

Women in Chief Information Officer (CIO) Positions in Canadian Higher Education: Challenges, Barriers, and Opportunities

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Introduction

Of the 51 universities belonging to the Canadian University Council of Chief Information Officers ([CUCCIO](#)) currently only 10 of the CIOs are women. Given the relatively high percentage of women in information technology (IT), approximately 40% of the IT workforce, why are relatively few (18%) attaining the most senior IT role?

This paper investigates the challenges, barriers, and opportunities of women in leadership roles in information technology in Canadian universities. The findings of the research literature are amplified by interviews with those in the field. Interviews were conducted with three women: a former CIO, a current CIO, and a senior IT manager with aspirations to be a CIO. In order to gain a broader view of emerging trends, the Executive Director of CUCCIO (herself a former higher education CIO) was also interviewed.

The paper will identify systemic barriers and present recommendations for personal and organizational initiatives to promote senior technology leadership for women in Canadian higher education. While more women are attaining CIO roles in Canadian universities than ever before, this positive trend is confounded by the continuing negative consequences of stereotypes and other significant career obstacles.

Diversity and Equity in Higher Education Leadership

It is widely accepted that diversity in leadership is essential not just for reasons of equity and fairness but because broadening recruitment and retention to the full spectrum of participants ensures the most effective talent management. The challenges of women assuming leadership positions in higher education are well documented (Dominici, 2009). As the Catalyst report *The Double-Bind Dilemma for Women in Leadership* concludes:

As 'atypical leaders', women are often perceived as going against the norms of leadership or those of femininity. Caught between impossible choices, those who try to conform to traditional – i.e., masculine – leadership behaviors are damned if they do, doomed if they don't. (Catalyst, 2007, p.1)

However, coincident with the increased representation of women in leadership roles is the awareness that women approach leadership differently than men and that these differences have benefits for the workplace. Sally Helgesen (*The Female Advantage: Women's Ways of Leadership*, 1990) identifies "feminine principles" that are guiding women in leadership roles in the emerging economy and workplace. In defining these principles, Helgesen quotes Anita Roddick (founder of The Body Shop) who describes these as:

principles of caring, making intuitive decisions, not getting hung up on hierarchy or all those dreadfully boring business-school management ideas; having a sense of work as being part of your life, not separate from it; putting your labour where your love is; being responsible to the world in how you use your profits; recognizing that the bottom line should stay there – at the bottom. (Helgesen, 1990, p. 38-39).

By focusing on leadership through "voice" rather than through "vision" (Helgesen, 1990, p. 228-230), Helgesen suggests that women have leadership skills and perspectives that are more aligned with the needs of the emerging workplace and current business challenges.

Extending this insight, Elliot & Stead (*Learning from Leading Women's Experience*, 2008) suggest that in terms of role models for leadership "women leaders who stand outside traditional organizational boundaries are often those who inspire others" (Elliot & Stead, 2008, p. 177). In seeking leadership models in new places (i.e. not the traditional hierarchy and male oriented organizational culture), women also defined leadership differently allowing that leadership "can be pioneering and may encompass leading ideas, communities and the representation of issues" (Elliot & Stead, 2008, p. 178).

This broader leadership context is an important insight into the way women view CIO roles. As we shall see, the CIO role is typically a "herding cats" job where there is much accountability but limited authority. Successful leadership in these contexts requires a more dynamic and responsive view that is normally found in traditional leadership models.

Women in Information Technology

IT has historically been a male dominated profession. While this is slowly changing, men still outnumber women in IT positions and the culture of IT remains strongly masculine. In a 2004 EDCAUSE survey of IT professionals, 37% of the respondents were women, but they represented only 21% of the senior IT roles, such as CIOs, Directors, or Managers (Katz et al, 2004, p. 36). As Simard discovered:

the odds of being in a high-level position are 2.7 times as great for men as for women. Women comprise an increasingly smaller proportion of the workforce at each successive level (from entry to mid to high). (Simard et al, 2008, p. 4)

Perhaps even more concerning is the result from the 2008 EDUCAUSE survey:

Among the non-senior-most IT leaders who responded to the survey, 23% said they aspired to become CIOs. Another 21% reported that they were undecided. Answers differed significantly by gender. In fact, we found that male respondents were twice as likely as female respondents to aspire to be CIOs. Qualitative interviewees offered many possible reasons for this gender imbalance, including challenges of maintain work-life balance, societal pressures on women to be primary caregivers to their families, a shortage of role models, and perhaps an inherent bias against seeing women as technology leaders. (Goldstein, 2008, p. 15).

