# DEVELOPING CANADA'S DIGITAL-READY PUBLIC SERVICE

Attracting and Retaining a Highly Skilled, Diverse Workforce to Support the Government of Canada's Digital Strategy

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# EXECUTIVE SUMMARY

The federal public service has ambitious plans to develop a transformational digital platform that will support innovation; enable delivery of user-centered, customized, and accessible services; and increase transparency and accountability. Such a platform is critical for meeting the public's expectations for efficient and effective government.

To move toward information technology modernization, Canada's public service must attract and retain world-class talent with the digital skills, experience, and mindset to drive this change. However, government is hamstrung by a skills gap. Not only does Canada suffer from a shortage of professionals with the skills government needs, but the people who possess digital skills are increasingly in demand in other sectors.

The skills shortage is most acute in areas including artificial intelligence (AI), analytics, the Internet of Things, cloud-based development, and matching technology to the specific requirements of users. Virtually all industrial sectors are now increasingly reliant on technology, and demand for skills has increased more swiftly than supply.

For decades, Canada's public service has been an employer of choice, offering opportunities to serve, coupled with job security, benefits and career advancement. However, there are some issues that are limiting government's ability to attract highly skilled candidates. While government offers a work environment that aligns with the aspirations of many young job seekers—particularly with respect to serving a social purpose—some aspects of bureaucracy are less appealing. The work environment is perceived by some to be hierarchical and slow moving, with limited opportunities for advancement compared to the private sector.

Moreover, the federal public service's complex rules and processes, including a lack of flexibility to negotiate compensation, put it at a disadvantage for attracting and retaining the best and brightest digital talent in a highly competitive market. While immigration has helped decrease the skills shortage in some sectors, public sector requirements and rules, such as the need for bilingualism, make it less easy to tap into this pool of workers.

These issues are particularly vexing as they relate to the hiring of skilled women. Increasing the participation of women in digital roles advances the design and decision-making process and allows organizations to hire from a broader talent pool. The absence of diversity in general in the development of digital technologies has been shown to allow bias to be embedded into products and services.

While senior roles in the federal public service have achieved something close to gender parity, women continue to be under-represented in technology roles. Most troubling is the significant decline in the

percentage of young women in technology roles due to a smaller pool of women pursuing education in engineering, paired with an increase of demand for women talent by the private sector.

So, what can be done to narrow this gap and attract a skilled and diverse workforce? An integrated strategy should include the following:

1. **Demonstrate the political will to build a digitally ready public service**

   Government must communicate the importance of talent and inclusion, and why the public service is a great place to work.

2. **Benchmark and develop accountability mechanisms**

   Apply accountability mechanisms, including measurable targets (which are distinct from quotas) and regular reporting, to set goals and track progress on the recruitment, development and advancement of digital talent.

3. **Build a digitally ready and inclusive organizational culture**

   The federal public service's organizational culture must support building workplaces that are stimulating, rewarding, welcoming, inclusive, and provide access to state-of-the art tools to attract digitally ready talent.

4. **Modernize human resources and hiring practices**

   Core skills—especially in analytics, user experience, and artificial intelligence—are shifting away from "code warriors" and toward people who understand how to drive change enabled by technology. Government must update job classifications to reflect current skill needs and apply a critical lens through every stage of human resource processes.

5. **Commit to new approaches to training**

   While engineering and computer science remain important disciplines, for many jobs the foundation can be laid through a variety of roles to which the requisite technology skills can be added. New approaches to training offer alternative pathways to digital roles, support upskilling existing talent, and build on assets such as "soft skills" or sector knowledge.

6. **Apply a gender and diversity lens across the value chain**

   Progressive, high-performing organizations value diverse perspectives at every level. New tools, such as Gender Based Analysis Plus, inclusive design tools, and the Diversity Institute's Diversity Assessment Tool, provide systematic approaches to open up the possibility of new approaches to "mainstream" inclusion.

7. **Build public-private partnerships**

   Collaborations with the private sector, post-secondary institutions, and non-governmental organizations can provide access to talent, new ideas, and innovative approaches.

