not planned, I did achieve an acceptable mix of generations quite serendipitously.

Table 3 Characteristics of Interviewed Higher Education CIOs

No.	Gender	CIO Tenure (Years)	Carnegie Class	Public/Private	Student Headcount
1	Male	9	Bachelor Diverse Small	Private	1,775
2	Male	2	Masters Large	Private	3,300
3	Female	2	RU/VH Research	Private	7,000
4	Female	5	RU/VH Research	Private	25,000
5	Male	10	Master Large	Public	8,300
6	Male	11	Masters Large	Public	12,500
7	Female	35	Two-Year Community College Large	Public	30,000
8	Female	5	Masters Large	Private	6,200

I limited my site selections to the mid-Atlantic and New England regions of the U.S., which offer large numbers of diverse institutions to choose from. I believe that the sites chosen sufficiently represented the total population of U.S. colleges and universities. I was able to travel to the selected campuses by driving one to four hours. Although this might be considered convenience sampling, I would argue that in this case it isn't significant since there are a plethora of institutions to choose from in the mid-Atlantic and New England regions (Patton, 2002).

Table 4 Characteristics of Interviewed Senior Officers

No.	Gender	Carnegie Class	Discipline
1	Female	Bachelor Diverse Small	Academics
2	Female	Masters Large	President
3	Female	RU/VH Research	Student Affairs
4	Male	RU/VH Research	Human Resources
5	Female	Masters Large	Academics
6	Male	Masters Large	Advancement
7	Female	Two-Year Community College Large	Enrollment Management
8	Male	Masters Large	Finance

To properly target prospective interviewees to invite I partially used the snowball method. By reputation, I was able to identify a diverse group of CIOs to seek an audience. However, by using the snowball method of seeking the recommendations of other CIOs for subjects to include in the study I was able to uncover some CIOs who truly possessed the know-how about the profession to provide insightful thinking about

my research questions (Patton, 2002). In some cases consultation with fellow CIOs was leveraged to gain access to those selected who I was not familiar with and might otherwise decline participation because they don't personally know me. In all cases I recruited the CIO participants first, and then enlisted their help in identifying and introducing me to the senior officer that would also be participating in the study. In the majority of cases the CIO helped coordinate the interview with the senior officer on their respective campus. This process worked out exceedingly well. Senior officers ranged from chief financial officers to academic officers to human resources officers to institutional advancement officers. In all cases of selection I was consciously focusing on subjects who had stories to tell and would be open to such inquiry (Cresswell, 2007). Although the vast majority of the participants did contribute first-order narratives, a few participants did offer a few second-order narratives that proved useful.

Process

Once the targeted individuals were identified, I emailed each prospective participant. In the email I briefly described my research and asked for their assistance in the form of an on-campus, in person interview. A few candidates declined participation fundamentally due to scheduling constraints. But, I had back-up candidates pre-identified to contact in the event I was unsuccessful in filling my original slate of preferred interviewees.

A week or two prior to the interview I sent the participant a brief questionnaire via email to collect basic information such as title and full name, highest degree attained, number of years in the CIO position, FTE enrollment at their respective institution, approximate total IT budget, and total FTE IT staff. This permitted me to optimize my interview time with each participant by focusing on the more complex, salient issues.

At the interview site, I asked for permission to audio-tape the interview and inquired if the interviewee preferred anonymity. I reviewed the IRB consent form with each person and secured a signature and date. All participants cooperated with the audio-taping of the interview and the completion of the consent form. I then embarked on my interview protocols, drafts of which are presented in Appendix II and III of this document. It is worth noting that I adjusted my protocol by inserting a few new questions and rephrasing a few others based on my experience with the earlier interviews, so I was learning and adapting as I was progressing along.

Interviewing is more challenging than it appears on the surface. It requires patience and skill on the part of the researcher (Cresswell, 2007). In my case, due to my own edification through the process, I was more comfortable in the latter interviews than the earlier interviews though all of the discourse contributed positively to the study.

The Interview Protocol

The interview protocol appearing in Appendix I has been updated since the completion of my pilot study, which was informative in helping to re-word, eliminate, add, and refine several of the questions.

The CIO interview protocol is structured into three sections. The first section assesses perspectives on the higher education CIO role in a broad sense and encourages participants to expound. The second section proceeds to gather data that pertains to my research questions. The final section wraps up the interview with a set of questions about other trends and the future of the profession. I did amend the protocol based on the results of the LBCIO survey, as described earlier. As with the pilot study interviews, I followed-up certain questions with other queries if the responses took an interesting twist or revealed a rich vein of data waiting to be mined. I brought each interview to a close by asking the open-ended question, “Can you think of any other

relevant information that we haven't covered that you deem helpful to this research?" Following the response to this question I thanked the interviewee for his/her time and indicated that I was willing to share a synopsis of what I gleaned from the interview to validate my findings (Creswell, 2007). I then offered to share a copy of the transcribed interview and my final dissertation with them at a future date, if they wished to receive either or both documents. A few of the CIO interviewees indicated that they were interested in receiving a copy of the final dissertation.

The senior officer protocol consisted of a more limited set of questions, many of which offered opportunities for expounding. I made greater use of extemporaneous questions since there was significant diversity in the roles of the senior officers. The timeframes for the interviews with senior officers ran somewhat shorter than the CIOs, averaging about 45 minutes. Other than that difference the process paralleled the process used with the CIOs.

I contracted with an individual to transcribe each interview session from tape. I then reviewed the transcribed copies without delay so that the ideas, insights, and thoughts would begin to coalesce in my mind while they were fresh. About a week after each interview, I sent a written note of appreciation to each participant.

In summary, this process though arduous at times was marked by a spirit of cooperation and candor that I couldn't have scripted.

The Focus Group at EDUCAUSE

EDUCAUSE is the premier organization devoted to the information technology field and related professions in higher education. Many CIOs and IT staff from around the world attend the EDUCAUSE annual conference, which has grown over the years to include thousands of participants. The 2011 annual conference was held in Philadelphia in October 2011, which provided me with a unique, timely opportunity to gather

qualitative data pertinent to my research. Instead of augmenting the numbers of my one on one CIO interviews, I decided to conduct a focus group of CIOs at the annual meeting. In this way I could introduce yet another method of data collection to my study, one in which fellow CIOs could play off of each other's ideas and perhaps grapple with issues where there was both divergence and convergence of thought.

The EDUCAUSE staff graciously agreed to assist me with recruiting CIOs for the session, who were both registered for the conference and who had formal titles signifying that they were indeed CIOs. Within hours of the distribution of the email solicitation that I drafted, the focus group was filled with 24 participants. Several interested parties asked to be placed on a waiting list, which was indicative of the high interest in the research topics to be discussed at the session.

As Patton (2002) observed "the object of a focus group is to get high quality data in a social context where people can consider their own views in the context of the views of others". Up to this point in the qualitative portion of the study data collection had been limited to one-on-one discussions. With the focus group came an opportunity for lively, interactive discussion among a group of participants sharing my research interests.

The CIO focus group ultimately was attended by 14 CIOs from a diverse group of institutions. The session involved my posing of about ten pre-selected questions that were intended to zero in on the key issues supporting my research questions. The interaction among the CIOs was lively and replete with interesting and insightful observations and quotes. Though there wasn't much in the way of disagreement there were plenty of contributions that built upon answers provided by participants, and points of clarification offered. The hour slipped by ever so quickly. My assessment is that the focus group represented an extremely valuable facet of my research and was a fascinating experience.

Following the focus group I sent notes of appreciation to the focus group participants and offered to share access to my dissertation when it was completed. About half of the participants took me up on the offer.

Qualitative Analysis

Once all of the individual interviews and the EDUCAUSE focus group were completed I needed to codify the results of this research. I identified each of my research issues (consumerization, cloud, virtualization, security, and budget) as well as those supporting issues that dealt with the relevance of the role that surfaced during this process and coded all of the responses. This allowed me to understand how each of these research issues was viewed, as well as the intensity and extent of the impact of each on the CIO role. After careful consideration of the options, I decided to use a traditional coding scheme by carefully reading through all of the transcripts and making notations in the margins. This was followed by using colored highlighters to bring attention to the most salient ideas and the most profound quotes. Utilizing different colors to align with the various main topical areas of inquiry, I was able to effectively categorize the most prominent observations. Then I sought out areas of convergence or what Patton (2002) would consider internal homogeneity. Likewise I looked to identify areas of divergence or what Patton (2002) would term external heterogeneity. From there I transferred the data to flipcharts and legal pads for further analysis, refinement, and observation.

Clustered around my primary and secondary research questions, I penned carefully refined ideas and concepts that emerged from the research. This process took considerable time as I focused on one research theme at a time. Then I proceeded to examine all of the data I collected on that theme. Finally, before I included a concept or idea in the cluster, I would seek out those consistencies that added validity to the idea.

Those data elements that were of the outlier category (mentioned only once or perhaps twice) were also captured separately. I examined and re-examined these multiple times in light of the body of data collected to be certain that I was making the most reasonable and informed judgment about that data.

Intangibly, these clusters ultimately were translated into my findings as my sense-making process played out. Finally, I had to decide what to include in my findings and what to leave out.

Other Sources

The IT field is one that is characterized by a breakneck pace. Such a hyper-changing landscape yields much fodder for industry watchers and scribes to analyze and discuss. On a daily basis blogs and a host of web news sources are filled with the latest, breaking news announcements and analysis. Some of the information produced and disseminated is well supported and sound, while some lacks grounding and proper review. So, choosing trusted sources for new information to enhance the literature review and to contribute perspective to the research is critical. Such publications as *Computerworld, The Chronicle of Higher Education, CIO Magazine, EDUCAUSE Quarterly, University Business,* and others continued to inform my work into October-December 2011. Since such issues as consumerization and cloud computing are early in their cycle of adoption and understanding, there was new literature emerging daily that was helpful to this study. I had to be increasingly more discerning as time marched on, or this project would never have been completed within the prescribed timeframe.

By experience I know that the higher education CIO community tends to be actively and openly engaged in sharing insights. Occasionally, some of the most insightful information is found on the EDUCAUSE CIO Listserv where new threads are posted at least a few times daily. This listserv is also known for its timely informal

surveys where a CIO poses a question, listserv members respond, and the person originating the posting summarizes the results for the entire listserv. I continued to participate in and monitor this listserv to avail myself of all pertinent information into October-December 2011.

Social networks such as LinkedIn are also beginning to provide thought-provoking information on a variety of topics. Being linked to a host of higher education CIOs on this social network delivers daily blog feeds that are akin to conversations and debates on a variety of relevant issues.

Suffice it to say, accessing data, both quantitative and qualitative, on the topics I was researching was not problematic. Sorting through all the reams of data to surface that which was most useful to my research was much more challenging.

Validity and Reliability

With respect to validity I needed to prove with great certitude that the data collected truly reflected what the respondents actually think. As previously stated I chose the mixed methods approach to ensure the greatest probability for validity since corroborating evidence is a proven method for ensuring validity (Suskie, 1996). To this end I utilized an enhanced web survey and my extensive network of colleague CIOs to harvest my data. However, the mixed methodology also lends more credence to the research in that it probes for data in two very different ways. The two methods did prove to reveal interesting points of intersection, or at least partial overlaps that strengthened the validity of the results of this shared experience and perspective. Less is left for interpretation and hypothesis if more than one source of data is producing similar results (Patton, 2002). This “triangulation technique” was the centerpiece of my main validation strategy. Also, I am able to support a claim of validity by comparing a few key metrics. The average tenure of a higher education CIO is 7 years (Brown, 2011). With my CIO

interview sample the median tenure was between 5-9 years. Brown (2011) also reports that 28% of higher education CIOs hail from Masters level institutions while 26% work at Research institutions. These numbers correlate well with the respondents to the 2011 LBCIO survey where 28% of the responding CIOs represented Masters level schools and 26% represented Research universities (DeSanto & Zastrocky, 2011).

I would also add that my experience with the CIO higher education community is one that bespeaks trust and openness. There are no conceivable reasons for CIOs to provide misleading information or to withhold information. On the contrary, my experience bears out that CIOs will extend themselves to provide frank, candid, and thoughtful comments at all times. Thus, I implicitly trust the input of the participants.

Reliability denotes consistency of responses meaning that responses to similar questions should remain consistent over time (Suskie, 1996). Fortunately, the pilot study discussed previously afforded me the opportunity to test many of my interview questions. The responses to many questions from the pilot study tracked consistent with the formal study passing the relatively brief test of time. In addition, because the LBCIO survey was administered in 2010 and repeated with some enhancements in 2011, I was able to examine the responses to similar questions that were administered each year. Test-retest is an acceptable measure of reliability, and in this case proved true to form (Suskie, 1996).

Personal Perspective

I am currently a higher education CIO with over thirty years of experience in the IT industry and over 20 years as a higher education CIO. Thus, I can't avoid coming to the table with perspectives of my own. However, I made the conscious effort during the interviews and subsequent analysis associated with my pilot study and the actual qualitative portion of the study to listen carefully and not contribute my own beliefs and

perspective to the conversations or subsequent analysis. This basically aligns with Moustakas' steps of Phenomenological Reduction, which I drew upon during the formal study. The three phases of this process known as bracketing, horizontalizing, and clustering the horizons are very eloquent conceptualizations of qualitative analysis capturing the essence of the researcher dealing with the qualitative experience while setting aside knowledge, personal experience, and other subtle and non-subtle biases (Moustakas, 1994). As challenging as this may sound, I'm confident that this effort paid dividends in the Findings and Conclusions chapters.

Ethics

I was ever mindful of the potential ethical issues associated with my research. The LBCIO survey is owned and controlled by the LBCIO Board, of which I'm a member. The Board approved my use of the results in this research study. I gained the consent of each participant in the one on one interviews and the focus group to use information gathered through these processes while guaranteeing anonymity. I didn't feel it necessary to seek permission to identify the institutions represented in the study or to attribute comments directly to any participant in the interviews or focus group. Thus, I was able to avoid any ethical complexities associated with direct attribution without sacrificing my findings and conclusions. In retrospect the data gathered was not controversial or explicitly revealing to compromise anyone participating in any way. However, safeguarding the confidentiality of the participants remained one of my primary concerns.

Summary

This concludes a comprehensive description of the methodology designed and executed for this mixed methods study with a primary emphasis on qualitative phenomenological research methods. My contention is that the methods discussed in

this section did yield the most complete, valid results, adhering to the highest ethical standards to satisfactorily address my research questions. As a researcher I was truly fortunate to be able to access a very extensive, rich body of both quantitative and qualitative data in my study. I couldn't have hoped for anything better. My cursory review of other such studies reveals that mixed methods is uncommon. The studies are either quantitative or qualitative in nature, not both, so I'm heartened that this research approach is unique and refreshing in these regards.

The upcoming chapter begins laying out the findings section of this dissertation. I begin this delineation with the 2011 LBCIO survey results, which provides groundwork that can stand on its own as well as inform the remainder of my qualitative data collection activities, as discussed earlier in this chapter.

CHAPTER 4

THE LEADERSHIP BOARD of CIOs (LBCIO) 2011 SURVEY FINDINGS

Introduction

LBCIO (Leadership Board of Higher Education CIOs) is a relatively new organization comprised of higher education CIOs and their protégés (as identified by the CIOs). The organization prides itself on information and knowledge sharing about the CIO profession in higher education, and the plethora of challenges and pressures facing these senior administrators.

I decided to use this survey to serve two main purposes. First, I wanted to triangulate my findings relative to my research questions. This survey allowed me to reach a relatively large, diverse population of higher education CIOs at precisely the most opportune time during my research project. Coupling these results with my qualitative findings would provide for a triangulation that included both wider scope (survey respondents) and more-focused scope (interviews) data collection. Second, this survey was intended to generate data for me to consider and utilize as I constructed and executed the qualitative portion of the research study.

Accordingly, this chapter examines the segment of the survey results that most closely supports this dissertation research. Therefore, I decided to limit the reporting and discussion in this chapter to CIO responses concerning IT consumerization, IT security, the cloud, budget constraints, and the strategic versus operational issue. The survey responses to questions on virtualization did not produce meaningful findings, so I decided not to report on that issue. Many of the LBCIO survey questions were authored by me to specifically support my research. I’ve attached a copy of the survey in Appendix I of this document with the questions I inserted highlighted for easy reference.