Women, while still entering the IT workforce in higher education, are reluctant to seek the senior most IT roles. In examining the IT workforce more generally (i.e. beyond just higher education), a 2008 Catalyst report, *Women in Technology: Maximizing Talent, Minimizing Barriers*, examined six substantive areas of the workplace:

1. Companies as places to work
2. Supervision and corporate leadership
3. Career development and talent management
4. Fairness and voice
5. Job satisfaction, engagement, and commitment
6. Work-life effectiveness

For the most part this research revealed positive developments with respect to the success and achievement of women in IT. However,

The findings revealed that while women in technology companies were generally satisfied, there were areas of particular concern—specifically around supervisory relationships and perceptions of fairness and voice—that companies must address. (Catalyst, 2008, p. 4)

With respect to the differences women bring to leadership roles, perhaps most concerning are the findings that,

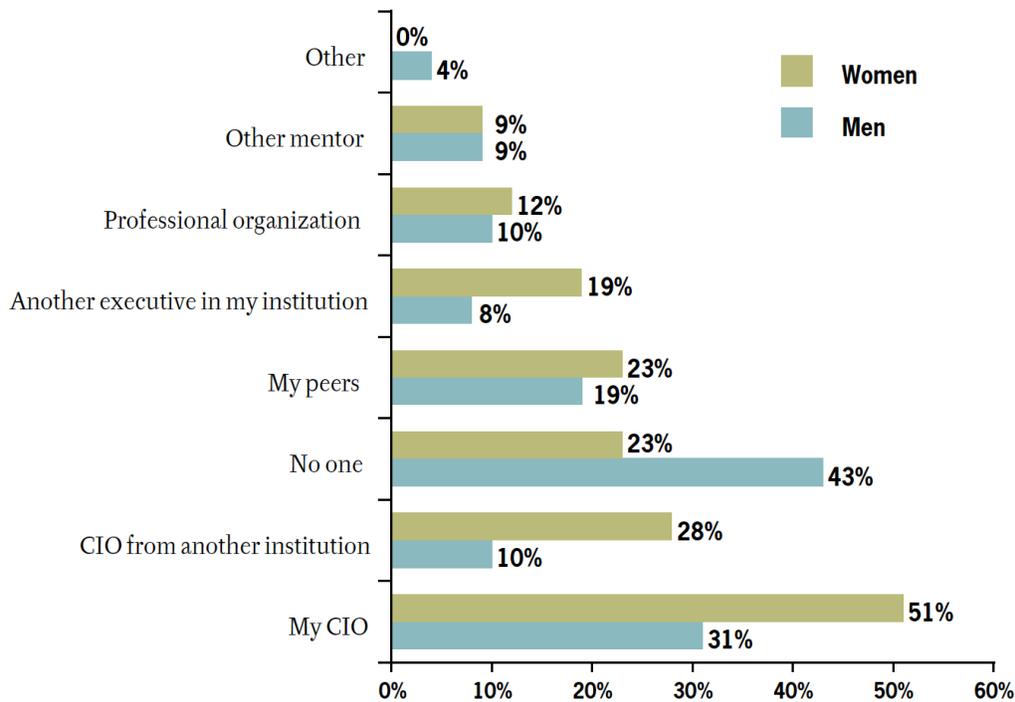
Many of them [the women interviewed] expressed the belief that only a certain personality or working type was viewed as competent and that employees who did not conform to that style were penalized or disregarded. (Catalyst, 2008, p. 19)

If Helgesen and Elliot & Stead are correct, and women do bring a different perspective to their leadership roles, it may be those very differences that are negatively influencing their ability to succeed. This is where role models and pioneers are critical. As the Catalyst report concludes,

The overall message that emerged from the barriers analyses is that a lack of women colleagues—who serve as mentors and champions, who act as role

models, and who provide opportunities for the formation of networks—is a substantial and systemic obstacle to the advancement of women in technology. (Catalyst, 2008, p. 30)

The importance of mentoring for women in leadership roles, especially IT, is highlighted by the findings from surveys reported on by Brown & McClure (2009). The following chart shows the findings, by gender, to the question: "Who is helping you prepare to become a CIO?"



The significant difference of mentoring and others relationships for women over men is striking. The response of men in the category of "No one" likely shapes how these future CIOs will (or will not) provide support for their staff (an especially significant concern if these staff are women).