Findings

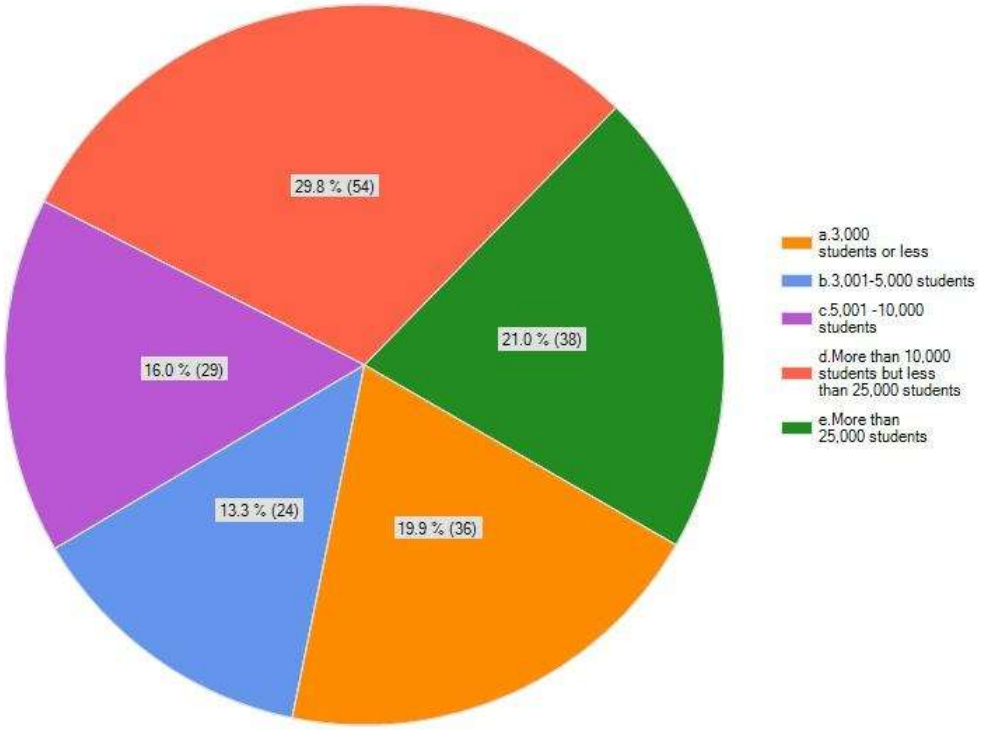
The 2011 LBCIO survey generated the following key findings that most inform my research questions:

- IT consumerization has infiltrated college campuses rapidly and is having a noticeable impact with 95% of respondents indicating that the effect can be described as either moderate or significant.
- The comfort level with cloud computing is increasing as evidenced by the report that 57% of the CIOs surveyed indicated that they are using cloud computing on their campuses compared to 46% reporting on the same question in the 2010 LBCIO survey.
- Support for information security efforts increased over the past two years at 61% of the responding institutions. In the 2010 LBCIO survey 51% of the responding institutions reported a 25% increase in spending on information security.
- IT budgets are beginning to rebound from low points reported in 2010. 75% of respondents reported either flat or increased IT budgets during 2011. This compares favorably to the 2010 report of 57% of budgets remaining flat or increasing.
- 68% of CIOs believe that the CIO role has become more strategic in nature.
- 91% of CIOs see business process improvement as a key area where they can add value to the institution. This is closely followed by 82% reporting that CIOs are positioned to add value in institutional strategic planning, and 80% reporting that CIOs add value in teaching and learning innovation.

Demographics

The 2011 LBCIO survey was distributed to 965 and completed by 183 higher education CIOs for a response rate of 19%.

Chart 1
Size of Institution (based on FTE not Headcount)



Note. From "Information Technology in Higher Education: 2011 Survey of Chief Information Officers, Executive Summary," by Jerome DeSanto and Michael Zastrocky, 2011.

The 183 CIO respondents hail from a diverse grouping of schools that are categorized by size (FTE headcount). Large schools of 10,000 FTE to 25,000 FTE lead the pack at 29.8% while those schools with 3,000 FTE to 5000 FTE trail at 13.3%. Very large institutions of 25,000+ FTE are also well represented at 21%.

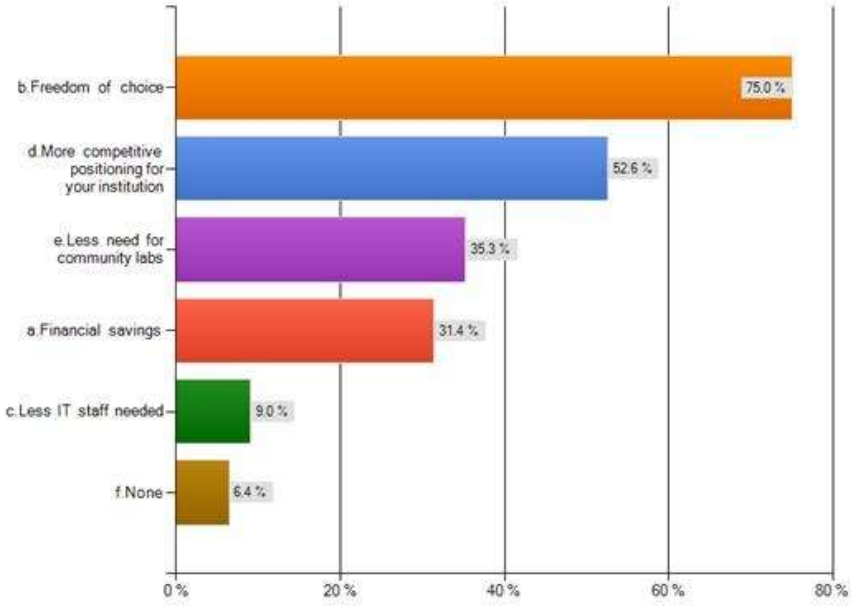
IT Consumerization

A principal focus of this study deals with the consumerization of IT. Individuals on college campuses are purchasing smart phones, laptops, and tablets expecting to

mirror the experience on campus with that in the consumer space (O'Brien, 2011). As reported earlier, 95% of respondents see consumerization having a moderate or significant impact on CIO planning.

Closely examining the perspectives of the CIOs about this phenomenon perhaps one can see how CIOs are beginning to develop their thinking about consumerization. Chart 2 assesses the CIOs' views on the potential benefits of IT consumerization Although the top two benefits listed (freedom of choice and more competitive positioning for the institution) are difficult to tangibly measure, the next three benefits (less need for community labs, financial savings, and less IT staff needed) get to a key matter—impact on cost and finances. In identifying these potential cost benefits, surveyed CIOs may be suggesting that there could conceivably be a silver lining to consumerization.

Chart 2
Potential Benefits of the Consumerization Movement



Note. From "Information Technology in Higher Education: 2011 Survey of Chief Information Officers, Executive Summary," by Jerome DeSanto and Michael Zastrocky, 2011.

Balancing the potential benefits of consumerization are the recognizable pitfalls. Chief among the CIO concerns are the ever-present IT security issue at 91.8%. This worry mainly centers around the prospect for lost or stolen devices that may have confidential information stored on them (Schuman, 2011). This problem is closely followed by integration issues at 86.8% and bandwidth concerns at 62.3%. The former issue deals with the diversity of devices appearing on the scene lacking interoperability because of the wide variety of vendors and standards. The latter matter points to the amount of network bandwidth resource required to support untold number of WiFi enabled devices on campus. It's very difficult to predict how much network bandwidth will be enough to meet demand when it's impossible to know how many devices need to be supported and the extent of usage these devices will see.

This data on consumerization illustrates higher education CIOs first recognizing that the phenonemen is real and impactful, and second that in these early days of factfinding and analysis there are a number of advantages and disadvantages to consider. This data aided me in designing my primary and follow-up questions regarding consumerization for the qualitative portion of the research study.

IT Security

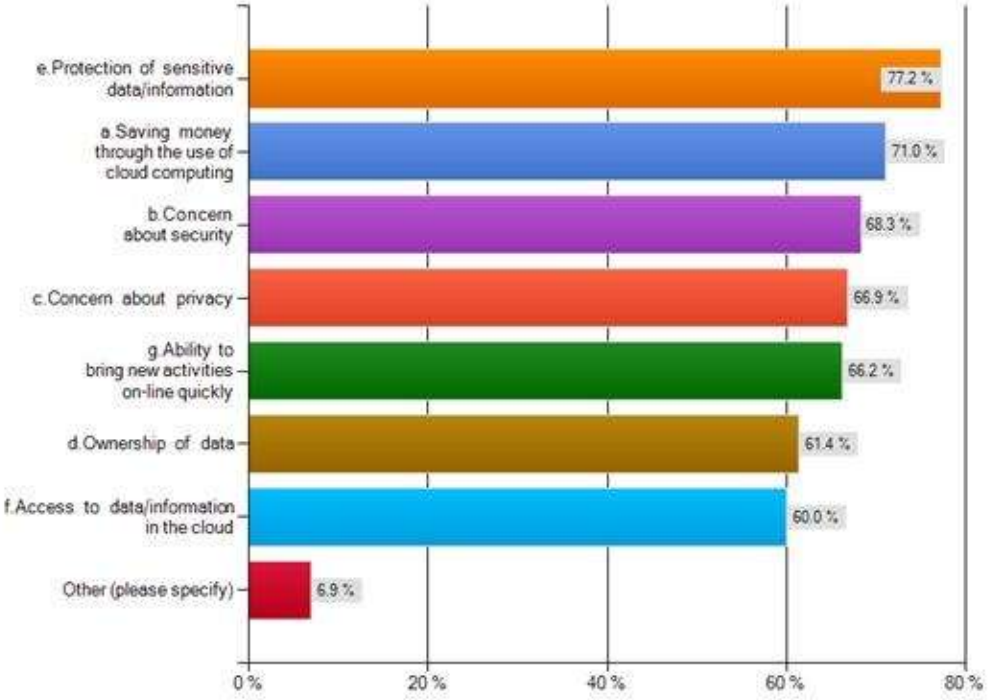
The escalating significance of IT security is examined through two main questions on the survey. The first question deals with the identification of a Chief Security Officer (CSO) for the campus. The 2011 survey shows that 57% of responding institutions have indeed designated someone as CSO. This compares to 55% reported in the prior year's survey. This represents only a slight increase year to year. But, one might deduce that many campuses are coordinating the function by adding these responsibilities to existing staff members' portfolios of responsibilities instead of appointing a true CSO. Someone is obviously performing these functions. Evidence of

the mounting importance of the function is found in the swelling financial investments being made in information security, which represents the second fundamental inquiry in the survey. 61% of CIOs indicate that they have dedicated additional financial resources to the information security function over the past two years. This data was instrumental in informing my qualitative probe that attempted to gauge the CIOs' efforts in this regard. This track focused on inquiry into how IT security, given its pressure on resources, was impacting the CIOs' role in the broader institutional sense and in day to day activities.

The Cloud

The survey data supports that cloud computing is another key factor impacting today's higher education CIO. The survey collected responses on a variety of aspects of cloud computing. The evidence supports the contention that CIOs are increasingly migrating services to the cloud. 81% of responding CIOs indicated that they are either currently utilizing cloud computing or plan to use it in the future. Those currently deploying cloud solutions represent 57% of this combined number. This compares to 46% reported in the 2010 survey, which represents a 20% increase year to year. The chief question for this research deals with the CIOs' rationale for opting to use the cloud. The chart that follows shows both a mix of rationale for using the cloud as well as concerns about the cloud. The main anxiety-producer for the CIOs appears to be emanating from security, privacy, and ownership issues, which track between 70% and 80% of respondents in the survey, while the rationale for adopting the cloud focuses on saving money and enjoying quicker speed to development, which yielded responses of 71% and 66% respectively.

Chart 3
Cloud Computing Influencers



Note. From "Information Technology in Higher Education: 2011 Survey of Chief Information Officers, Executive Summary," by Jerome DeSanto and Michael Zastrocky, 2011.

This set of data on the cloud was very useful in helping me refine my inquiries about the motivations that are driving CIOs to opt for cloud computing solutions. Much like consumerization, there is a delicate balancing act operative where the benefits of using the cloud are weighed against the potential shortcomings of this strategy. It's interesting to note that the data points to perceived weaknesses that dovetail with CIO concerns that are primarily part of the information security function.

IT Budget Constraints

As discussed previously in this research the IT budget is fodder for much analysis and conversations among CIOs. Thus, this survey commits several questions to ascertaining various information about budget. The good news reported by CIOs is that

the impact of the current recession on the IT budget has begun to recede. 75% of CIO respondents indicated that their budgets have either stayed at the same levels from the prior year or increased. This compares quite favorably against 57% reporting on the same question in 2010. In direct support of this research, CIOs were asked to what extent constrained budgets were impacting their IT decision-making. Strikingly, over 80% of the respondents answered that their decision-making is either somewhat (54%) or significantly (24%) being influenced by financial resource constraints. This signals that most CIOs are feeling budget pressures as they juggle multiple existing operational neccessities as well as emerging needs.

These responses informed my thinking about where to incisively probe for more fruitful information concerning the relevance of the research question surrounding budget.

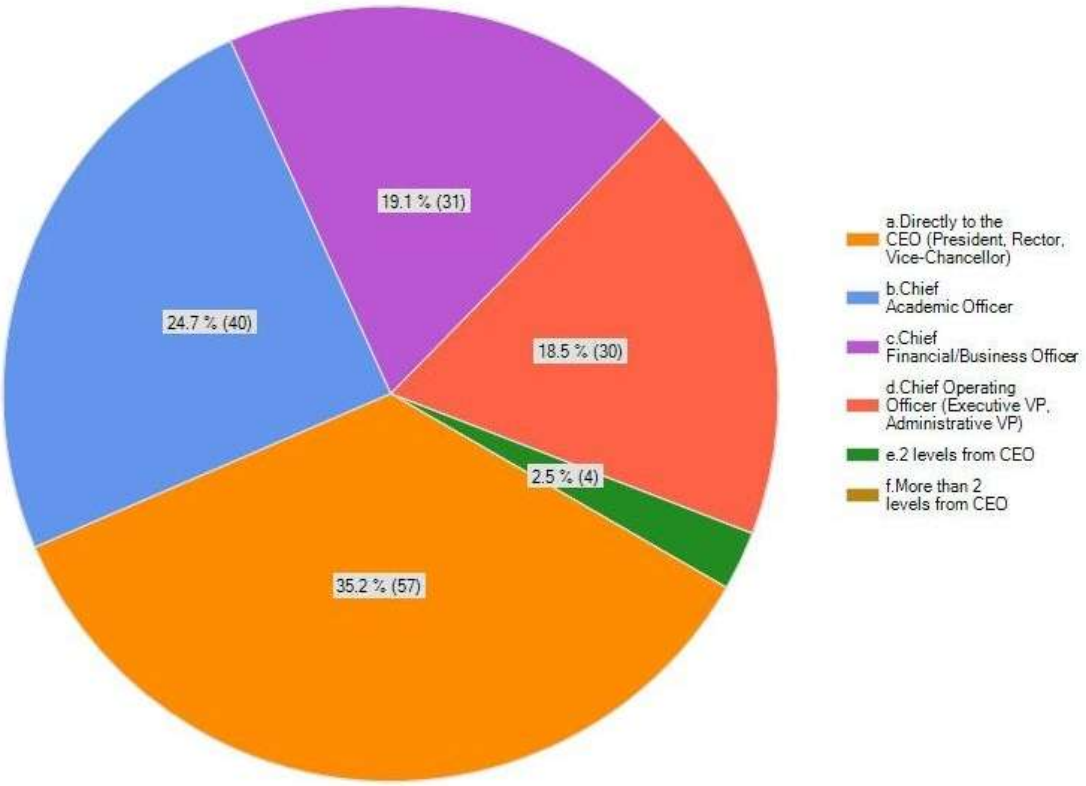
CIO Role Relevance and the Value Proposition

The 2011 LBCIO survey deals with the essence of the evolving higher education CIO role—how it is viewed and how it is positioned now and for the future. The responses to several questions aid in bringing clarity to understanding how this complex and often debated area is developing.

Almost 9 out of 10 CIOs believe that the can add the most value in the realms of business process improvement and institutional strategic planning, while almost 8 out of 10 CIOs contend that they can add value in the area of teaching and learning innovation. This clearly stakes out turf for the CIO to make significant contributions. Drilling down further in this data and performing a cross-tabulation against the CIOs' reporting line, we discover that 93% of the CIOs who report directly to the campus CEO or President see value added in the strategic planning arena, while that number decreases to 80% for those CIOs who report to the CFO. This analysis would seem to support the notion that

those CIOs who report directly to the president are more likely to contribute to institutional strategy.

Chart 4
Where Does the CIO Report?



Note. From "Information Technology in Higher Education: 2011 Survey of Chief Information Officers, Executive Summary," by Jerome DeSanto and Michael Zastrocky, 2011.

The data from the 2011 LBCIO survey tracks consistently with the few other surveys (Brown, 2011) that report on such matters. The majority of CIOs report to the President at 35%, closely followed by the CAO at 25%, the CFO at 19%, and COO at 18.5%.

Regardless of reporting line 68% of responding CIOs believe that their role has become more strategic, while 12% think that their role has become more operational.

The other 20% of CIO responders have experienced no discernible change in the role. This data plainly refutes Nicolas Carr's (2003) assertion about the decline of the significance of the CIO role, at least from the perspective of the CIOs.

Another equally interesting observation is seen in the responses to the question concerning executive leadership support for the CIO to contribute to non-IT strategy. 30% of CIOs thought that senior leadership strongly supported this idea while 54% saw the support as middle range or marginal. 16% felt that executive leadership had no interest in the CIOs contributing in this manner. This data provides a less convincing picture about CIO involvement in institutional strategy formulation. The feelings appear to be mixed about how welcome CIOs actually are in weighing in on institutional strategy.

Finally, a question regarding the CIO's most important institutional relationships with other senior administrators was posed. Although various senior administrators are mentioned in the data, the CAO at 76%, the CFO at 73%, and the President at 71% dominate this grouping. This data appears to parallel and support the key areas CIOs see themselves capable of adding value (business process improvement, strategic planning, and teaching and learning innovation). These functions are clearly important to the three senior administrators that top this list.

Summary

The full 2011 LBCIO survey covers considerably more ground than is chronicled in this chapter, but in the interest of the focus areas of my study I have concentrated attention on the themes detailed in the preceding pages.

Many of these results tracked consistently and complement the findings that were uncovered in the literature review and emerged from my pilot study. Overall, these findings continue to support that CIOs are cognizant of the major drivers of change in the

IT industry that are impacting the role of the CIO, and fully acknowledge that the role is indeed changing. Furthermore, the data supports that CIO optimism about the future of the role and the strategic nature of the role is strong and omnipresent. Additionally, this data persistently points to the necessity for CIOs to partner with other senior leaders as their respective institutions evolve.

The LBCIO survey results were instrumental in guiding the development and refinement of the qualitative portion of this study. It helped tailor questions and identify areas that could be probed for more in depth analysis in the sixteen individual interviews as well as in the focus group. The results of this survey triangulated with the findings detailed in Chapter 5 lead to the conclusions in Chapter 6.

CHAPTER 5

QUALITATIVE FINDINGS

Introduction

Overlaying this forthcoming discussion of findings was the intentional practice of epoche as Moustakas (1994) describes so aptly as a refreshingly new way of looking at things. It was challenging for me having immersed myself for almost two decades in the CIO profession to actually step back and put aside my knowledge, understandings and experiences. But, to be true to this process I endeavored to accomplish this and present the following findings.

I am reporting on and describing eight findings in this chapter. I have chosen to organize and describe these findings as follows: The first three findings directly correlate and support my primary research question about what contemporary IT industry influencers are most impacting the evolving higher education CIO role. The next three findings substantiate positions regarding the description of the CIO role as primarily operational or strategic. The final two findings deal with the future state of the higher education CIO, looking at what is to come through a set of finite lenses.

Finding #1—IT Consumerization and Personalization

95% of the 2011 LBCIO Survey respondents indicated that IT consumerization is either moderately or extensively impacting their planning efforts. This majority contention is further endorsed in the individual CIO and senior leader interviews and the focus group session. This evidence is overwhelming.

Participants unanimously agreed that they must be accepting of the onrush of IT consumerization. There really is no other choice. The reactions to this phenomenon by participating CIOs were decidedly mixed. On one hand CIOs seemed resolute with what

was occurring around them. But, on the other hand there was a palpable state of discomfort. Most interactions surrounding consumerization prompted thoughtful, pensive reactions as one could surmise that CIOs were not quite sure what the future might have in store as a result of this movement.

One particularly thoughtful CIO introduced the idea that consumerization is in effect “personalization” of IT. This notion connoting that everyone will now begin to customize their IT experiences on campus, at home, and in myriad other venues is antithetical to traditional IT approaches, which have heavily focused on standards to control cost and ensure consistency of service. In recent times one would be remiss not to mention the data confidentiality and security reasons for the application of standards. However, there is a universal admission that the rules of the game have changed. Reflecting on how consumerization has impacted CIO planning and decision-making, and how the power and control is shifting, one small college CIO quipped:

> We had an iron grip on all technology spending and initiatives. We could keep things we didn’t want out of the organization while imposing standards on the organization for what tools people would use to get stuff done, and that control is quickly vanishing.

Interestingly, IT consumerization refers to more than devices, according to one CIO I spoke with from a mid-sized state university. He told a story about an academic office that procured its own clouded storage solution from an outside provider and began to move university data to this storage, without consulting with IT. Such storage is relatively inexpensive and quite easy to purchase. However, the academic department was not well versed on what to look out for with respect to performance, reliability, and redundancy, not to mention the complexities of the contract.

Two CIOs attending the focus group session offered these comments about IT consumerization:

> I think something that is different is the rate at which change is occurring. There is less time for us to become familiar with things. There is also a greater diversity of things. There is much less time for us to understand how things work and figure out solutions to problems.
>
> I think it is challenging us to be more precise about what is core to our institutions and that's where our depth has to focus. In our roles as CIOs we almost become limbo space between consumers and our technical staff trying to balance connection between the two. Is it worth it trying to keep up? Should we even try?

During the Focus Group one CIO commented on the experience of a fellow colleague CIO and how consumerization is driving expectations and changing the IT service paradigm:

> My colleague's worst days of the month followed her President's trips by air travel where he had seen the executive magazines in the seat pocket and all the consumer gadgets being advertised. Now everyone sees it everywhere on television, newspapers, and blogs and so forth. This has set some new expectations. We are evolving into brokers of tools and information content.

Senior officers echoed sentiments that embracing consumerization was non-negotiable. They collectively centered their thinking about consumerization on student customers and their rising expectations. One senior officer appeared to capture this idea particularly well.

> I just reviewed the ECAR study over the weekend and that study confirmed that the students expect to use whatever device they bring to campus. I feel that way. I think it's the University's responsibility to accommodate that consumerization.

With respect to the impact on the role of the higher education CIO, the research bears out that the CIOs are spending much less time considering standards and procuring devices (EDUCAUSE, 2009). They are shifting their attention to facilitating the operability of consumer devices, and designing and providing support to customers, though there is a growing sentiment among CIOs who are beginning to question whether there is really going to be a need for customer support in the future. This position acknowledges the very high level of sophistication of many constituents who are fully

capable of providing their own support and the seemingly futile position CIOs find themselves in trying to stay current with the latest devices.

One significant shift in the CIO role deals with the human capacity for being expert. One focus group CIO articulated this shift succinctly.

> I think we CIOs used to be masters of a few things at a very deep level. Now we have to be much more agile and be satisfied perhaps with a more shallow understanding of a lot of things.

These findings parallel evidence presented in the Literature Review. The good news is that the CIO and the IT departments are learning to live with the BYOD (Bring Your Own Device) scenario, but the struggle continues to manage them from a security, cost, and operations perspective (Tynan, 2011). This is where the CIO finds himself these days, and into the foreseeable future.

Finding #2—The Cloud—A Repackaging of Outsourcing

The data center was once the heart of every IT operation: a bastion of machines, cables, and forced cool air flow, functioning in building basements under lock and key. Some data centers included glass enclosures so that visitors could marvel at the display of power and might amidst the mystery surrounding it all. Over the last few decades as the mystery receded and the weight and mass of the hardware decreased, the data centers shrunk in size and moved to any floor in the building of choice. The awe dissipated and was replaced with the simple acknowledgement that these were rooms with technology equipment, which could really be located anywhere on or off premise. These facilities were originally a sustainability engineer's nightmare, consuming considerable electrical resource and generating considerable disposal challenges when obsolescence inevitably arrived (Goldstein, 2008).

The disappearance of the proprietary data centers has been spurred on by the emergence of the "cloud." Several CIOs commented that the cloud is merely a

repackaging of what has been commonly referred to in the past as outsourced services. Some of the CIOs interviewed contend that the cloud will sound the death knell for the internally run data center since external providers will be able to provision the services less expensively and equally or more securely than provisioning a locally hosted cloud (data center).

Since a significant portion of the CIOs' past responsibilities dealt with building and managing the data center, this movement to the external cloud is indeed a role-altering event. In the 2011 LBCIO survey, all sixteen individual interviews and the focus group supplied the same attitudes about the cloud. There is definitely an increasing comfort level with migrating services to the cloud among all participants in this research. It has proven to be reliable, secure, less expensive, and quicker to deployment than hosting solutions in house. The cloud though does not come without some caveats. A few CIOs expressed worry about someday reversing their decisions about using the cloud sensing that it may become more time-consuming and expensive to revert to the internal cloud. In addition, all participants shared trepidation about the implications of storing confidential data off site. Notwithstanding assurances written in contractual language with vendors, remote storage of regulated personally identifiable information (PII) is troubling to most. A CIO from a large Research I institution mentions:

> We worry about security and privacy. We also worry about cost. It is a business model that needs to be managed. Over the last decade or two we have built several large data centers, so we are looking carefully at the cost of migration to the cloud both short term and long term. I think for the most part we have a positive sentiment about migrating more and more to the cloud.

Increasingly, this movement to the cloud redefines the CIOs' role from data center architect and manager to contract negotiator and broker of services. This is another leading example of how the role has shifted and why CIO business and interpersonal skills are underscored as crucial. One outlier CIO who is spending much

time in this space commented that he is discussing future needs with cloud providers and attempting to forge agreements for future options for services at a predetermined price. He went on to articulate that he has contemplated the possibility of selling his options to another CIO who may need such cloud offerings sooner. Thus, he sees part of the CIO role defined as Options Dealer.

Smaller school CIOs seem to be more aggressively pursuing cloud options for reasons of cost savings. One small school CIO offered the following at the Focus Group:

> I'm from a small school, so for us it has meant going to look for a solution first from the cloud just because of resource availability. Is there something out there that somebody will host for us? Then we try to balance the security concerns.

Senior officers seem to place their trust in the CIO for deciding on cloud solutions. One senior officer stated it this way:

> If the CIO sits down with me and recommends using the cloud, then that is what we're doing. We rely on the CIO to make sure he's OK with security. If it is safe and saves us money I'm all for it.

When CIOs contemplate a future filled with cloud services, a degree of healthy skepticism creeps into the conversation. Most CIOs would readily admit that it's hard to envision an entire ERP suite in an external cloud. Others are quick to mention that they remain a discriminating consumer when considering cloud solutions. A CIO at the focus group commented:

> There are times when the cloud makes perfect sense, and then there are times when it doesn't. I had my staff respond to me when I was looking at the new Apple 4s iPhone, the new operating system, and the iCloud. How are we going to keep people from putting their college email up in iCloud? He said, "What makes you think you can stop them?"

Finding #3—Security, Risk Management and Compliance

Few could mount a coherent argument against the contention that the birth and pervasiveness of the Internet monumentally changed IT expectations and deliverables for the betterment of our global society. It fueled the materialization of the globalization

movement, which eliminated territorial and communications barriers and facilitated the creation of a true global economy and society. However, with significant progress and achievement typically come caveats. In the case of robust and ubiquitous communications networks, which are utilized today to advance business, learning, and understanding, there lurks the dark side of humanity manifesting itself in those who wish to use such resources for nefarious purposes. Indiscretions include various forms of identity theft, illegal use of assets and resources, and denial of service attacks perpetrated on businesses and organizations of any type, just to cite a few examples. Colleges and universities are prime targets for cyber criminals because they contain an abundant array of rich data resources and their defenses are traditionally not stalwart owing to the “open” nature of these institutions.

This creates a very high order obligation on the part of the higher education CIO to provide protection for its campus information assets in an environment and culture that doesn’t support restrictions of any kind. The investments of time, people, and money in preventive measures, forensic tools, and remedial solutions are escalating each year as evidenced by several recent surveys, and there’s no end in sight. For instance, the 2011 LBCIO survey reports that over 90% of the institutions are spending the same amount or increased amount of dollars on IT security as compared to the previous year. Of these 55% are reporting increased spending at a time when budgets are very constrained due to higher education’s response to the economic downturn as referenced in the Literature Review. Although many CIOs have established Information Security Offices and recruited for Chief Information Security Officers and engineers to lead and staff this growing function, CIOs are also spending more of their time involved in such activities. This certainly reflects the critical nature of the risks involved and the

complexities of contemplating reactions to multi-pronged, sophisticated attacks being launched continuously at the enterprise.

Consistent with the information found in the Review of Literature about this relatively recent phenomenon, all sixteen participants in the interviews expressed both concern and dismay at the current state of affairs of information security. Heightened anxiety alone isn't getting the job done though. After putting deterrents in place to ward off attackers, which has increasingly become a cat and mouse game, many CIOs have begun the tireless long overdue work of examining and developing IT policies. Others began this process by focusing on government imposed challenges. One CIO from a mid-sized university remarked:

> In my first year I realized we were policy-light. The first thing we did was draft an overarching information security policy that gave us the ability to start bolting on some very specific policies or addendums. I also discovered we were out of compliance with respect to PCI DSS, and so over time we needed to work with vendors to achieve compliance.

The compliance issues have become so burdensome and complex that some Institutions have decided to hire their own legal counsel. A CIO from a Research I institution offered:

> I have the good fortune of having a Chief Security and Compliance Officer who works for me. He is an attorney who was educated at Harvard. He is brilliant and relentless. He is one of those people who knows when to raise the flag and when to just manage things behind the scenes.

This last statement about the Harvard trained attorney is quite profound and illustrates well one way in which the CIO role has evolved. CIOs are now being positioned to assess risk and action, or lack thereof, on behalf of their institution. Much of this concern is embedded in choices as to publically disclosing suspected cybercrime events or not. These are choices that CIOs weren't faced with a decade ago. With most cases the potential for harm to individuals and the institution is great, but the costs

(financial, reputational, service constraints) of taking certain actions are also great. Balancing these competing choices has become so complicated that consulting with lawyers is often the prudent avenue to pursue.

A new partnership between an institution's General Counsel and the CIO is rapidly developing on most campuses. As a recent article states, "'Putting a CIO and a lawyer together in the same room may give you the start of a pretty decent joke, but it could also save your institution millions of dollars in legal fees. While the IT chief understands the systems that fall under the purview of compliance, the attorney is the go-to pessimist for identifying the "gotcha" elements when it comes to the law. Working together, they are equipped to anticipate and resolve legal worries before they mushroom into headaches" (Schaffhauser, 2012).

A CIO from a state university decried being under the scrutiny of outside auditors:

> In my first year as CIO we had five visits including state auditors, Price-Waterhouse Coopers and special audits—everything ranging from servers to firewall evaluations, penetration testing and the typical ones dealing with processes and procedures. The climate is so infused with the concern for security that it has affected all layers of our process.

In at least some cases CIOs share the weight of mitigating information security risk with key divisions outside of IT. One senior officer shared this insight:

> I absolutely worry about information security. I have security people on my team. You have an unprotected computer and there are people out there trying to harm you. Then you have the benevolent screw ups where people are web surfing and they don't even know they have a key logger. In my area we deal with some of the most critical data. We worry about it all the time. Internal audit comes out and audits us regularly.

Other senior officers recognize that the challenge requires more robust educational programs for faculty and staff, but even education is not sufficient to fully mitigate the threat.

> You want to make sure you are educating your campus community about the proper use of confidential information. So you have educational programs that minimize that exposure, but with the broad use of technology, the broad use of devices, handhelds, iPads there is always the danger that one with critical information on it gets stolen.

So, much akin to IT consumerization and the cloud, information security is having a dramatic impact on the role of the CIO. The battle of wits that is waged continuously between outside perpetrators and institutional guardians persists, mostly invisibly to the IT customer that depends heavily on the guardians to safeguard their information assets and provide for a safe and productive work environment free from interference. As chief of the guardians, the CIO must first appreciate the dangers present and commit the resources to stay one step ahead of the wrongdoers. In addition, the CIO is compelled to comply with laws and regulations intended to protect the privacy, confidentiality, and financial well-being of its constituents. This all requires increasing vigilance and attention at a time when the CIO finds himself pulled in many other directions. This effort is truly altering the role.

Finding #4—There's No Escaping the Criticality of Service

The CIO role was conceived to coordinate the delivery of innumerable IT services to the enterprise, which have grown in significance over the years. Despite the fact that the role continues to evolve and become involved in other important functions, the idea of service is still consistently mentioned as the top priority. It's difficult to ignore the reality that IT has become an essential part of all business processes, communications, and collaboration. IT has also exceptionally enhanced the teaching and learning paradigm on most college campuses. The extent to which the college community depends on IT to conduct business, teach, learn, and engage in research has skyrocketed, which has prompted the categorization of IT services as "critical" in nature, and has caused campus executives to develop disaster recovery plans and

business continuity plans. Accordingly, service availability and delivery is of the utmost importance, and downtime of any kind has become unacceptable. This is a stark reminder to the CIO and reinforces the idea that services come first.

Time and again, the service imperative was mentioned by participants in the study. One senior officer at a mid-sized institution captured the essence of this thought exceptionally well.

> Technology is almost like a dining service operation. You are only as good as your last meal. In technology you're only as good as your last connection to the Internet. If it's down and someone loses a half-hour of connectivity, or if they are in the middle of a project, or if a faculty member is in the middle of his/her class and the technology doesn't work it negates the great things you have done.

From the CIO perspective I frequently heard commitment and passion about service. A community college CIO articulated this nicely.

> I always see myself as a student and an end-user advocate. I don't necessarily know that this is something that all CIOs either feel that this is their role, but I always try to put myself in the shoes of the end-user. Then you will understand why an hour is too long for down time or why they can't shut that system down at 11:00PM. The word service is very important. I think I always saw that IT was a service department. I can remember a banner that says "Students Come First." So if you see and understand who your customer base is, and that technology is just technology, I think that sort of has been really important to me in my career.

When one small college CIO was asked about whether he was optimistic about the future of the CIO role he expressed an almost "lunch pail" service philosophy that is clearly more prevalent at smaller schools with modest human and financial resources.

> I have the attitude that whatever the job is you take it on. I told my staff who were worried about their jobs being outsourced, if the customers want us to wash the windows then let's wash the windows—we are a service provider. At the root of IT is a service entity, and I guess that there are people who resist that and think IT should be on a pedestal to be worshipped by clueless business people the way it might have been 30-40 years ago. People who try to hold onto that old attitude are going to be in trouble.

The advent of IT service catalogues, which delineate IT service offerings and methods for managing services such as CRM (customer relationship management)

software, and ITIL (the International Infrastructure Library) are emblematic of the serious commitment CIOs are now making towards managing services. Many of these systems provide SLAs (Service Level Agreements) or OLAs (Operating Level Agreements), which are tantamount to a contractual obligation between CIOs and their customers concerning service expectations. Mentioned numerous times in the participant interviews was the necessity to get service right, or fall prey to irrelevance.