An international survey of CIOs primarily in the private sector reveals the larger pattern of the problem and highlights an ongoing concern. According to the *Harvey Nash 2012 CIO Survey* (Harvey Nash is an executive search company), the number of women CIOs declined slightly (down 1% and only comprising 7% of the sample) from 2010. The lack of women in these roles is clearly related to a lack of women in the career pipeline since 35% of CIOs report no women in their IT management roles and 46% report less than a quarter of their IT management roles are filled by women. Women are not becoming CIOs in part because they are not working in the technical roles and IT management roles that lead to such positions.

Most revealingly, however, are the findings that

Over half of CIOs (51 percent) think relationships between IT and the business improve by hiring more women, and 48 percent believe it enhances team cohesion and morale. However, the vast majority of CIOs think there is no impact on strategy (82 percent) and technical knowledge (86 percent) from hiring more women into IT. (Harvey Nash 2012 CIO Survey, "Executive Summary")

To phrase this differently, women are beneficial if they can respond in traditional female leadership roles (such as relationship building and team nurturing) but not in traditionally male leadership roles (such as business strategy and content expertise). This international survey reflects the same stereotypes experienced in other contexts (e.g. academic administrative leadership). Surprisingly, the report made no comment on these findings.

However, the challenges for women in IT can be more visceral as exemplified by the shocking reports from the recent DEFCON conference. DEFCON, while associated with the hacker community, is one of the most important IT security conferences in North America. The sexual harassment experienced by women at these conferences was explicit (e.g. public groping and verbal abuse) and yet it was widely accepted by the male attendees.

In challenging the defensive reaction of the conference organizers, Valerie Aurora observes:

When you say, "Women shouldn't go to DEFCON if they don't like it," you are saying that women shouldn't have all of the opportunities that come with attending DEFCON: jobs, education, networking, book contracts, speaking opportunities – or else should be willing to undergo sexual harassment and assault to get access to them. Is that really what you believe? (Aurora, 2012)

Advances for women in information technology are substantial and encouraging. However, it appears that the obstacles and barriers are still deeply, and disturbingly, engrained in IT organizations and IT culture.

Chief Information Officers

Currently there are 10 women CIOs in Canadian universities (or 18% based on the membership of CUCCIO). Equivalent data in the US is not available although it is known that 21% of the senior IT positions in higher education (CIO, Director, or Manager) are held by women (Katz et al., 2004, p. 16). There have been steady but slow improvements in Canada: in 2004 only 3 women were CIOs and in 2010 there were only 5 female CIOs.

The Chief Information Officer (CIO) role is relatively new in Canadian higher education, emerging only within the past 6 years. The private sector and the US higher education

sector have had CIO positions for much longer, some dating back to the early 1990s. The role of the CIO is different than that of the more common "Director of Information Technology." The difference is important because it impacts on the paths people take to become CIOs.

While the CIO is almost always responsible for the information technology operations of the institution (hence the "head of IT"), the role is also about institutional strategy and transformation (the "information" part of the CIO title). An effective CIO is a "C" level executive working with their peers to articulate and advance institutional strategy. The Director of IT runs the university's network and computers; the CIO is involved in running the university. Broadbent and Kitzis (2005) describe the new CIO as someone who understands and acts knowing that "IT is at the heart of every significant business process and is crucial to innovation and enterprise success" (Broadbent & Kitzis, 2005, p. 2).

As a result, while the CIO role is based on technology and information, the success of the role is dependent on leveraging that knowledge to transform the academic and administrative capabilities of the university. Weill and Ross, leading researchers in the area of IT governance, see an even more profound change: "we see the CIO moving towards enterprise process management and perhaps a new role – the strategy executive officer, or SEO" (Weill & Ross, 2009, p. 147).

Regardless, it is clear that the role is less about information technology than it is about organizational success. To this Broadbent and Kitzis note that CIO credibility,

"comes from one place only: delivering results that your enterprise leadership cares about. We can't overemphasize this observation, which too many CIOs overlook. The only success metrics that matter are those of your executive colleagues." (Broadbent & Kitzis, 2005, p. 20)

The career path of a CIO is quite diverse. Despite the traditional requirement for technical expertise, CIOs come from widely divergent backgrounds and experiences. In Canada, the current higher education CIOs have primary disciplinary backgrounds in librarianship, accounting, business administration, mathematics, and education as well as, more conventionally, computing and networking. These CIOs have emerged from positions as professors, academic administrators, private sector business managers, and the expected IT managers.