Finding #5—A Seat at the Cabinet Table

The issue of CIO strategic relevance appears to be largely dependent on whether or not the CIO has a seat at the president's cabinet table. Since it is likely that most institutional strategic discussions are taking place at cabinet meetings, it stands to reason that the CIO's presence at such meetings provides opportunities to participate in these deliberations where he may seek ways of bringing IT resources into the equation of how to achieve institutional strategic objectives.

On the CIO professional meeting circuit one often hears the phrase "alignment of IT strategy with business strategy." In my discussions it's interesting to note that several CIOs preferred the term "partnership" to alignment. One CIO from a Research I institution commented:

> I don't like the word alignment. It connotes a reaction to strategy. I prefer partnership which connotes a joint development of strategy.

This is indicative of the position of many CIOs I spoke to who believe that they as professionals have much more to offer with respect to business strategy than simply automating processes or driving efficiencies. Many feel quite capable of envisioning and constructing broader strategy and policy.

This research yielded the finding that getting a seat at the cabinet table is fundamentally connected to the reporting lines of the CIO. Obviously if the CIO reports

directly to the President or CEO, the CIO becomes a member of the cabinet by virtue of the reporting line. The 2011 LBCIO survey illustrates that approximately 35% of CIOs report to the President or CEO, while the other 60%+ report one level down to the CAO, CFO, or other senior administrator (DeSanto & Zastrocky, 2011). This data seems to track true with other CIO surveys (Brown, 2011). Through the interviews it appears that a lower percentage of CIOs reporting one level down have seats at the cabinet table. One dissenting CFO that I interviewed offered a different perspective.

> As long as the CIO is providing the leadership, the importance of technology, and the role it plays at the University, and it is being well communicated to the senior level influencing decisions about allocation of resources then I don't think where the CIO specifically reports is that critical.

Some CIOs would find this view myopic and limiting. It begs the question as to how the CIO can strategically contribute to conversations if he/she is not at the table. However, one small college CIO expressed some ambivalence about this notion.

> Sometimes I wish I was at the cabinet table. The paycheck would be better than a director level, but it also would come with additional headaches and entanglements and things that are not germane to what I do and it could be a strain on my time. I would not demand a seat at the cabinet table, but in some instances I think it would be beneficial.

Looking at this data longitudinally we see that there has been a leveling off of CIOs directly reporting to the President or CEO of their respective institutions. In all sixteen interviews I asked this question about reporting lines and a seat at the cabinet table. The results are somewhat inconclusive. The majority of subjects believed that the CIO should be present at the cabinet table because of the importance of IT to the enterprise. However, who the CIO should report to was less clear. Many posited that a reporting line to the President was most advisable while others made cases for reporting to the CAO or CFO. The transcripts bear out that the reporting line question is highly customized to the institution. Factors weighing in on the decision are tied to the history

and culture of the institution. Is IT viewed as a strategic resource on campus? Is the CIO viewed as a key participant of strategy development on campus? Does he wield influence? Can the CIO effectively sell his ideas in non-technology terms? Is the President personally interested and invested in IT as a strategic resource, or is s/he a technology neophyte or phobic? Does the institution rely on data for decision-making? Is data seen as a strategic asset? These are a sampling of some of the questions that seem to influence a CIO's reporting lines.

A president of a mid-sized college explained her rationale for having the CIO position reporting to the CFO this way:

> I thought about this a lot when I became President and when we were working towards creating the CIO position. I didn't personally feel it was a cabinet level position because we were moving towards a major migration and were dealing with many other things. I felt that the cabinet was operating at a higher level and that it would be better for me to get this information by delegating this function to someone else, in our case the CFO, who would in turn brief me on what I needed to know.

My findings show very strong linkage among the concepts "strategic," "seat at the cabinet table," and "reporting line to the President." If this linkage is stalwart, the CIO is in excellent position to perform at a strategic end of the spectrum. If one or more of the linkages are non-existent or severed, the CIO's access and cache is lessened and will push him/her more towards the operational realm of the spectrum. Once again it's worth reiterating that the reporting line question is highly dependent on the institution, the President, and the culture present there. One size does not fit all.

Finding #6—Strategic or Operational?

The 2011 LBCIO survey reports that CIOs overwhelmingly believe that their role has become more strategic with smaller institutions leading the way at 80% and larger institutions gauging this at around 60%. The survey findings align well with the interviews with both CIOs and senior officers. Everyone agrees that there is an

operational component to the CIO's job. Payroll needs to be processed on time, the network must carry traffic, and the classroom projectors need to display images so everyone can see. But, as one CIO remarked, these examples reflect expectations that are taken for granted and must be fulfilled:

> The expectation is perfection…that everything is going to work all the time. There's a lack of understanding that it's not that magical.

Consequently, the emphasis is shifting away from what has been "perfected" and "operationalized" to focusing on how to contribute towards the fulfillment of the institution's strategic goals. CIOs who truly desire to add value to their institution aren't talking *tech*, or bits and bytes. They are actively listening and engaging in solution development activities, ensuring that they are speaking the language of their customer. A good example of this was offered by a senior officer at a mid-sized state university:

> I never talk with my CIO about the nuts and bolts of IT. I tell him that we need to go from point A to point B, as in moving the endowment from $30 Million to $50 Million. I ask him to offer suggestions for accomplishing this.

Most participants would agree that the future of the CIO profession is intimately linked with CIOs bringing their unique skill sets to the table to offer solutions to move their institution forward. No one could mount a convincing argument that the operational side of IT isn't more or less a utility in nature, though the connotation here is decidedly negative. Nicolas Carr, as observed in the Literature Review, would undeniably concur (Carr, 2004). One CIO at the Focus Group put this interesting spin on this question.

> I think if you're not doing well operationally, you don't get to be strategic. If your operations are running well I think you are afforded the credibility to be strategic. You have to have the operations under control and that's the base part of our job. The network has to run, the ERP has to run, and if you can't do that chances are that you will be gone. If it is working then you can speak to your colleagues about business strategy. Then you can be very much strategic in your role.

Consequently, one would argue that success breeds opportunity for more visible, high level success for the CIO.

Another area of CIO contribution that lends itself to strategic innovation involves the change movement. Without a single exception all CIOs participating in this study see themselves as agents of change, and since much has been reported about the academy's reluctance to change, this role looms critical. One community college CIO remarked:

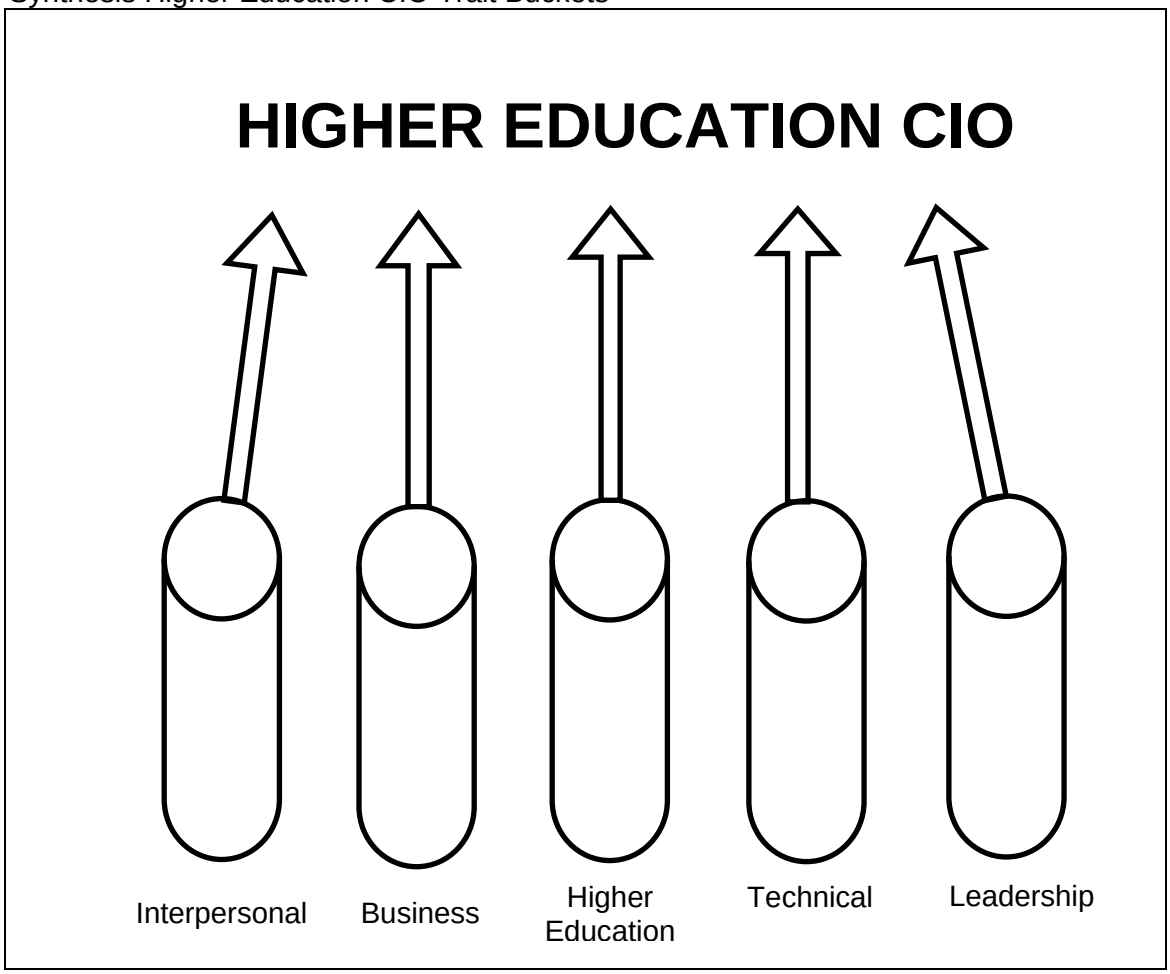
> I think I add value strategically because I see possibilities for change and improvements, and at the same time I truly understand how hard it is for people to do. I see myself as someone to help drive change.

In summary, the findings seem to suggest that CIOs can be purely operational, or an operational/strategic hybrid, the latter of which is more prevalent. This distinction is largely dependent on the CIO's operational success, and his/her passion and motivation to carve out a meaningful niche in the strategic realm as change agent, if the President and institution are amenable to it.

Finding #7—The CIO Role—Skills,Traits and Tendencies

A fascinating element of my qualitative research was discussing CIO skill sets, traits, and tendencies with the participants. In such research one seems drawn to explore the question of these qualities. We want to know if there is a link between personal and professional qualities and success in the role. In the case of this study where the role is clearly in flux, it's natural to examine current and future preparation for the role, and ultimately who is best suited to perform the role. Without such treatment we would be looking at the role's future state not having a clue about who to recruit for the role. This is impractical to say the least.

Figure 1
Synthesis Higher Education CIO Trait Buckets



It would be highly improbable that any research study could identify additional skills or traits that weren't already delineated by the ECAR piece written by Meredith Weiss (Weiss, 2011) as referenced in the Literature Review. But, instead of underscoring or building upon individual elements cited in that ECAR report, I thought it was wiser for me to synthesize the data I uncovered in the literature review, the LBCIO survey, and the qualitative elements of my study. The results of this synthesis are depicted in Figure 1 as five encompassing trait buckets that gather together those traits and skills cited most frequently during this research that through deduction apparently enhance higher education CIO success today and into the foreseeable future.

Interestingly, these five major trait areas align well with the top five skill sets needed by higher education CIOs as chronicled in the *2011 Study of Higher Education Chief Information Officer Roles and Effectiveness* (Brown, 2011).

First, interpersonal or soft skills were prominently mentioned by every participant in the study. These skills include communications of every variety including conceptualizing, speaking, listening, and writing. The other soft skills coalesce around people relationship building and nurturing. During the Focus Group one CIO observed:

> When I hire staff the most important criteria I seek is the ability to build human relationships. If you don't have that ability to build trust and credibility with a student, faculty members, or staff member then when things go wrong these folks will not give you benefit of the doubt.

Sub-categories here would include adroitness at emotional intelligence, marketing/selling ideas, and leadership prowess. I inquired specifically about the need for political skills. Almost everyone reacted in identical fashion. To effectively navigate the complexities of the organization at a senior level, political skills were an obvious given. The few dissenters agreed with this assertion, but confessed they were at a distinct disadvantage when it came to political acumen. One briefly offered:

> I think political skills are important. But, I don't have much of that capability. I have not mastered the fine art of politics.

A single senior officer offered that CIOs must be "unflappable" because something is always going to go wrong, and steady, strong leadership will be needed to deal with the inevitable adversities.

Second, business knowledge surfaced time and again as key to the CIOs' success. In many regards CIOs are running pseudo businesses within their respective universities necessitating the need for the full array of business talents. One CIO from a small college captured it quite succinctly:

> Business knowledge is very important because IT is a very expensive undertaking and you have to be able to work intelligently with finance people talking about what you're proposing for the institution to invest in. It must be presented in a way that convinces them that you have done your due diligence. You also need to conduct yourself in a business-like manner in dealing with vendors, soliciting proposals and evaluating the responses that come in to eventually reach a recommendation to undertake some of the biggest investments the institution will make.

This comment deals with the crucial business aspects of procurement, which CIOs are frequently engaged in. But, it doesn't touch upon an equally critical use of business knowledge that aids CIOs today and will likely persist into tomorrow. Without fail the Literature Review and the qualitative portion of this study identifies business process improvement as an essential element of the CIOs' imperative to add value to their institution. 90% of the 2011 LBCIO survey listed business process improvement as the number one way CIOs add value to their institution (DeSanto & Zastrocky, 2011). This set of activities geared around customer service needs and the strong pull for more cost-saving efficiencies dictates the need for business familiarity. How can one hope to offer solutions to improve business processes unless there is a good grasp of how businesses operate? This body of knowledge includes everything from Customer Relationship Management (CRM) to internal budget planning and management, to marketing and promotion, to even business continuity planning and support, just to cite a few.

It's interesting to note that the two research I institutions participating in this study both operate under RCM (Responsibility Centered Management), which basically requires entities within the university to financially be responsible for their own operations, with great latitude, and pay a "tax" to the central university for certain administrative and support services. The CIOs and senior officers from both of these institutions participating in the study were well versed with RCM. Their experiences and

responses to some of my questions reflected this uniqueness about their institutions. I mention this here since both CIOs at RCM institutions legitimately run their own IT businesses within their universities. They both supply an abbreviated catalogue of core services for their overall institution, but the norm is for them to compete with other internal and outside entities for IT business. In these cases the CIO role embodies some distinct differences from the traditional role. Suffice it to say that their business savvy and knowledge of the higher education industry are essential to balancing their financial ledger. There is definitely a more acute focus on customer relations, service reliability, and overall revenues and expenses. Since RCM has garnered a considerable bit of attention of late and is utilized at a growing number of larger, more complex institutions, it might be intriguing for a future researcher to study the higher education CIO role in RCM environments comparing and contrasting it with the traditional, more prevalent centralized environments.

Third, the evidence overwhelmingly supports a growing need for CIOs to possess extensive knowledge of the higher education industry. It's quite apparent that a CIO can't hope to contribute to institutional strategic discussions unless he has acquired an appropriate level of familiarity with the higher education industry. Senior management conducted strategic discussions typically hover around visioning and planning, competitive positioning, program/service offerings, pricing, marketing, and public relations. One CIO commented:

> I have a very, very heavy reading program so that I can learn more about the industry and the various functions we have established at the university, such as admissions, advancement, and student affairs.

Several CIOs spoke about their intentional conversations with students to stay abreast of student needs and preferences. Several CIOs referred to their efforts to reach out to parents and other constituencies. Remaining obscure in the data center

may have been the norm decades ago when ensuring computer operations was at the core of the CIOs' function. This is obviously counterproductive today.

Fourth, CIOs must have enough of an IT technical understanding to function successfully in this role. Increasingly, it has become clearer that a CIO need not possess a computing sciences degree as was expected in the 1980's (Brown, 2011). But, to earn the respect of the university community and the IT staff alike CIOs need to be appropriately academically credentialed (Brown, 2011). Brown's 2011 study reports that only 23% of CIOs who responded believe that the CIO should possess a Computing Science or other technical degree (Brown, 2011). However, the same study produced findings that the majority of CIOs posited that the CIO should at least have an earned graduate degree (Brown, 2011). Coupled with the requisite academic credentials, CIOs must be able to follow and grasp an increasingly complex IT industry and appreciate how IT solution choices can fit within their institution's IT portfolio to help their respective campuses achieve their objectives. A senior campus leader captured this well:

> I expect our CIO to have core knowledge of everything related to IT, but that can be an inch deep, but it's got to be mile wide. I don't expect it to be a mile deep and a mile wide. She has to garner the respect of the deans. She has to be someone who speaks knowledgably and authoritatively so there is no question of her expertise in this area.

The IT industry is progressing at unprecedented levels of speed and complexity. This creates many situations where choices of solution sets are numerous and interdependencies must be considered. Without a technical understanding of what's available, what's necessary, and what's possible CIOs would not be able to make informed choices. Bear in mind that many of these decisions are very costly for the institution, which in today's constrained budget environment, can't easily or inexpensively be reversed. Also, as with any senior management role, major mistakes

could easily lead to reprimand or dismissal. Therefore, a forte in technical know-how remains an important skill for the higher education CIO.

Fifth, many CIOs are responsible for medium to large size operations, with budgets totaling millions of dollars, and staff sizes of dozens to hundreds of employees. Given this fact CIOs are compelled to be effective leaders. They need to be capable of moving a large organization productively forward to achieve value-driven results. This requires the utilization of many levers in the leadership toolkit to foster dedication, commitment, innovation, agility, and productivity in their respective organizations. Today, the ability to lead people in their complex organizations has eclipsed technical prowess (Faas, 2012).

I discovered an intriguing finding in what I will describe as an overlapping of few of these key skill sets. Several participants spoke extensively about the CIO as collaborator and facilitator, and a few used the descriptor of consultant. I intuit this as an overlap of leadership and interpersonal traits. One CIO remarked:

> What I like to do is be collaborative. Let's brainstorm. It's sort of like we are facilitators. I think that is a huge role to be able to enable others to get things done that they need to do.

Another CIO took this sentiment to the next level in tracing the development of the role.

> Over time CIOs have progressed from being order takers, then facilitators, and really now innovators. This goes along with bold thinking, but I fear the resources aren't there to support the bold thinking.

Such blending of talents is certainly not unique to the CIO role. But, it signals that effective CIOs need not be all knowing, powerful sages. Synergy development through participation and collaboration with others in the CIO orbit appears to be helpful in this regard. The coalescence of these traits interestingly jibes with the Future State CIO framework introduced by Frank and depicted in Appendix IV (Frank, 2011).

Finding #8—CIO as Technologist or Informaticist?

In some ways it's curious that this research is centered around the evolving role of the Chief **Information** Officer when so much effort is being expended exploring the impact of the technological advances on the profession. An intriguing finding of this study emerged regarding the critical nature and asset value of information, and the CIOs' role in ensuring that institutions generate information to support strategic and tactical decision-making. What could possibly be more important to the health and viability of the institution? A quite astute observation about this was offered by a community college CIO:

> I think the beauty of the title Chief Information Officer is the *information officer* piece. I do think many colleges and universities have hired chief technology officers. I think we're even going to be doing less technology in the future. I think the CIO of the future is somebody who is successful about making the technology invisible.

This sentiment is a fitting parallel with the strategic vs. operational discussion. CIOs have successfully operationalized business functions by deploying data processing and transaction processing systems commonly referred to as ERP (Enterprise Resource Planning) systems. But for the most part, these systems are not producing the type of business intelligence or analytics information that aids in decision-making. This appears to create space for an opportunity for the CIO to truly be master of critical business information. The new catch-phrase for such initiatives is the leveraging of "Big Data," which is also expected to underpin new waves of productivity growth, innovation, and consumer surplus (Manyika et. al., 2011). Big Data acknowledges that the institution is collecting and storing a ton of data that is not being joined in a collective sense to aid in business strategy or solve business problems.

However, as with some other key issues the leveraging of information by senior leadership appears to be tied to the culture of the institution. One CIO at the Focus Group remarked:

> I have worked around Presidents' cabinets that were data driven and I worked around others that you could provide all the data in the world to, but it was all intuitive decision-making. After gathering all of the data, one or two vocal faculty members would say well my experience is this, which basically says that I'm trumping everything you said because I am friends with the President. Sometimes I see heroic efforts, resources squandered because a few very influential people exert their power on campus.

It's customary to associate CIOs with hardware like PCs or servers, and software like ERPs and Learning Management Systems (LMS), and communications networks like the Internet and Internet2. But, clearly emerging as a strategic tool in the CIO's arsenal is the information asset, and how this asset can be used to aid in decision-making and perhaps competitive positioning for the institution. This idea connects directly to Brown's 2009 study where he identified *Informaticist* as a key emerging higher education CIO role. This emerging role presents another intriguing shift in the CIO's priorities, and a golden opportunity for the CIO to contribute at a high level for the institution. With broad institutional responsibilities for "information management" implicit in the CIO title and with the importance of business intelligence escalating due to the increasingly competitive higher education industry, CIOs are positioned to assert themselves in this realm (Auringer, Gomolski, & Aron, 2008).

Issues That Didn't Yield Salient Findings

Patton (2002) describes finding nothing in a qualitative study in one sense as quite possible since some qualitative inquiry does not always lead to significant new discoveries or revelations. However, Patton is quick to add that in another paradoxical sense it's impossible to find nothing there since there are interviews and transcripts, and therefore some semblance of a story to relay. In the case of this study there are several

salient findings delineated in the previous section that contribute to study conclusions. However, there are non-findings relative to the first research question that yielded very little in the way of impact on the evolution of the role of the higher education CIO.

Virtualization

Indisputably there are a number of findings that support the contention that rapidly changing industry forces are indeed impacting the evolving role of the higher education CIO. However, one technological innovation identified in my research questions does not appear to be having much impact on the role. Virtualization represents a wonderful innovation that paves the way for increased efficiencies resulting in improved services and less overall costs. The employment of virtualization strategies in almost all higher education IT enterprises is extensive and not limited to well-resourced institutions. The beauty of virtualization is that even the smallest institutions with very modest IT staffs and budgets can use virtualization to their advantage.

However, other than generating efficiencies and perhaps increasing the information security posture of the institution the impact on the CIO role appears to be negligible. Most CIOs have taken the development of virtualization strategies in stride using such deployments to provide cost savings, energy savings, time savings and staff support savings. The fact that using virtualization supports “green” or sustainability causes is an added benefit that in most instances serves to burnish the image of the CIO and IT.

So, for the purposes of this study and in addressing the research questions, my finding is that virtualization strategies, despite being replete with advantages for the CIO, have not had a major impact on the evolution of the CIO role.

Budget Constraints

Higher education CIOs have been dealing with austere budgets seemingly forever. It must be acknowledged that the last four years of economic recession and increased scrutiny on higher education costs have impacted IT budgets significantly. But, despite the increased squeeze on budgets, the role of the CIO has largely not been impacted by this other than to note that CIOs ever mindful of budget tensions are continually seeking ways of creating efficiencies and reducing costs while maintaining high service levels. For more than a decade EDUCAUSE has produced results from its annual survey of CIOs, which lists the top ten issues for the year for CIOs to grapple with (Ingerman & Young, 2011). Once again in 2011, as every year since inception, *Funding IT* was cited as the number one issue. In truth CIOs have become quite adept at the budget dance relying on their business skills to help allocate and reallocate scarce resources. This requires continuous evaluation of choices and a robust well-designed system of IT governance that aids the CIO in priority setting. IT governance provides a much needed support structure that appreciates the inherent funding limitations.

Many CIOs have been engaged in real budget cutting during this downturn (Zastrokey, 2010). Anecdotally, some CIOs have given back up to 10% of their annual budgets during this recession. This is serious business with consequences that frequently negatively impact service offerings. But, CIOs have also been innovative in leveraging savings from virtualization and cloud strategies, as examples, to produce budget relief and make up some of the difference.

However, the budget picture appears to be brightening somewhat. In the 2011 LBCIO survey about 25% of the CIOs reported actual IT budget decreases compared with 43% in the 2010 survey (DeSanto & Zastrocky, 2011).

Realistically, budget pressures do impact the CIO and what services the CIO can offer. But, since higher education CIOs have always dealt with suboptimal funding, this has become ingrained in the evolution of the role. This is akin to the intrinsic behavioral adaption that evolving species progress through as part of natural selection.

As a result, with respect to this research, I did not uncover substantive evidence that constrained budgets were indeed impacting the evolution of the CIO role in any meaningful way. CIOs have been conditioned in their evolution to cope with the financial resource pinch, and it will probably always be so.

Summary

The preceding findings rely extensively on the verbalization of participant experiences germane to topics that help address my research questions. The goal was to embrace the phenomenological strategy as aptly articulated by Moustaukas (1994) to relay "descriptions of experiences retaining the original texture of things, their phenomenal qualities and material properties." As previously mentioned, the qualitative part of this study was considerably informed and supported by the 2011 LBCIO survey. The synthesis of the full array of these findings requires careful reflection and articulation, which is presented and discussed in Chapter 6.

CHAPTER 6

DISCUSSION AND IMPLICATIONS

Introduction

Informed by the Literature Review and the Research Methodology chapters, and strengthened and advanced by the LBCIO Survey Findings chapter and the Qualitative Findings chapter, this final chapter will introduce and discuss conclusions drawn by the research study. It will serve principally as a synthesis of the aforementioned information and will identify practical implications for today while also earmarking areas that are ripe for future associated research.

Discussion

This study was conceived to study the evolution of the higher education CIO role and how it is being impacted by a variety of contemporary IT industry forces. The Literature Review chronicled what has been researched and written about these much mentioned IT industry forces and the CIO role in higher education to date. The purpose of this study was to fill the gap in knowledge that addresses specifically how this role is evolving amidst key, emerging forces that are creating something of a “perfect storm.” The study is fundamentally anchored in a phenomenological approach so that representative participants in the role could convey firsthand how these industry forces were shaping and reshaping their professional roles as CIOs. Final triangulation was achieved through the timely administration of the LBCIO survey to higher education CIOs.

The data analysis process that was described in detail in Chapter 3 produced eight thematic findings, as well four emergent topics prime for further study. Study conclusions as depicted in Table 5 were arrived at via a discernment and analysis process and are presented in fuller detail herein.

Table 5 succinctly summarizes the main conclusions of the study contextualized around my research questions. The contents of the table are unpacked and discussed in greater detail on the following pages.

Table 5
Higher Education CIO Role Research Questions Conclusion Matrix

Key External Influencers		**Key Evolving Functions**
IT Consumerization	→	Shift from standards culture to personalized culture
The Cloud	→	Shift from on-campus data centers and capital purchasing to contracted services
IT Security	→	Shift from openness and sharing to privacy, compliance, and risk mitigation
Factors Impacting Role Relevance		**Role Relevance in Action**
Adding Value	→	Operational efficiencies to strategic contributions
Cabinet Seat	→	Facilitates contributions to strategic discussions
Reporting Lines	→	Entre to cabinet seat and strategic involvement

The Impact of IT Consumerization on the Higher Education CIO Role

Every portion of this study, including the Literature Review, the pilot study, the LBCIO survey, the focus group, and the interviews points to the fact that IT consumerization is a tidal wave that is significantly engulfing every higher education IT enterprise and therefore is impacting the evolving role of the higher education CIO. In truth, this trend may be actually hitting the higher education CIO harder than most other industry CIOs because of the cultural tendencies in higher education to allow greater latitude in diversifying hardware and software solutions on college campuses.

Other industries are invariably accustomed to stricter IT standards to guarantee cost-effectiveness and productivity of employees. So, the invasion of consumer devices

in the business world, though revolutionary, will likely be more orderly than higher education. In higher education there are unwavering expectations to accommodate these new technologies and to offer a customer-defined acceptable level of support. One of the unique features of higher education is that student customers live and work in the same environment as IT. This coupling is much more pervasive and intense than what is experienced with most for-profit businesses. Moreover, faculty exercise control over curriculum design and delivery. Faculty, additionally, under the aegis of academic freedom, enjoy levels of autonomy and flexibility not experienced in the for-profit sector.

These realities force the higher education CIO to plan for the transition away from fairly rigid standards to much looser standards, where broad, base level support is provided, rather than in depth support of a few key technology solutions. CIOs are also beginning to shift away from large scale purchasing of personal computers and other standardized devices, increasingly leaving this activity up to the discretion of their customers. CIO efforts are expected to focus on common, stable, interoperability of infrastructure to facilitate the entry of hordes of new devices, with no end in sight. It also will alter the CIO's planning and thinking away from the desktop personal computer in the office or laboratory to the mobile device, which will travel with the customer and demand wireless access to a set of services, some of which are currently only provided on the wired desktop.

CIOs will have to recruit agile, multi-talented staff who have the capabilities to learn new technologies quickly and interact effectively with customers whose needs will be highly personalized. This clearly shifts the CIO role to one of facilitator, planner, educator, and communicator rather than technology standards-enforcer, rule-maker, and technologies procurer. It also sets the CIO's sights on supporting working and learning

anytime, anywhere, not in any way limited to the office, residence hall room, or classroom.

The Impact of the Cloud on the Higher Education CIO Role

This research study produced findings that higher education CIOs were increasingly attracted to cloud services because of lower cost, speed of deployment, quality of services and reliability of services. These advantages in total are not always present in every decision scenario when the cloud is being considered. But, you can be assured that one or more of them is operative in the decision matrix. This study confirmed current writings that this repackaging and extension of outsourced services is gaining traction quickly with higher education CIOs resulting in less need for on-campus data centers, physical servers, storage arrays, and people who administer and manage these assets.

Given budget constraints and rising customer expectations other choices are patently less attractive. This shifts the CIO role away from procurer and manager of things and people to procurer and manager of contracts, services, and relationships. It places the CIO directly in the broker or matchmaker role bridging the service-hungry customer with the cloud service provider. In this regard the CIO provides assurances that the services rendered by the cloud provider are adequate to meet the customer's business requirements, and that appropriate safeguards are in place to protect these assets and ensure integrity, reliability, and quality. This responsibility is not to be taken lightly, nor is it simple to consistently and successfully execute.

Some might argue that the advent of the cloud may signal the beginning of the end of the CIO role. But if this were the case, a palpable skill and experience gap between the customer and the cloud provider would exist. The CIO is ideally positioned to bridge this gap possessing know-how to match customer needs to cloud providers,

and perform due diligence with respect to contract provisions and much needed integration strategies? This represents turf that the CIO could and should tenaciously hang onto.

The Impact of Information Security on the Higher Education CIO Role

This study generated results that largely underscore the CIOs' dislike but acceptance of the chores that encompass the information security realm. The current legal climate undergirds the growing glut of issues that reside in the dominions of cyber-crime, privacy, confidentiality, risk mitigation, and compliance with countless new government laws and regulations that the CIO has to grapple with. The cultural conflict within higher education deals with the openness and sharing that higher education is particularly known for. Any venturing towards service depravation or what might be construed as censorship is taboo in higher education. So, the CIO finds himself caught amidst mounting pressures to protect, limit, and comply in a work environment that thirsts for collaboration, sharing, and transparency.

The stakes are particularly elevated when one considers the consequences of information security breaches. Every participant in the interviews appreciates the risks and indicated that they worry about potential breaches. The research bears out that more CIO time is being expended in this arena, and escalating investments in staff, training, and tools are necessary to provide the requisite protections and compliances.

The impact on the role of the CIO is three-fold. First, the contemporary CIO must balance implementing protection and controls on information at a time when CIOs are losing more control of technology choices through consumerization and cloud computing. It's almost akin to protecting customers from themselves, when the customers have little interest in being protected. In many instances CIOs find this to be a reputational Achilles heel. If they try to exert too much control there is pushback. If

they exert too little control, breaches are likely to occur. Therefore, in this seemingly no-win situation a delicate weighing of security with functionality and productivity is a must. Some degree of exposure in higher education appears tolerable, but this does present exploitable weaknesses. Second, CIOs are spending more time with their institutional attorneys to help navigate very complicated and sometimes confusing legal waters. This is forcing CIOs to become more knowledgeable with the laws and various risk profiles. At least one participant CIO in the study indicated that she has an attorney on her staff to deal with these issues. But, attorneys rarely make final decisions. They typically advise and then defer to the CIO on matters like this. Accordingly, CIOs must be comfortable with and knowledgeable of applicable laws. Third, information security is no longer being treated as an afterthought in the procurement and deployment of technology solutions. It has now become one of the key drivers in the decision matrix. This requires the CIO to educate customers and IT staff alike about the risks of procuring IT services and counseling others internally and externally about risk mitigation strategies.

In the final analysis, the impact of information security on the CIO role deals principally with allocating precious time and expending mental energy in a new direction. It also requires that CIOs learn about laws and regulations. This is compelling CIOs to reallocate a substantial chunk of their time to devote to information security. This is time that previously was spent elsewhere in the day of the typical CIO.

The Evolution of the Higher Education CIO Role in Practice

Table 6 Higher Education CIO Role Evolution

Catalyst	Former Roles	Evolving
Consumerization	Standards Architect	Enabler
	Rule Enforcer	Facilitator
	Hardware/Software Procurer	Educator
The Cloud	Manager of people, things, places	Matchmaker
	Recruiter and procurer of the physical	Broker/Intermediary
	All powerful IT decision-maker	Contract Negotiator
	Controller of all IT finances	Service Procurer Integrator
Information Security	Password Controller	IT legal expert and consultant
	Enforcer of responsible computing behavior	Risk assessor and mitigator
	Grants access	Maintainer of balance points (risks vs. function)

Table 6 provides a synopsis of the higher education CIO former roles juxtaposed against the set of higher education CIO evolving roles contextualized around the three key research question influencers. The sheer number of changes alone illustrates the escalating complexity of the role. However, the evolving roles individually and collectively paint a new mosaic that exemplifies the wide diversity of challenges facing the higher education CIO. Additionally, a picture begins to emerge regarding the skill sets and traits the avant-garde higher education CIO should possess.

The Evolution of the New Higher Education CIO

This research has established that IT consumerization, the cloud, and information security are all having a substantial impact on the evolving role of the higher education CIO. Each of these catalytic trends is forcing higher education CIOs to

eschew their traditional roles depicted in the middle column of Table 6, in favor of adopting the roles delineated in the third column of Table 6.