There is no one dominant disciplinary path to the CIO role. This is important because it downplays the criticality of IT expertise or technical expertise as a central requirement for CIOs. Given that women are less represented in technical IT roles, this should, theoretically, open the door for greater participation of women in CIO roles.

However, in the 2008 EDUCAUSE survey (Goldstein, 2008),

women respondents reported that they do not aspire to be CIOs because they believe lack the technical knowledge required for the job. Conversely, those respondents in CIO roles today rated technical skills as among the least important to their overall success. (Goldstein, 2008, p. 20)

Does a female CIO have to be more explicitly technical to prove their suitability for the CIO role (even if that role is no longer primarily technical)? Many of the women CIOs interviewed for the EDUCAUSE report felt they had to be "ultra capable" (Katz et al, 2004, p. 37-38). The different standard and the higher bar for women is evident in these findings.

In her examination of a selected number female US higher education CIOs, Marilyn Drury (Drury, 2008) identified the characteristics that enabled their professional advancement: "personal strengths, mentors, family support, and a good education and experiential background" and those that created significant obstacles: "stereotypic responses and beliefs from co-workers or supervisors, a lack of recognition, support, and trust, and marginalization" (Drury, 2008, p. 317). Key methods to deal with these obstacles included "gaining strength from support groups and individuals, perseverance, and connecting to others with credibility" (Drury, 2008, p. 317). This again reinforces the critical importance of mentoring and support for career development.

Referring to the CIOs she interviewed as the "co-narrators" of her research, Drury notes that:

Hurtful, destructive, disparaging comments were made to each of them [the co-narrators] to varying degrees, preconceived notion by others that women didn't belong in information technology existed, fear and denial by others that a woman could effectively lead an information technology department existed, and the co-narrators experienced a lack of trust by others concerning their credibility as the CIO. (Drury, 2008, p. 340)

While Drury's subjects felt that the "old boy network" was diminishing, they were concerned that a "new boy network" had taken its place (Drury, 2008, p. 347). This new network was created by the "dot com" companies and IT startups that were largely male, had a strong male culture, and were generally unfriendly to women.

Are women getting good advice to respond to these challenges? In "Women CIOs" Armstrong, herself a successful CIO in the private sector, advises that aspiring CIOs take on "those unpopular tasks [that your boss does not want to do]. This may be the very key to your success" (Armstrong, 2004, p. 23). However, Sabattini & Dinolfo (2010) note, visibility and relationship building may be far more effective and important than simply hard work, long hours, and other performance or workload-based approaches. In Canada, how have successful female CIOs and those wishing to be CIOs experienced these constraints and obstacles, and how have they responded to overcome them?

Voices from the Field

In order to explore the challenges, barriers, and opportunities at a more individual, and personal level, three women from Canadian higher education IT were interviewed about their careers. While these interviews were structured around a series of common questions (see Appendix 1), the conversations moved in directions unique to the specific person being interviewed.

The women interviewed were: a former CIO, a current CIO, and a senior IT manager who aspires to be a CIO. Since many of the answers and observations are highly personal, the identities of the women have been kept confidential. As much as possible common themes and observations will be identified. Where individual comments are reported, the interviewee will be identified as Former CIO, Current CIO, and Aspiring CIO.

A number of common themes and experiences emerged from these interviews. In terms of the personal characteristics that enabled these women to be successful in their careers, all mentioned relationship building and persistence. The Aspiring CIO acknowledged that she "worked her ass off" in order to be seen as a capable manager, noting that "you don't let your guard down" lest you be viewed by your peers or your supervisor as lacking credibility. The Former CIO echoed this and noted that her expressed desire to take on bigger challenges and to seek out development opportunities made her "a challenge for my supervisors." Current CIO agreed with these sentiments and suggested that making lateral moves was beneficial for longer term rewards. She also acknowledged her "ability to welcome change. I have never been afraid of changing jobs or to accept challenging projects." Words like "aggressive", "persistent", "continuous education", and "outspoken" were common in their answers. While none used the term, most saw themselves as pioneers.

The importance of mentoring and the presence of role models was mentioned in all the interviews. Aspiring CIO expressed regret that she didn't have a mentor earlier in her career. Former CIO noted that she didn't seek out a mentor. Instead, senior women administrators around her "reached out to me because I was a woman." The mentors recognized the need to provide help and guidance (i.e. knew the challenges) even if the mentee did not at that point in her career. Role models were also critical. Most critical was to see women in senior administrative roles, not just specifically IT leadership roles. Current CIO indicated that these individuals were "motivating" even if they were not mentors or known personally. Their example was "validation" that it was possible to achieve these positions.