If we were to first examine the middle column, and add to that some additional supporting findings from this research, a picture of the higher education CIO perhaps 20 years ago begins to take shape. We see a male who is quite technically adept and oriented endeavoring to quickly ramp up and maintain IT services for his institution. This CIO is adding resources in the manner of people and hardware/software solutions to his IT domain, which is growing rapidly to meet the precipitously escalating requests of his customers. To stretch precious financial resources the CIO mandates a distinct focus on standards, which are strictly adhered to. Getting everyone access to the network is an imperative, and sharing information, enhancing electronic communications, and automating business processes are of paramount importance. Playing and engagement rules over the network outside of password enforcement are few. This CIO spends much time in the data center environment planning IT purchases and working closely with IT staff on technical implementations. The pace is quick, and money is spent liberally as appropriate solutions present themselves and the hungry consumers are satisfied, albeit fleetingly. This CIO isn't particularly well versed in the higher education industry, but his higher education lexicon is gradually increasing. This technical, all-powerful guru is clearly holding the IT reins through highly centralized budget, decision-making and procurement.

Moving to the right-most column an image of the new age higher education CIO comes clearer into view. Although this CIO is still largely male, more females are on the verge of entering the CIO ranks. This CIO possesses enough technical expertise to understand the environment, the IT industry, and the solution sets, but relies more heavily on technical staff and outside providers for deeper technical dives. This CIO is

actively engaged in leveraging virtualization strategies and cloud strategies to reduce IT costs. The IT staff are being strongly encouraged to retool under the CIO's leadership as soft skills are becoming more essential than hard, technical skills. This CIO is more acutely aware of customer behavior on the network and embraces policy, strategy, and solutions to protect the institutions' reputation and information assets. Instead of a laser beam focus on standards, this CIO understands the personalization movement and conceives of an architecture that will accommodate a diversity of devices and solutions. The new CIO expends more time and effort with his customers relying on well-honed soft skills. He does much more listening than talking. He is increasingly engaged in offering solutions and services that are financed external to his budget. Gaining a better appreciation of the higher education industry has become more important to this CIO who is attempting to optimize spending on value-added services. There's continued celerity to the pace of events driving the CIO's frenetic schedule. The CIO, instead of being in total control, must build a series of relationships and deliver on value propositions. The job is less well defined, and complexity and ambiguity abound.

The two portraits that are presented contrast in many ways, but do they reveal anything about role relevance?

Higher Education CIO Role Relevance

The secondary research question identified in this study deals with the relevance of the higher education CIO role. The research supports that the CIO role is complex and evolving very rapidly. The research also points out how significantly the main functions of the role and skill sets needed to successfully perform the role are changing. So is there any evidence to support that the role is spiraling downward to irrelevance? Or, is the role still significant and perhaps even poised for greater heights?

The qualitative research parallels findings in the Literature Review that to maintain relevance the higher education CIO must be engaged in adding value to the business enterprise. This contention happens to transcend all industries. Across the board, simply making sure that IT operations are functioning well is not sufficient to ensure CIO role relevance.

As elucidated in Chapter 5 the higher education CIOs' engagement in adding value is connected to producing efficiencies by improving institutional operations, customer services, and saving money. Additionally, the higher education CIO can add value by innovating in the realm of teaching and learning. These goals are particularly important when one considers the pressures that higher education is currently grappling with. The accountability movement demands increased efficiencies and documented student outcomes. Cost-conscious consumers and government alike are demanding tightening controls on higher education expenditures and lower tuition increases. At the same time these same constituencies are insisting on students' employability as a key outcome. Students obviously need to be academically prepared to enter the workforce. The CIO can be instrumental in contributing to addressing all of these pressures by leveraging IT.

But, more importantly, as a senior administrator, the CIO has the opportunity to contribute to institutional strategy. Remembering that this dissertation commenced with the analogy of the CIO as polymath, CIOs should conceivably bring to the senior management table keen, informed perspectives on information-driven business opportunities, and the deployment of education industry disruptive technologies and know-how that could help relieve a number of business tensions. But, the CIO must be afforded the opportunity to contribute in this way.

The research identified three key issues that will position the higher education CIO to be profoundly relevant. They are: CIO reporting line; seat at the cabinet table; and access to strategic conversations.

The findings relative to the most desirable CIO reporting line are decidedly mixed. Some CIOs and senior officers contend that a direct reporting line to the President is integral to CIO strategic effectiveness since the President would provide the avenue to CIO participation in strategic discussions. About 30% of higher education CIOs report to their presidents (Brown, 2011).

Other participants assert that a reporting line to a CFO or CAO suffices just fine, and in fact has advantages for different reasons. CFOs and CAOs may provide better support and direction for the CIO, and have more interest in IT overall than the president. Depending on the institution, these senior administrators may be more active executive sponsors or promoters for IT and the CIO than the president.

A convergence point of opinion is that regardless of who the CIO reports to, it is critical that he has a seat at the cabinet table and is welcome to contribute with other senior officers on topics of strategic importance. Without this positioning the CIO is relegated to a back seat in the administrative hierarchy and is less likely to be able to contribute strategically.

Apparently, the answer to the question posed about the future relevance of the higher education CIO role is an undecided “it depends.” It’s evident that the jury remains out on this issue since there are dependencies present that remain outside of the direct control of the higher education CIO. Most CIOs I spoke to would savor the opportunity to serve on their president’s cabinet if afforded that opportunity. However, like so many other matters in higher education, this decision appears to be highly customized to the individual institution, its culture, the preference of the President, and the amount of

importance the institution places on IT and the CIO. This can't be legislated and takes considerable time to change, even if the will to change is present.

Implications for Practice

Scholarship of this genre has the inherent goal of contributing to the body of knowledge surrounding the phenomenon being studied. A major goal of this research study is to contribute in this way. In addition, this study is intended to inform higher education practice. Patton (2002) prefers to think about practice implications as high quality lessons learned where knowledge is applied to future action and derived from screening according to specific criteria. Reader groups delineated in the following sections include current and aspiring higher education CIOs, senior higher education administrators who recruit and hire CIOs as well as other administrators who work at lateral levels with CIOs in the higher education administrative hierarchy, and IT professionals working under the purview of the CIO. There are certainly other groups who could benefit from a keener understanding of the higher education CIO role, but for the purposes of this study I will focus on these three constituencies.

Implications for Current and Aspiring Higher Education CIOs

The most prominent implications of the aforementioned conclusions deal with transitions professionals currently in the role must traverse and skill sets aspiring professionals must gain and possess to be most effective in this role. In the former category it's particularly critical that current CIOs examine their strengths and limitations and ascertain whether or not they are well suited to the reality of the new requirements of this changing role. As an example, those CIOs with vast amounts of technical expertise but with dubious or underdeveloped soft skills are going to find themselves at a distinct disadvantage with the critical role as communicator. Likewise, those CIOs who are accustomed to exerting ultimate control, including over the purse strings, are going

to become quickly disillusioned with the emerging “personalization” and decentralized paradigms of the evolving state of IT where CIOs are experiencing the erosion of highly centralized IT funding models.

Reflecting on the service imperative, it follows that the higher education CIO as service provider will likely endure in some fashion unless the CIO as a role is eliminated for good. Functionally, this provides an operational base for the CIO to continue to oversee regardless of precisely where the actual services are being generated from. Some higher education CIOs will undoubtedly remain solely in the role of operational service provider, and never be afforded the opportunity to act strategically. Some will be content in this state. Others will find this mundane and unpalatable.

Cautious optimism pervades the world of the higher education CIO. Consequently, it is a career option worth pursuing for the professional possessing the true skill sets to reap success. Women, in particular, should be encouraged to take the leap in opting for this role. Women CIOs are currently a distinct minority, but are well qualified to function and excel in this male-dominated role.

As discussed repeatedly in this study the higher education CIO needs to discover how they best can contribute to the institution in “adding value.” This value proposition will continue to nip at the heels of the CIO and will in essence dictate the future relevance of the role. Being the chief technologist and operational strategist are simply not enough anymore in this highly commoditized industry.

Implications for Senior Higher Education Administrators

Almost serendipitously the timing for recruiting the new CIO is ideal. Baby boomer CIOs are predicted to retire in record numbers over the next 5-10 years, and this trend is expected to continue, according to several studies (Brown, 2011). This prediction provides institutions with a golden opportunity to hire CIOs with the right set of

competencies and traits for this multi-faceted job. At the same time there is a decision point at hand for Presidents and senior administrators to consider. How do they intend to use and position the new CIO in their organization? If they view the new CIO as a polymath who can truly contribute to strategy formulation and execution then they should provide him/her with the venue and opportunity to do this. In truth, few other higher education positions are prepared for and tasked with embracing disruptive events and associated technologies to bring about revolutionary change in this industry, which finds itself under extreme pressure to change. The change agent role is one that CIOs have traditionally been very accustomed to. And this comes inherently with precisely the kind of thinking that higher education particularly needs at this juncture in time. Consequently, presidents should view this as a prospect worth seizing.

Senior administrators should take heed and seek to hire CIOs with a blend of leadership, business, technical, interpersonal, and higher education experience and skills. If the role is to be positioned to function strategically, then the reporting line and cabinet seat question needs careful consideration.

Implications for Higher Education IT Professionals

Outside of the small group of IT professionals who aspire to the higher education CIO role, the rank and file IT professionals can gain insight and guidance into the changes they too are experiencing by understanding more fully the CIO role and its placement in the institutional administrative hierarchy. In truth there is an onus on the CIO to clearly and often communicate changing paradigms and expectations that most inform the value add proposition that has emerged as the centerpiece of the CIO relevance argument. But, there is at least an equal responsibility on the part of the IT management and staff to recognize the changes at hand, including how the role of the CIO and the entire IT enterprise is evolving, and adapt accordingly. IT workforce agility

was raised a few times at pivotal points in a couple interviews. A sign of the CIO perspective on IT staff skill sets was captured best by a CIO at the focus group.

> When I hire new IT staff I look for four things: First is the ability to build human relationships; Second, is the ability to receive and harvest feedback; Third, is the ability to grow with the organization; Last, is the ability to renew skill sets because these seem to change every few years.

This comment parallels what we have come to understand about the preferred CIO skill sets. Notice that technical acumen is not even mentioned.

One must remain mindful that the CIO is but one role in the higher education IT hierarchy, and although it is a pivotal role, he/she alone can't accomplish much. It is incumbent on the higher education CIO to provide the vision and leadership to inspire such adaptability and agility so that the IT organization can continue to thrive.

Study Limitations

This study design uses triangulation by mixing methods to substantially mitigate the limitations inherent in qualitative research. As Patton (2002) asserts qualitative inquiry is best exercised by people who have high tolerance for ambiguity. And it's in the ambiguities that study limitations are found.

Sample Size

Patton (2002) further contends that there are no rules governing sample size in quantitative inquiry. "Sample size depends on what you want to know, the purpose of the inquiry, what's at stake, what will be useful, what will have credibility, and what can be done with available time and resources."

In this study I came to the conclusion that eight site visits would be adequate to collect the most relevant data to support the study. Early on in the study design, based largely on past experiences with seeing the results of other studies and considering sample sizes and diversity, I came to the conclusion that geography wasn't an important

determinant in sample selection. In every study I have examined on the CIO role the only discernible difference influenced by geography appeared to be salary levels, principally because the cost of living varies by geographic location in the United States. I decided to concentrate my efforts in the mid-Atlantic and New England states. I did think it was critical that I achieved diversity by gender, type and size of institution, and tenure in the CIO role. With eight participants I was able to accomplish this objective.

I was satisfied with the data collection from the sixteen interviews at the eight sites, where the results were both predictably rich and in many cases consistent. However, as expected the interviews also provided for some dissenting views. I must confess that more interviews may have yielded additional stories and examples that could have supplemented my study. However, one never knows this in advance. From a purely practical perspective this number of interviews also passed my internal reasonableness test, which was consistent with the qualitative study literature authored by Patton (2002) and Moustakas (1997).

Some would surely argue that more isn't necessarily better and they would find themselves in popular company. However, this would assume that I chose my participants wisely. What might this study have returned if I had chosen sixteen different participants at eight different sites? My contention is that very similar results would have been produced. But, this is something we will never know.

Bias and Knowledge

My decision to study these particular research questions was highly influenced by my strong professional connection to the CIO role in higher education. As I see it this is a huge benefit for me in that I'm invested in the study on numerous fronts and have intimate knowledge about the subject matter. I also have my own experiences and opinions on the topics to reflect on. But, it comes with some drawbacks; the most

noteworthy being the potential for my own bias creeping into the findings and conclusions. Secondarily, my in depth knowledge could have negatively impacted my spirit of curiosity and inquiry. Less knowledgeable researchers might have been coaxed to perform deeper dives for information that I simply absorbed from experience or took for granted. These deep dives could have produced some other valuable findings.

It's therefore fair to note this delicate balance limits the study. Since I was cognizant of this limitation, I took purposeful steps to be particularly objective during data collection and analysis. I also endeavored not to take anything mentioned to me for granted, always asking the follow-up clarification question, even though most times I knew what was lurking as the layers were being peeled back. In almost all cases my own views were indeed validated through the study. My own acknowledgement of findings was another form of validation of sorts since I have a long history as a higher education CIO. However, if I were to say that I didn't learn anything new in the study I would be severely underestimating the overall experience and the resultant findings.

Potential of Prejudice by Perspective

This research project was conceived from the outset as a study of the role of the higher education CIO told through the experiences and insights of a group of representative CIOs. The study design was augmented during the proposal hearing to also include interviews with senior officers at each CIO participant site. Despite the fact that the senior officer interviews were helpful in contributing to this research, the weight of the study was slanted toward the CIO interviews. The findings from both sets of interviews coupled with the literature review and LBCIO survey converged nicely. But, it should be noted that a similar study could be undertaken by primarily targeting the perspective of senior officers, Provosts, Presidents, or CFOs for that matter. This angle may have returned some differing perspectives on the CIO role. In actuality, I haven't

seen a single higher education CIO study from any other perspective than the CIO, so I have nothing concrete to base this opinion on. It is fascinating though to consider.

Emergent Ideas to Explore

In the spirit of Patton's (2002) suggestion regarding qualitative inquiry to "side-track, zigzag, and circumnavigate" to achieve a certain level of "creativity," I uncovered some interesting threads or ideas that are worthy of further exploration.

The Female CIO in Higher Education

During my conversations with female CIOs I discovered that a theme relative to a female's fitness for the CIO job began to emerge. The literature review had already yielded a few articles about the reluctance of females to aspire to the role of CIO. Current studies report that about 25% of higher education CIOs are female, and this number has not been increasing (Brown, 2011). Although not a focus of my research questions, it occurred to me that I shouldn't let the opportunity to explore this idea pass totally unnoticed since it appeared to be surfacing in some of my conversations.

Initially I expected the female participants to be somewhat circumspect about this issue. However, to my surprise all four female CIOs were eager to tackle the question regarding female success in this heavily male dominated role. Three of the four subjects identified issues that indeed impacted their ability to succeed. These issues seemed to center around the perception that most college/university senior administrators are indeed male, and that males bonded around male interests such as sports and other male activities. The females, in essence, felt excluded from their male counterpart's forms of relationship building. One subject talked at length about her occupying a role that engineers were originally targeted for in the early days of the existence of the CIO. And, as everyone knows, engineers were always males. Another relayed the following story.

> I was recently asked to mentor a women who works in our Development Office, and she said to me that the main reason she requested me as a mentor was because she observed me around the table and when somebody asks who is going to take notes I don't immediately pick up the pen. I'm sensitive to what she said and I don't have a good explanation for it other than to say that it is part of the culture here. The woman is expected to take the notes here. I think there is an issue here and I wish I better understood it. I've not wasted a single minute trying to understand it but I wish it were different. I personally haven't found it to be too much of an impediment that keeps me from getting the job done. But, I do think there is a bit of back slapping—how was the football game on Sunday mentality around here. It is not easy for all women I'm sure.

I began to deduce that the four female CIOs were all successful in their CIO roles despite any stigma attached to their gender. This deduction arose from hearing directly from each of them about their accomplishments at their respective institutions. In addition, this conclusion was supported by my conversations with the senior officers at their institutions. Without exception, the senior officers heaped considerable praise on the female CIOs for their abilities to get things done as well as their well-honed communications, relationship, and political skills.

Simply stated, studies about female CIOs are pretty much non-existent. Thus, there is an excellent opportunity for future research on this topic. Perhaps such research could generate findings and conclusions that would encourage more females to seek the CIO role, which the higher education industry appears to be yearning for.

Honestly, Integrity, and Trust

To my surprise, as I discussed key desirable CIO traits with participants I discovered an emerging aspiration for CIOs to be honest, trustworthy, and possessive of the highest levels of integrity. In today's society, which according to global media reporting is rife with deceitfulness, greed, and immorality, it was refreshing to learn that core values resonated so soundly with CIOs and senior officers alike. But, why is this so? I could only hypothesize with my thoughts taking two separate tracks on this particular notion. First, many in senior administration may be reacting to the intensity

and swiftness of the higher education accountability movement where senior administrators are being held to the highest standards, and as exemplars for others to emulate. Second, when people think IT they see dollar signs, and justifiably so. IT is expensive to purchase, deploy, and maintain. When large financial investments are involved the temptation for wrongdoing is magnified. One university president expressed this idea well.