There was a tension among those interviewed about not wanting to acknowledge systemic barriers or blatant stereotypes. Is this denial? All indicated that such challenges exist, but all indicated that they personally were not negatively affected by them during their career development and progress. However, Former CIO was clear about the persistence of inequities: "it is out there, but I don't like to be preoccupied with it."

All those interviewed reported that they have not altered their leadership style to conform to a male dominated workplace and a predominately masculine culture. And yet for some their experiences suggest otherwise (at least to a certain extent). For example, Former CIO recounted a meeting where her frustration level at the discussion around a particular operational issue became overwhelming. Because she felt she was going to "burst into tears" in frustration she decided to leave the meeting room. She reflected on what this "said" to her male colleagues in the meeting. Was crying a sign of female weakness? Did this undermine her current and future credibility with her male colleagues? Or would she be seen as "playing the female card" in order to get sympathy and perhaps concessions? Former CIO was advised by another senior women administrator to "ratchet back your passion" because it demonstrated a feminine trait that would not serve her well in that organization's culture. Similarly the Aspiring CIO identified herself, in a positive manner, as an "emotional" person but wondered if that caused her to be viewed as weak or less capable.

This "second guessing" of their actions and reactions was a theme in the interviews. The women were behaving and engaging in ways authentic to their personalities and leadership styles, and yet they were concerned that these responses perpetuated a female stereotype that would negatively impact their career path. The women commented about whether they reflected a "female persona" or simply their own persona. Aspiring CIO wondered if this was "our own game we play with ourselves" by regularly questioning their own actions, motivations and how they are viewed by others. These "mind games" were a prominent topic in most of the interviews. Aspiring CIO wondered if she "stereotypes herself."

The changing nature of the CIO role was acknowledged by all the women. Former CIO indicated that this has opened up opportunities for women because the focus is less technical and more strategic. However, Aspiring CIO and Former CIO noted that while the role has changed many of the search committees and senior administrators have not fully understood this shift. As a result the traditional expectation of a technical expert ("Head of IT") persists. Aspiring CIO felt that the changed role and expectations of the CIO needed to be better communicated to those entrusted with hiring into these positions; not having this informed perspective was undermining women seeking these roles.

Concern, even insecurity, about a lack of a technical or IT background was expressed by some of the women. As noted in the 2008 EDUCAUSE survey (Goldstein, 2008), this concern was prominent despite the fact that these women also knew that the role was no longer a technical one nor required a technical background. Both the Aspiring CIO and the Former CIO came from non-IT backgrounds (BA in English literature; BComm in marketing) and clearly indicated that an employer "took a chance on me" allowing them to get an initial position in information technology. The Current CIO has a humanities background but also a graduate degree in computer science. The most significant shift appears to be not in the equity of opportunity for women arising from a more inclusive workplace but rather in the emerging redefinition of the role of the CIO

(and other IT positions) that diminishes the technical focus of the position. Women are becoming CIOs, in part, because the qualifications for CIOs have changed.

Many of the questions repeatedly focused the interviews on the differences between men and women in leadership styles, career advancement, and opportunities for development. When the interviewer persisted on trying to draw out these issues, many of the women expressed frustration, even a weariness, to put all this behind them and to move on. A common theme was to have women acknowledged solely on the basis of their skills and abilities and not from the perspective of them as women.

All the women interviewed mentioned their family situation and how this affected their career path. Whether they had children or not, whether their partner was able to stay at home with the family, and whether they were able (or willing) to move to seek advancement were clearly critical components of their career choices. The Former CIO said that unlike many women she had "one job not two" because of a stay at home partner. All acknowledged that there was an assumption by others that they had "given up something" in order to take on the roles they were in (although each had made personal choices, none felt that they had given up things).

Both Drury (2008) and the Catalyst reports (Catalyst, 2007; Foust-Cummings, 2008) discuss the need for better supervision (and better supervisors) to respond to the different expectations and challenges of women moving through their careers. Those interviewed all directly or indirectly supported this. Supervisors were either viewed as singularly critical to them moving forward ("took a chance", "gave me opportunities", "stimulating and supportive") or specifically unhelpful ("no feedback", "I was a challenge", able to "move on before it became an issue"). While feedback and career development are expectations of men as well as women, it is clear from the literature and these interviews that women expect a different kind of support from their supervisors.