> The CIO must have integrity and ethics around information use and abuse. As the University president it matters a lot to me that there is very strong ethical perspective and so much that even can evolve into criminal behavior with downloading and all those kinds of things. It is important that the person in that role is aware of what is right and wrong and never tolerate that kind of thing.

This president demands honesty and integrity of her senior administrators. This case is illustrative of the value of the information asset and the need for enforcement of IT security policy surrounding information, which is ultimately the responsibility of the CIO, who must be above reproach.

A CIO participant commented:

> I think skills like honesty and integrity are always going to be right at the top of the list of CIO skills. When I think about how I've been able to keep this job, I think it's been because I have earned the trust of the people I serve and the people I work for.

In today's climate where integrity appears to be a rare commodity, it might be interesting for a researcher to examine the higher education CIO role through the lens of these most revered values.

Does Value Creation Mean Revenue Generation?

The Literature review identified a growing trend that CIO effectiveness and relevance is connected to CIO value creation. In for-profit businesses value creation is largely indicative of IT being a lever for directly enhancing revenue generation through new product development, sales, or other measures. However, as my interviews

unfolded, it became abundantly clear that CIOs from the not-for-profit world view value creation as enabling other divisions of the university to generate more revenue rather than generating returns on IT investments or producing dollar gains by some innovative system deployments or practices. One CIO from a mid-sized university commented at the focus group:

> I would differentiate creating value from generating revenue. If you are not creating value for the institution then why are you in the job? If we are not creating value then we don't have a leg to stand on in terms of dealing with other people in the institution. I see our role as helping others to generate revenue. We work closely with the Admissions staff in terms of not just bringing in enough students but raising the quality of the students we bring in, and using technology to do that. I've never once tried to do a return on investment justification for technology investment.

Another absorbing distinction between higher education and the for-profit business deals with the importance of mission. At many higher education institutions great value is attributed to satisfying institutional mission objectives even if these same objectives do not directly augment revenues. The CIO therefore may take actions to enhance mission totally disconnected from the direct return on investment. This is particularly the case at values-based institutions where service to the regional community or more broadly, may be of supreme importance in the fulfillment of mission. But, these institutions would surely argue that its mission-based activities make their institution truly distinctive and therefore more appealing to their customers.

Since all of the data points to the assertion that value creation is inextricably linked with future success in the higher education CIO role, and since "value" has industry-specific definitions, this might be an area that could produce some interesting findings through a future research study. The study could try to answer how value should ultimately be defined.

Higher Education CIOs that Immigrate from Other Industries

As I was designing my research methodology and ultimately conducting the qualitative portion of this study it never dawned on me that I could segment the CIO and senior officer samples into two groups. One group could have conceivably represented those who have spent all or most of their careers in higher education. Another group could represent those who had migrated to higher education from the for-profit sector. In retrospect as I examined the transcripts more carefully I found that at least three of the sixteen participants held previous jobs in the for-profit world while the majority of the participants were fundamentally homegrown higher education talent. In reviewing the transcripts and reflecting further on the interviews, I found it fascinating to consider the divergence of perspectives of these individuals. The folks with for-profit roots certainly have become accustomed to the higher education industry, but they also talked openly about their prior work life in the for-profit sector contrasting their experiences. Since I did not construct questions to delve into these differing perspectives, I didn't gather nearly enough data to analyze. The literature reviewed did in a few select places discuss the differences of the CIO role by industry. Some similarities and differences did surface. However, this treatment was shallow and incomplete. Thus, I believe a study of the differences in higher education CIO role and the counterpart role in the for-profit world would be intriguing to explore in more depth.

Summary

In sum this section identified five areas that were uncovered during this research that could become topics for further study. This is certainly not an exhaustive list as I'm sure additional research will be conceived on a wide range of other related topics and fields. However, these do represent paths that have only been minimally or not traversed that could add to the body of knowledge in this research realm.

Final Synthesis

As a concluding synthesis I offer the portrait of the higher education CIO through Figure 2, which reflects ten dominant traits and tendencies, comparing the evolving role of today with that of twenty years ago. Through this synthesis we see a role that has indeed evolved parallel with the hyper-changing IT industry and higher education. As with any role it must be acknowledged that certain tendencies are dominant, but not exclusive, since exceptional circumstances do unfold at times requiring recessive actions. In addition, although the profession has evolved, higher education CIOs are not all evolving at the precise same rate. Consequently, a subset may argue that they have not yet reached the 2012 dominant tendencies in total. Some of the dominant comparisons are obvious while others are more subtle in nature. Many of the ten have already received considerable treatment in this research and therefore I won't go into considerable depth here. Some editorial license has been exercised in extrapolation to reach these points.

Figure 2
Synthesis Portrait of the Higher Education CIO 1992 → 2012 and Beyond

Dominant	**Dominant**
Build	Share
Spend	Optimize
Technical	Well-rounded
Physical	Virtual
Obscure	Visible
Consumption	Bracketed
Functional	Value-Added
User-centric	Customer-centric
Operational	Strategic
Manager	Leader
1992	**2012 and Beyond**

Twenty years ago CIOs were orchestrating a frenetic IT **building** plan. Campus networks were built. Data centers were built, expanded, and enhanced. Software systems were designed and built. Today, the operative idea is procuring or **sharing** what has been built by someone else. Whether it be shared software through open source, or shared services through collaborative efforts, or purchased services through a vendor, CIOs have come to recognize that this approach gets the job done more efficiently and effectively.

Building in the 1990's was synonymous with **spending**. IT budgets were soaring at an unprecedented pace to meet rising demands and to stay competitive. The focus on austerity in the higher education industry coupled with continued escalating demands has resulted in CIOs focusing more intently on **optimization** so that precious dollars could be stretched.

Computers and networks were still somewhat mysterious to most in the early 1990's, and as builders the CIOs needed in depth **technical** knowledge of their creations. In 2012, this is less the case, where the CIO possessing **well rounded** skills is preferable to hard core technical skills.

Twenty years ago the emphasis was on the **physical**—data centers, servers, personal computers, switches. And the CIO reigned over the physical. Today, the emphasis is on the **virtual**—data centers, servers, personal computers.

The CIO of the past spent considerable time hunkered down in the data center, and was indistinguishable or **obscure** on many college campuses. Today's CIO is highly **visible**, interacting with the entire campus community on a regular basis.

CIOs in the early 1990's encouraged and facilitated wide-spread, rapid access to and adoption of IT pushing the campus community to **consume** at will. Today's CIO

supports IT adoption and use, but tempers this use by **bracketing** through policy or security tools.

Yesteryear's CIOs were entrenched in work to meet the **functional** requirements of running a college campus. The CIO of today is endeavoring to take that concept to the next level by concentrating on **value-added** solutions.

The 1990's CIO saw those availing themselves of IT services as **users** of CIO owned or controlled resources. The CIO of today acutely recognizes a broadened population of constituents as **customers** who have unique, personalized needs that far transcend centrally offered and controlled IT resources.

Operational duties still dominated the CIOs' workday twenty years ago. In 2012 the CIO is thinking holistically and **strategically** about how IT can be most effectively leveraged to help their institution gain competitive advantage.

Lastly, traditional **management** functions were exercised most prevalently by CIOs twenty years ago. Today, the IT organization is more diverse and complex. The rapid changes in the IT industry dictate the need for an ever-changing, agile workforce. In addition, customer expectations are off the charts and require careful management. To make this happen the CIO must exercise visionary and inspirational **leadership** within and outside of IT.

Closing

In closing it is heartening that the findings and conclusions exude optimism and confidence. The pessimism expressed by Carr (2003) really never surfaced in any part of the research. The future of this quickly evolving role in higher education and in the broader industry landscape appears to be in the hands of the CIOs themselves and the executives they report to. The charting of the course and the defining of the future of this profession is principally on the shoulders of those who care most about it and are in

a position to mold and shape it. However, if the goal is to heighten the visibility, credibility, and effectiveness of the role, then this research should be a catalyst for a call to action for today's higher education CIOs. The value proposition discussed frequently in the preceding pages will not be satisfied by osmosis. Today's and tomorrow's higher education CIOs need to consciously nudge and influence the direction of the profession to continually add value, utilizing every tool in their collective arsenals. Only then can future generations of higher education CIOs be assured that this profession will endure the evolutionary roller coaster ride that the role and profession continue to exhibit.

I would like to end this dissertation where I began, with the higher education CIO analogy of the Polymath. Certain historians would argue that Leonardo Da Vinci was the consummate polymath. He painted some of the most impressive artistic works of all time including the Mona Lisa and the Last Supper. But, he was much more than a painter. He was good at sports, science, and engineering. He excelled at singing, playing the violin, and telling jokes. He was known as a charming conversationalist. He was also reputed as the finest expert on horses in the world in his time (Lou, 2012). It certainly sounds like Da Vinci was one of a kind and hardly replicable.

Today's higher education CIO is undoubtedly working in turbulent times, which requires a plethora of skills to be successful, as this research study bears out. There's been much discussion in this study about the hyper-changing IT industry landscape, and this by all accounts is a truism. But, it would be remiss not to assert that all companies are changing to adapt to a rapidly changing world. This idea of universal change is crucial to understanding the profound role that IT and its leader, the CIO, has stimulated since so much change is technologically based and fueled by IT.

Much like Da Vinci, the higher education CIO needs to be multi-talented, and these talents need frequent refreshing as the world changes and businesses, including

higher education, continue to advance and adapt. The complexity is increasing everywhere you look as the higher education CIO role continues to evolve.

One recent publication posits that a more fitting title for the CIO could be: CCO (Chief Cloud Officer), CPO (Chief Process Officer), CDO (Chief Digitization Officer), or perhaps even CPO (Chief Polymath Officer) (Fingar, 2010). There are other acronyms that possibly could be put forward. Whatever CIO title is most apt, “it’s all about mastering the unpredictable” (Fingar, 2010).

This research was intended to shed some new light on the evolving role of the higher education CIO. It is with sincere respect and humility that I assert that this study captures the essence of this phenomenon today and contributes to the body of knowledge about this fascinating role. I strongly encourage others to build upon this research, which has opened the door for future inquiry.

APPENDIX I

Leadership Board for CIO's

2011 Survey of Higher Education CIOs

The Chronicle of Higher Education and the Leadership Board for CIOs created a survey of CIOs in higher education in 2010. This survey is the second annual survey of CIOs which is intended to provide information for CIOs in higher education globally. Data will be made available through The Leadership Board for CIOs (LBCIO), white papers, articles in The Chronicle of Higher Education, and other reports from the Leadership Board for CIOs. Everyone who completes the survey will receive a summary of the survey results once the study has been completed. You may also request a summary of the 2010 survey after completing the survey.

How to complete the survey:

- Depending on your responses, the survey should take about 20-30 minutes to complete.
- The survey is divided into several sections and can be completed one section at a time.
- If you experience any technical difficulties, please e-mail a description of your problem to survey@lbcio.org
- **At the end of the survey you will be asked if you wish to receive the Executive Summary for 2011 and 2010. Please check the appropriate box and enter your email address. We will send you the 2010 summary shortly after you complete this survey and the 2011 summary once responses have been validated and research is complete.**

Privacy notice:

All information you provide will be used for research purposes only. None of your responses will be identified with your name or your institution's name without your permission.

Leadership Board for CIO's

Demographics:

1. Which Best describes your Institution:
   a. 2-Year Institution
   b. 4-Year Institution Only
   c. 4-Year with Masters Degree Programs
   d. Doctoral Granting institution
   e. Research University
2. Size of Institution (based on FTE not Head Count)
   a. 3,000 students or less
   b. 3,001-5,000 students
   c. 5,001 -10,000 students
   d. More than 10,000 students but less than 25,000 students
   e. More than 25,000 students
3. Type of institution
   a. Public
   b. Private, non-profit
   c. For Profit
4. What is included in the central IT organization at your institution? (check all that apply)
   a. Administrative applications and support
   b. Applications programming
   c. Media Services/classroom technology
   d. Academic applications and support
   e. Networking and telecommunications
   f. Library management
   g. Research computing
   h. Other, please list _____

Section 1: Financial and Budget Planning

5. Has your current fiscal year operating budget (2010/2011)for the institution:
   f. Stayed the same as prior year budget
   g. Grown from prior year budget
   h. Decreased from prior year budget
6. Has your current fiscal year budget for IT:
   a. Stayed the same as prior year budget
   b. Grown from prior year budget

c. Decreased from prior year budget

7. Do you expect your fiscal year operating budget for the institution next year (2011/2012) to:
   a. Stay the same as current fiscal year
   b. Increase from current fiscal year
   c. Decrease from current fiscal year
8. Do you expect your fiscal year budget for IT for next year to:
   a. Stay the same as current fiscal year
   b. Increase from current fiscal year
   c. Decrease from current fiscal year
9. To what degree have major technology decisions been influenced by constrained budgets during the past 12 months?
   a. Significantly
   b. Somewhat
   c. Minimally
   d. Not at all
10. To what degree do you expect cloud computing to impact your budget in the future?
    a. Very positive (save money)
    b. Moderately positive
    c. Neutral on budget
    d. Somewhat negative
    e. Very negative (will cost more than we currently spend)
11. Are capital expenditures included in your IT Budget?
    a. Yes
    b. No
    c. Some, but not all
12. If capital expenditures are not included in your IT budget, where are they funded (check all that apply)?

a. From general fund
b. From restricted funds
c. Projects that are funded by special fees
d. Other (please specify)_____

13. If your IT budget has been cut from the prior year, which of the following have been cut (check all that apply):
    a. Personnel
    b. Services
    c. Software licenses
    d. Delayed maintenance or replacements
    e. Other (please specify) _____
14. If you are planning for no growth or cuts in your IT budget for the next fiscal year which of the following strategies will you likely follow(check all that apply):

a. Non-replacement of staff leaving the institution
b. Renegotiating contracts with vendors
c. Increased use of chargebacks for services/support
d. Increased student fees
e. Cutbacks in services and support
f. Staff position eliminations
g. Other (please specify) _____

15. What do you expect your IT budget to do in the next five years:
    a. Remain flat (with cost of living increases)
    b. Begin to increase above cost of living
    c. Decrease from current level (not growing as much as cost of living raises)
    d. Not sure
16. What new IT funding sources if any, are you considering?
    a. No new funding sources
    b. Increased user fees (faculty, staff, students, others)
    c. Selling IT/support services to others

    Other (please specify) _____

Section 2: IT Organization and Governance

1. Has your Full Time IT staff:
    a. Increased in the past 12 months
    b. Decreased in the past 12 months
    c. Stayed the same
2. Do you expect your Full Time IT staff to:
    a. Increase in the next year
    b. Decrease in the next year
    c. Stay the same
3. Has your use of student workers:
    a. Increased in the past 12 months
    b. Decreased in the past 12 months
    c. Stayed the same
4. Do you expect your use of student workers to:
    a. Increase in the next year
    b. Decrease in the next year
    c. Stay the same
5. Are you outsourcing any IT services or support?
    a. Yes
    b. No
6. Has your use of outsourcing of IT services or support:
    a. Increased in the past 2 years
    b. Decreased in the past 2 years
    c. Stayed the same

7. If you have or are using outsourcing services how have costs met expectations?
    a. Met expectations
    b. Cost more
    c. Cost less..
8. If you have or are using outsourcing services how have services matched expectations?
    a. Exceeded expectations
    b. Met expectations
    c. Were less than expected
9. If you have brought back service/support that was previously outsourced, what reasons were used to bring the service back in house? (please check all that apply)
    a. Costs were greater than expected
    b. Services did not meet expectations
    c. Delay in implementations (time sensitivities not met)
    d. Other (please list)

    _____
10. Do you expect your use of outsourcing of IT services or support to:
    a. Increase in the next 2 years
    b. Decrease in the next 2 years
    c. Stay the same
11. Which of the following are most likely to be considered for moving to the cloud or being outsourced in the future? (check all that apply)
    a. Administrative applications (ERP)
    b. Academic applications including course management systems/learning management systems
    c. Web development/applications
    d. Email/social networking/communications
    e. Networking
    f. Security
    g. Others (please list) _____
12. Which activities currently are being outsourced to some degree? (Check all that apply)
    a. Networking activities including cable plan maintenance
    b. Administrative applications
    c. Lab maintenance and support (PCs)
    d. Project management
    e. Other (Please specify) _____
13. What percentage best represents total institutional IT support reporting to central IT?
    a. 90% or greater
    b. 75-90 %

c. 50-75%
d. Less than 50%

14. If you have less than 75% IT spend under your central IT budget, which best describes your influence on the rest of the institutional IT spend?
    a. No influence
    b. Indirect influence through guidance and collaboration
    c. Great deal of influence
    d. Set the standards and specifications
    e. Directly involved in the decision making
15. Has the role of the CIO in recent years become:
    a. More strategic
    b. More operational
    c. No change
16. Where does the CIO report?
    a. Directly to the CEO (President, Rector, Vice-Chancellor)
    b. Chief Academic Officer
    c. Chief Financial/Business Officer
    d. Chief Operating Officer (Executive VP, Administrative VP)
    e. 2 levels from CEO
    f. More than 2 levels from CEO
17. Reflecting on your prospects for continuing success as a higher education CIO, what key institutional relationships do you need to nurture more intensely? (Check all that apply)
    a. CEO (President, Rector, Vice-Chancellor…)
    b. Chief financial officer
    c. Chief academic officer
    d. Chief advancement officer
    e. Chief enrollment officer
    f. Head of Research
    g. Head of physical plant
    h. Head of human resources
    i. Dean of Library
    j. Academic Deans
    k. Students
    l. Other (please specify)

For the next few questions consumerization represents the movement to buy whatever technology is of interest to the consumer regardless of the institutional standard. Consumers include students, faculty, staff and others who will interface with or use campus IT resources.