When asked if being a women was actually an advantage in their career progress (for example, as a result of an employment equity program or special initiatives), all said no. Since all these women had careers at a time when a focus on equity issues for women was prominent, especially within the academic environment, what does this say? Were the programs implemented to help support and advance women ineffective? Were they simply not available to these women? Or do they not want to acknowledge the difference these program did make, preferring to see their success as a result of their own abilities and performance?

The presence or absence of women role models in leadership position or in IT leadership positions was important to all of them. While most were concerned about starting an "old girls network" to offset the existing "old boys network", all reinforced the need for networking and, in certain cases, the need to network specifically with women. They want the network to allow them to enhance their abilities but they don't want the network to bestow preferential treatment. While CUCCIO was viewed as a venue for this, SWAAC (Senior Women Academic Administrators of Canada) was either unknown

or viewed with concern. SWAAC, established as a means to encourage, develop, and support women in leadership roles, was seen by some of the women as problematic in that it reinforced distinctions rather than advancing inclusivity.

Much has been written about the rise of female leadership styles as advantageous in a changing workplace and business environment (Helgesen, 1990; Drury, 2008). When trying to pursue this with the women they resisted seeing their leadership style as gendered. There was a strong desire to be successful based on their own skills and expertise, not as a result of special treatment or preferential programs and certainly not because the bar was set lower for women.

In order to see these issues from a national perspective, Lori MacMullen, the Executive Director of the Canadian University Council of Chief Information Officers (CUCCIO), was also interviewed (see Appendix 2 for the questions that formed the basis of the interview). MacMullen, herself twice a CIO (Province of New Brunswick and the University of New Brunswick), provides a context and overview from the perspective of the recently formed organization that brings together university CIOs in Canada.

MacMullen acknowledged the increase in women CIOs but noted, perhaps more importantly, that women are typically the most active participants from the member institutions (whether the CIO, the designated second representation, or simply a member of a CUCCIO task group or committee). Women, apparently more so than men, take advantage of CUCCIO as a networking opportunity to broaden their expertise and to make connection to advance their careers.

A professional development program for CUCCIO has been under discussion for a number of years. While MacMullen indicated that CUCCIO must create programs that respond to the needs of women, there is concern that the organization respond to all members and all IT staff. She sees the concerns of women being incorporated into a more holistic program. The most significant challenge, according to MacMullen, is not with existing women in IT and IT leadership positions but with young women, in Grade 9 or earlier, who need to see IT and technical careers as exciting, desirable, and free from negative consequences. To that end CUCCIO may wish to sponsor events or programs that bring CIOs and technical staff in higher education together with young women at the earliest stages of their career choices.

Will the greater participation of women in all aspects of the organization change CUCCIO? The leadership of CUCCIO, like higher education IT, has been male dominated since its inception in 2006. However, for the first time, the president is a women (Ghilaine Roquet, the CIO at McGill). MacMullen thinks this will have an impact and that the organization will respond differently; exactly how remains to be seen.

However, much like the Current CIO, the Former CIO, and the Aspiring CIO, MacMullen wants to transition to a situation where women are acknowledged, promoted, and celebrated based on their expertise and accomplishments and not held back by adverse cultures, negative stereotypes, and explicit discrimination. If there is a single common

theme among the four interviews it is that all are weary of having to talk about and deal with women as disadvantaged in the IT workplace. All would like to put this behind them, to not have to be concerned with inequity, and to not have to put energy and focus into such distractions. And yet all acknowledge that barriers and obstacles still exist for women, and that work must continue to eradicate those concerns.

Recommendations

The research literature and the interviews conducted with women in IT leadership positions all suggest that while the barriers and obstacles for female leaders are diminishing, there is still much work to be done. The following recommendations are aimed at the three areas where change and support can be most effective: the employer (universities), the professional community (associations), and the individual.

a) Universities

A key recommendation, echoed by Simard (2008), the Catalyst report (2007), Drury (2008) and the women interviewed, is to enhance the skills of supervisors. Supervisors, particularly those of women, need to improve their abilities in communications, decision-making, coaching, and career guidance. The Catalyst report also calls for a reward system that recognizes efforts and success in these areas and metrics that track and make explicit representation, retention, and promotions rates for underrepresented groups (Catalyst, 2007, p. 31).

While Drury (Drury, 2008, p. 375) calls for institutional mentoring programs there is considerable disagreement on whether these should be formalized and specifically focused on women. The women interviewed expressed concerns about "women-only" programs because of the suggestion of exclusivity. However, it is also clear that effective mentoring was a key characteristic of successful female IT leaders. Whether universities create formal programs or whether supervisors encourage and facilitate informal mentoring for their staff, women in particular derive considerable value from these support mechanisms.

Somewhat controversially, Drury calls for confidential channels for reporting the negative effects of stereotyping (Drury, 2008, p. 375). While this "whistle blowing" recommendation is not supported here, Drury's suggestion underscores the difficulty of changing organizational cultures. A more productive approach is to develop in-service training programs that make all staff aware of what stereotyping looks (and feels) like.

Drury (2008) and Simard (2008) call for more flexible work opportunities and workplaces. The family responsibilities typically managed by women (and thus to a lesser degree by men) can compromise career decisions and impact progress. For the most part the evidence suggests that universities have already responded favorably to this challenge. Current CIO cautions that the flexibility of "work from home" options for women can "isolate workers and remove them from consideration for promotion."

Former CIO and Aspiring CIO observed that "limited opportunities for advancement" was a significant barrier to attaining a senior IT leadership role. Such a limitation is chronic since there will always be intense competition for the limited number of senior administrative roles. Current CIO observed that "mobility is key; you have to build your own career path. It is unrealistic to assume one employer will provide it for you." However, perhaps universities need to develop credible career paths for senior IT leaders that are non-hierarchical. Rather than focusing specifically on attaining CIO roles, institutions could develop career and reward systems that valued leadership and strategic contributions from throughout the organization. For many, this more flexible and dynamic concept of leadership would be challenging and rewarding.

b) Professional associations

Various professional association and groups have critical roles to play in helping to overcome barriers experienced by women in IT. In particular, CUCCIO and SWAAC have opportunities to make a difference.

While CUCCIO is focused primarily on CIOs and their immediate reports, it is clear that encouraging women throughout the IT organization is critical to bringing women into the CIO career pipeline. As a result, CUCCIO needs to sponsor more meetings like CANHEIT (the Canadian Higher Education IT Conference) in regional settings to ensure that women have a better opportunity to attend, network, participate, and engage with role models.

However, as the Executive Director of CUCCIO noted, an especially important initiative would be to encourage young women (in Grade 9 or even earlier) to consider careers in technology. By linking young women with successful female IT leaders CUCCIO could perform an invaluable service by encouraging long term growth in the participation of women in all aspects of IT work. Current CIO has participated in such events but has not been optimistic about the outcome (i.e. few women still enter IT or many of the STEM careers).

CUCCIO could also invite women leaders from other disciplines to its meetings and programs as a way of attracting them to the issues in IT and the possibility of CIO roles. With less of a focus on technical issues, CIOs can come to the role from diverse backgrounds. An important source of female leadership may be from disciplines and groups currently unfamiliar with the challenges and rewards of the CIO role.

Another organization that might play a positive role is SWAAC. The Senior Women Academic Administrators of Canada (SWAAC) was established to promote senior female leadership. As a strategy to encourage, develop, and support women in leadership roles it is revealing that the conference agendas available through their website (www.swaac.ca) reflect no sessions specifically on women in IT or any other technical roles. No CIOs have been featured as speakers.

SWAAC has an opportunity to model and monitor female leadership roles in non-traditional fields by including IT and CIO voices at their conference and within their membership. Having other senior women administrators value technology leadership roles will go far in helping to promote the desirability of these positions.

c) Individuals

While organizations, in this context universities, need to take a primary role in establishing an appropriate workplace and putting into practice effective HR policies, it is also true that individuals must take on responsibility for their own careers and their own workplace situations. The women interviewed all explicitly took charge of their own career development and advancement by insisting on professional challenges and upgrading opportunities, and by seeking out mentors to support them in their career paths.

Current CIO underscored the importance of this, especially in an academic setting: "I have managed my career and professional development myself, often because my bosses were academics that didn't have a clue of what was required." It would appear that senior academic administrators could benefit from the same in-service training and supervisory development that is recommended for others.

Universities and professional organizations can do much to reduce existing barriers but they cannot compensate for lack of personal initiative and responsibility.

Conclusion

The relative lack of women in CIO roles in Canadian higher education is cause for alarm. If universities are to attract the best and most talented people into senior administrative roles, they must address the lack of diversity in the position of Chief Information Officer.

Have IT leadership opportunities for women in Canadian higher education changed for the better? Unquestionably yes, at least in very recent years. There are more female CIOs and more women in IT management roles. While barriers and obstacles continue to exist, there is also optimism that they are abating (even if not quickly enough).