18. How is the consumerization of IT impacting your campus?
    a. Significantly
    b. Moderately
    c. Not at all
19. Has the consumerization of IT had an impact on IT governance and planning?
    a. Yes
    b. No
    c. Not sure
20. If consumerization of IT has had an impact, which of the following have been affected? (check all that apply)
    a. Mobility issues for academic applications/services/support
    b. Mobility issues for administrative applications/services/support
    c. Networking and security
    d. Other (please list) _____
21. To what degree is consumerization impacting your current IT planning?
    a. Significantly
    b. Moderately
    c. Not at all
22. As you conceptualize the IT consumerization movement on campus, which groups are the early representatives of consumerization? (Check all that apply)
    a. Students
    b. Faculty
    c. Staff
    d. Alums
    e. Board members
    f. All
    g. None
23. What are the potential benefits of the consumerization movement? (Check all that apply)
    a. Financial savings
    b. Freedom of choice
    c. Less IT staff needed
    d. More competitive positioning for your institution
    e. Less need for community labs
    f. None
24. What are the potential problems that come from the consumerization movement? (Check all that apply)
    a. More staff needed for training and support
    b. More bandwidth needed
    c. Greater security issues/problems
    d. Data integrity and consistency
    e. Integration with existing systems

f. Less control
g. Greater cost
h. Greater need for community labs

25. Is your IT strategic plan linked or incorporated into the budget planning process?
    a. Yes
    b. No
26. Are Service Level Agreements (SLA's) important?
    a. Yes
    b. No
27. Do you have formal Service Level Agreements between IT and the following? (Check all that apply)
    a. Administrative applications and information management
    b. Content management for academic and/or research
    c. Hardware maintenance and support (PCs and Servers and other technologies)
    d. Help desk
    e. Instructional design and support
    f. Media services
    g. Telephone and voice services
    h. Printing
    i. Web services and support
    j. Training and other Professional Development activities
    k. Other (Please Specify) _____
28. Do you use SLA's to forge agreements with constituencies?
    a. Yes
    b. No
29. How important is IT governance to you as CIO?
    a. Very important
    b. Somewhat important
    c. Of minimal importance
    d. Not used
30. Have budget constraints had an impact on IT governance?
    a. Yes
    b. No
    c. Somewhat
31. How do you view the relative importance of assessing and improving IT governance at your institution?
    a. Very high priority – must do this right away
    b. Moderately high priority – within the next year or two
    c. Moderately low priority – more than two years out
    d. Low priority – not currently on the priority list
32. How much as a CIO do you rely upon IT governance to aid in decision making?

a. Rely completely upon the IT governance model to make decisions
b. Relatively high reliance but ultimate decision is mine
c. Low reliance upon IT governance model to make decisions
d. Do not rely at all upon IT governance

33. Are budget allocations for IT linked to IT governance?
    a. Yes
    b. No
    c. Partially
    d. Not at all
34. If budget constraints have had an impact which best describes the impact?
    a. Significant impact
    b. Moderate impact
    c. No impact
35. Does your IT governance include: (check all that apply)
    a. User group(s)
    b. High level committee(s) to set priorities for IT
    c. Outside influencers (advisory board)
    d. Board of Trustees/Directors/Governors
    e. Others
36. Our IT governance model is:
    a. Very effective
    b. Somewhat effective
    c. Moderately effective
    d. Has no effect
37. Does your IT governance model include a formal process for making and evaluation of requests?
    a. Yes
    b. No
38. If you have a formal process for making and evaluating requests, what percentage of IT decisions are a result of this process?
    a. 100%
    b. 80-99
    c. More than 50
    d. Less than 50
39. Who sets the IT governance model for your institution?
    a. The CEO
    b. The CIO
    c. Executive Committee
    d. Board of Trustees/Directors/Governors
    e. Other (please specify)
40. Is there a Board committee dedicated to deal with IT issues?
    a. Yes

b. No

41. In which of the following areas does the CIO add value to the institution? (check all that apply)
    a. Business Process Improvement
    b. Teaching and learning innovation
    c. Strategic planning at the institutional level
    d. Managing non-IT functions
    e. Modeling and leading project management initiatives
    f. Other (please list)_____
42. To what extent does your CEO and executive leadership express willingness to facilitate your efforts in adding value to non-it related discussions?
    a. Extremely important
    b. Marginally important
    c. Not important
43. As you consider how you as a CIO can add more value to your institution are you satisified that you have the appropriate level of familiarity with the following: (check all that apply)
    a. The higher education industry
    b. Your institution's customers
    c. Your institution's competitors
    d. Business processes at your institution
    e. Financial issues at your institution

Section 3: Administrative Computing and Applications

1. Which of the following best describes your core administrative applications (financials, student systems, human resources, advancement)
    a. ERP vendor supplied
    b. Open source
    c. Outsourced
    d. Home grown
    e. Best of Breed
    f. Other (please specify)

    _____

2. Please check which best applies to the particular modules

Module	Vendor Supplied	Open Source	Home Grown	Outsourced
Financials (GL,AP, AR…)				
Student Registration, grading, transcripting				

Financial Aid				
Human Resources				
Payroll				
Advancement				
Grants Management				

3. If you are using a vendor solution or an open source solution for financials which one are you currently using?
    a. SunGard Banner
    b. Datatel Colleague
    c. Oracle(PeopleSoft)
    d. Campus Management
    e. Jenzabar CX
    f. Jenzabar SX
    g. Kuali
    h. Other (Please specify) _____
4. If you are using a vendor solution or an open source solution for your student system which one are you currently using?
    a. SunGard Banner
    b. Datatel Colleague
    c. Oracle(PeopleSoft)
    d. Campus Management
    e. Jenzabar CX
    f. Jenzabar SX
    g. Kuali
    h. Other (Please specify) _____
5. If you are using a vendor solution or an open source solution for HR which one are you currently using?
    a. SunGard Banner
    b. Datatel Colleague
    c. Oracle(PeopleSoft)
    d. Campus Management
    e. Jenzabar CX
    f. Jenzabar SX
    g. Kuali
    h. Other (Please specify) _____
6. If you are using a vendor solution or an open source solution for advancement (fund raising) which one are you currently using?
    a. SunGard Banner
    b. SunGard (BSR) Advance
    c. Blackbaud (Raiser's Edge)

d. Sage (JSI) Millenium
e. RuffaloCody
f. Datatel Colleague
g. Oracle(PeopleSoft)
h. Campus Management
i. Jenzabar CX
j. Jenzabar SX
k. Other (Please specify) _____

7. What is the source of business intelligence tools being utilized (check all that apply)?
   a. ERP provider
   b. Third-party provider
   c. Open Source
   d. Other (Please specify) _____
8. Do you have data warehousing in place?
   a. Yes
   b. No
   c. Planning for the future
   d. No plans at this time
9. When will you likely replace or make a major upgrade to the following:

Module	In process	Next 2-3 years	4-6 years	More than 6 years
Financials (GL,AP, AR…)				
Student Registration, grading, transcripting				
Financial Aid				
Human Resources				
Payroll				
Advancement				
Grants Management				

10. Do you modify your vendor supplied or open source applications?
    a. Yes, but very judiciously
    b. Yes, greatly
    c. No
11. If you modify your systems who primarily does the modifications?
    a. In-house
    b. Vendor
    c. Third party

12. Which best represents your use of your Administrative Suite (check all that apply)?
    a. We use our administrative suite for all administrative information needs
    b. We could use it more effectively if we had more time, training or money
    c. While it is the core for our information needs, we use other tools to generate information that has been gathered from our administrative applications
    d. Shadow systems still play a dominant role in our information needs
13. Our administrative information modules are:
    a. Tightly integrated
    b. Loosely integrate
    c. Not integrated
14. Current state of shadow systems for administrative needs:
    a. Shadow systems are rare or non-existent
    b. Shadow systems are discouraged
    c. Shadow systems are common and relied upon for information needs
15. Shadow systems are:
    a. Fewer than a few years ago
    b. About the same
    c. Growing in number as budgets to support central IT get tight
    d. Likely to grow in the future
    e. Likely to diminish in importance in the future

Section 4: Academic Computing Issues

1. Which best describes your current course management system?
    a. Vendor supplied
    b. Outsourced
    c. Open Source
    d. Home grown
    e. Other (Please describe) _____
2. Please check the institutional CMS currently being used as the institutional standard.
    a. Blackboard
    b. Moodle
    c. Sakai
    d. Angel
    e. Desire2Learn
    f. TimeCruiser
    g. ILIAS
    h. Other (please list)_____
3. How long have you used your current course management system?
    a. More than 5 years

   b. Two – five years
   c. Less than two years
   d. Currently implementing
4. How soon before you consider a replacement for your current course management system?
   a. Currently considering
   b. Two – three years
   c. More than three years
   d. Don't know
5. Who is responsible for the maintenance of your course management system and related infrastructure?
   a. Central IT
   b. Academic computing
   c. Separate unit for on-line education
   d. Outsourced (please Identify outsourcing agent) _____
   e. Other (please specify)_____
6. Where does instructional design, course design and the management for on-line learning report?
   a. Provost or Chief Academic Officer
   b. CIO
   c. Dean level
   d. Separate unit for on-line education
   e. Other (Please specify) _____
7. Have you considered a shared services model for support of your course management system?
   a. Yes
   b. No
   c. Currently using a shared services model
   d. Don't know
8. How "open" are your current learning tools (check all that apply)?
   a. Very open
   b. Not open
   c. Don't know
   d. Don't care as long as they meet our needs
9. Do you support community labs?
   a. Yes
   b. No
10. If you support community labs, which best describes your support and plans :
   a. We continue to increase the numbers of labs available for general use
   b. We have about the same as we had five years ago

c. We are not increasing the numbers of labs but increasing the availability of hot sites for people to connect via LAN or Wi-Fi

11. Are you currently utilizing desktop virtualization?
    a. yes
    b. no
    c. planning stages
12. If you are utilizing desktop virtualization, which tools are you using (Please list all tools)
    a. _____
    b. _____
    c. _____
13. Have the number of institutionally-owned PCs:
    a. Increased over the past several years
    b. Stayed the same
    c. Decreased from prior years
    d. Don't know
14. Do you outsource email for students and if so to whom?
    a. Google
    b. Microsoft
    c. Yahoo
    d. Other (please specify
    e. Don't outsource
15. Do you outsource email for faculty and staff and if so to whom?
    a. Google
    b. Microsoft
    c. Yahoo
    d. Other (please specify)_____
    e. Don't outsource

Section 5: Infrastructure and Networking

1. Do you have someone designated as a Chief Security Officer?
    a. Yes
    b. No
    c. Not yet but planning on identifying one in the next year.
2. If you have a CSO, where does the person report?
    a. IT organization (CIO or other IT leader)
    b. Financial organization (CFO or other financial leader)
    c. Academic organization
    d. Other (please specify)
3. Has IT support for security:
    a. Increased in the past 2 years
    b. Stayed the same

    c. Decreased in the past 2 years
4. Do you expect security issues:
    a. To continue to be a major problem
    b. Will diminish over time
    c. Stay the same
5. Have you completed a security audit?
    a. Yes
    b. No
    c. Thinking about doing an audit
6. If so, how often do you plan to do an audit?
    a. Annual or more often
    b. Every 2 years or longer
    c. Don't know
7. Have you done penetration testing using an outside firm?
    a. Yes
    b. No
    c. Considering
8. Do you have a formal IT Security plan?
    a. Yes
    b. No
    c. Working on one
9. Is the plan updated at least annually?
    a. Yes
    b. No
    c. Don't know, haven't had one
10. Do you have a plan to resume mission critical operations in case of a crisis?
    a. Yes
    b. No
    c. Not yet but in process
11. Is the plan to resume mission critical operations:
    a. Tested annually
    b. Never been tested
    c. Tested more frequently than annually
    d. Tested less frequently than annually
12. Does your college have a fully redundant data center, where you could get all your systems up and running in less than a week?
    a. Yes
    b. No
    c. Planning stage
13. *How has the percentage of IT spend on security changed over the past five years?*
    a. Increased

b. Decreased
c. Stayed the same
d. Don't know

14. If your % of IT spend on security has changed over the past 5 years, which best represents the staffing change dedicated to IT security?
a. Increased 25%
b. Increased 50%
c. Increased more than 50%
d. Stayed the same
e. Decreased 25%
f. Decreased more than 25%

15. Has your institution implemented a multifactor authentication solution?
a. Yes
b. No
c. Considering

16. If you have implemented a multifactor authentication solution, please list which one and why?

_____

_____

17. Are you using cloud computing?
a. Yes
b. No
c. Considering for the future

18. If you are using cloud computing which best describes the cloud computing activities?
a. Mostly academic (teaching and learning)
b. Mostly management needs (administrative information)
c. Community service or outreach
d. Mix of academic and administrative and community service
e. Not sure

19. Which of the following are cloud computing influencers (check all that apply)
a. Saving money through the use of cloud computing
b. Concern about security
c. Concern about privacy
d. Ownership of data
e. Protection of sensitive data/information
f. Access to data/information in the cloud
g. Ability to bring new activities on-line quickly
h. Other (please specify) _____
i. Which of the following areas are you either currently placing in the cloud or are in the process of placing in the cloud (check all that apply)

j. Mail
k. Social networking
l. Desktop tools (i.e. MS Office)
m. Library applications
n. Alumni applications
o. Financial applications
p. Student applications (enrollment management, registration…)
q. Other (please specify)
    i. _____
    ii. _____
    iii. _____

20. Which of the following best describes wireless activity on campus (check all that apply)
    a. Wi-Fi is available on all campuses to everybody
    b. Wi-Fi is restricted to certain areas
    c. Wireless network is protected and monitored
    d. Wireless security is part of overall campus security
21. List the top 3 new and emerging technologies you are considering:
    a. _____
    b. _____
    c. _____

APPENDIX II

Interview Protocol for CIOs May 2011

SECTION I—Broad, Foundational, Building Rapport and Comfort

1. Tell me about your experience as CIO at this institution?
2. What do you find most rewarding about the CIO job?
3. What do you find most frustrating about the job?
4. In your opinion, what are major differences in the role today vs. 5 years ago?
5. In your opinion, looking forward 5 years how do you expect the role to change?
6. What are the three most important skills needed to successfully perform your role?
7. Are these skills different today than 5 years ago?
8. What skill sets do you predict will be needed to be successful in the role 5 years from now?
9. How critical are political skills in being successful in this role? Describe a situation where you have used political skills to achieve a certain result.

SECTION II—More Specific, Focus on the Research Questions

10. To whom do you report?
11. Who do you think the CIO should report to? Why?
12. Do you have a seat at the cabinet table?
13. Who are the 3 most important allies for your success that sit around the cabinet table? Describe how you nurture these relationships.
14. How has the "cloud" impacted your planning and decision-making as a CIO? Examples?
    Describe your process of discernment when you are considering the cloud as a solution.
15. How has "open source" impacted your planning and decision-making as a CIO? Examples? Describe your process of discernment as you consider open source.
16. How has IT consumerization impacted your planning and decision-making as a CIO? Examples?
17. Do you intend to embrace the IT consumerization movement on your campus? How?
18. How is IT consumerization impacting the CIO profession?
19. How have budget constraints most impacted your planning and decision-making as a CIO? Have you been compelled to cut your budget? How did you accomplish this?

SECTION III—Drilling Down, Summarization, The Future

20. Take me through your thinking process when you're on the verge of making a major decision. What are the major factors you're considering?

21. Do you believe the CIO role is becoming less strategic and more operational? Provide some examples? Explain.
22. How would you characterize your level of familiarity with the higher education industry?
23. How well do you know your University's customers and your University's portfolio of services?
24. Do you believe that you are adding value to your University enterprise? Provide some tangible examples. In what ways can you continue to add value in the future?
25. Are you optimistic about the CIO role in the future? Would you advise individuals to aspire to this role as a career goal? Why do you think less people are interested in pursuing the CIO role as a career?
26. Any final insights or thoughts that you think might aid me in my research endeavor?

APPENDIX III

Protocol for Senior Officers
August/September 2011

1. Could you provide me with some information about your background and experience in higher education administration?

2. How would you characterize the level of contact/involvement you have with your institution's CIO?

3. How would you characterize your familiarity with IT in higher education?

4. How would you assess the overall value of IT to your organization and higher education? Does IT matter?

5. Talk about your perspectives of the CIO role in higher education. What do you expect from your CIO? Have these expectations changed at all over the years? How does the role add value to the institution or your area specifically?

6. What personal/professional qualities are important for a CIO to possess?

7. Is the role tending to be more operational or strategic? Why?

8. Who do you think the role should report to? Why?

9. Do you think budget cutbacks or constraints have impacted what the CIO can accomplish? Is IT too expensive?

10. What is your comfort level with the cloud and IT consumerization?

11. Do you worry about IT security? Why or why not?

APPENDIX IV (Frank, 2011)

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