In an otherwise insightful book on leading IT staff, *Leading Geeks: How to Manage and Lead People Who Deliver Technology* (2003), Paul Glen states:

Geekdom knows no gender boundaries. Although it is true that there are more male than female geeks, it's not particularly important in understanding them. The patterns of attitudes, beliefs, and behaviors stem from the common assumptions of those who are drawn to technical work. (Glen, 2003, p. 28)

The deplorable situation at DEFCON (Aurora, 2012) suggests something quite different. Gender continues to be a divisive element in IT culture and in the IT workplace. The

denigration and discounting of women continues to negatively influence decisions by women to enter the IT workplace or to seek senior administrative roles such as the CIO.

While the increasing success of women in IT is attributable to changes in the workplace and changes in the acceptance of women as leaders, another major factor is change in the nature of the IT roles themselves. IT jobs are becoming more strategic and based on business issues, and less on technical expertise. As one of the one interviewees noted, by reducing the technical component of the jobs (for which many women had less skills or expertise), the management and administrative role have become more accessible to women. With respect to senior IT leadership, the positive changes in equity are as much about a change in the nature and role of the CIO as a change in the status of women.

In *The End of Diversity as We Know It* (2011), Martin Davidson argues that diversity programs have been unsuccessful and ineffective, both from an individual and business perspective. Instead he advises that organizations, and individuals, take a different approach and "leverage difference." This approach focuses less on equity and more on the advantage of difference. It is not simply that the increased representation of women will improve IT leadership in Canadian higher education; it is that diversity in those leaders will do this.

The ultimate goal is to create a diverse workplace where leadership can come from a wide and inclusive group of people. Whether this is more women, more people of colour, increased participation from those from various ethnic backgrounds, and other possibilities, the imperatives are fairness and talent management. Recruiting and retaining the best people means seeking out those people in all communities and using their different abilities in a more inclusive, flexible workplace.

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Appendix 1

Questions Asked of the Former CIO, Current CIO, and Aspiring CIO

Please provide a brief career summary. I am particularly interested in whether you have an IT background or if you came to IT from another discipline.

What were the three most significant personal characteristics or career opportunities that allowed you to achieve your current career position?

What were the three most significant obstacles for you as you moved through your career to your current position?

With respect to the obstacles you mentioned, what strategies did you use to avoid, minimize or eliminate those obstacles?

Did you (or do you) have a specific mentor supporting you in your career advancement? Is that person a woman or a man? Is it important to you either way?

A common concern for women in leadership roles is that they are stereotyped according to people's expectation of how a woman will act and lead. This is doubly true for IT leadership where women are still outsiders in a predominately male environment. Have you experienced stereotyping in your career? If so, how?

Did being a woman advantage you in your career path? For example, as a result of equity initiatives to recruit and/or promote women?

Do you encourage young women to get into IT and to think about senior IT leadership roles? Do you talk to them about stereotyping or inequity? What do you say?

Of the IT staff (i.e. managers or senior staff) that report directly to you, how many are men, how many are women?

Did you receive the career and professional development needed to move into your current role? Did you have to ask for it or was it provided as a standard program? Do you think men got more opportunities than you?

Are you a member of SWAAC (Senior Women Academic Administrators of Canada) or have you ever participated in any of their conferences?

Do you think you lead differently because you are a woman? Do you think you have adapted your preferred leadership style to suit a more masculine environment (i.e. IT and senior university administration)? What do you think about me even asking these questions?

Do women in Canadian higher education IT currently have equal opportunities for advancement and for the attainment of a CIO position? If so, why? If not, why not?

What remains the single biggest barrier to women achieving a CIO role in Canadian higher education?

What do you think universities could do to encourage and support more women in IT roles and specifically more women as CIOs?

Appendix 2

Questions Asked of Lori McMullen, Executive Director of CUCCIO

How has the landscape changed in the past five years with respect to women in IT leadership roles?

Does CUCCIO have any programs to encourage women in IT leadership roles? Do you think that is an appropriate role for CUCCIO?

Has the participation of women in CUCCIO activities changed? For example, as members or chairs of CUCCIO committees, conference presentations, etc.

CUCCIO is a male dominated organization (like IT is generally). Do you think this shapes the way the organization operates? Do you think more women as institutional members would change that? If so, how? If not, why not?

Do you as Executive Director of CUCCIO counsel women about their careers in IT? What is your advice? What recommendations to you make to assist them in their career advancement?