8. **Rebrand, market and promote government service**

   The federal public service needs to build the skills pipeline by better communicating, through multiple channels, the challenges and rewards of a career—or even a stint—in government.

Canada's public service has charted ambitious goals and a bold path enabled by technology. It needs an equally bold strategy to attract diverse talent, particularly women, who can help it get there.

# CANADIANS ARE DEMANDING A DIGITAL TRANSFORMATION

The Government of Canada has ambitious plans to become a digital government that will support innovation, enable delivery of user-centered, customized and accessible services, and increase transparency and accountability. At a time when demands on government are growing and resources are shrinking, technology has the potential to allow governments to do more with less.

> **"In the age of smartphones, social media and apps that do everything, Canadians expect their government to serve them as seamlessly and as well as they've come to expect from the best digital service providers. Government exists to improve the lives of people, and a digitally enabled public service gives us an unprecedented opportunity to improve government services."** [1]

**Scott Brison, former president of the Treasury Board and Minister of Digital Government**

The demand for digital technology is coming directly from Canadians. Today, we expect public services to be accessible online, and the user experience to be fast and intuitive. Citizens and businesses want intelligent systems that share data across applications and levels of government. Often referred to as "tell us once," such systems enable users to provide basic information about themselves or their enterprise that can then be stored and accessed by government as necessary.[2]

Federal public servants also expect a more sophisticated digital environment. Digital technology brings major benefits to the workplace, such as a more flexible and technology-enabled work environment, which is particularly valued by millennials. (For this group, studies suggest that telecommuting is second only to salary as a factor affecting employment choice.[3]) Employees in a modern workplace need digital tools that promote collaboration, information sharing and increased productivity, and that are accessible to and usable by people with disabilities.[4] Employees "want to be part of a networked workforce and want an experience that is open, inclusive, nimble and optimized for digital."[5]

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[1] Greenwood, M. (2018). Government of Canada launches digital academies. Retrieved from https://techvibes.com/2018/10/22/government-of-canada-launches-digital-academies

[2] Oelrich, K. (n.d.). Reimagining democratic governance in the digital era. Retrieved from https://www.tadigital.com/blog/reimagining-democratic-governance-digital-era/

[3] Ouye, J.A. (2011). Five trends that are dramatically changing work and the workplace. Retrieved from https://www.knoll.com/document/1352940439324/WP_FiveTrends.pdf

[4] Canada. (2017). Government of Canada strategic plan for information management and information technology 2017 to 2021. Retrieved from https://www.canada.ca/en/treasury-board-secretariat/services/information-technology/strategic-plan-2017-2021.html#toc3-1

[5] https://www.canada.ca/en/treasury-board-secretariat/services/information-technology/strategic-plan-2017-2021.html

The Government of Canada needs to build an enterprise-wide system that reduces fragmentation and lays the foundation for agile, responsive and secure service delivery—something that can be accomplished only if infrastructure is shared across services. Such a system must also support user demands for better tracking, analysis, targeting and accountability. This allows access to information about everything from strategies to performance to the status of individual services. Increased transparency and accountability are particularly important, as they create higher levels of satisfaction among users and foster trust.[6] Equally important is meeting security requirements for data protection, another key issue that affects the public's trust in government.

Digital technology has the potential to deliver all these things. The good news is that Canada's digital strategy places it among leaders across the Organisation for Economic Cooperation and Development (OECD) countries. Articulated in the Government of Canada Strategic Plan for Information Management and Information Technology 2017 to 2021[7], other critical components of the strategy include the Government of Canada Digital Standards, the Data Strategy Roadmap for the Federal Public Service, a developing digital policy, and Canada's fourth Plan on Open Government.

Canada's strategy does a good job of reflecting what Canadians need and want; it highlights the demand for ensuring a high level of security, privacy, interoperability, accessibility, and open information so that government can provide Canadians with a consistent, enterprise-wide end-user experience, regardless of geographical location. The strategy also recognizes the need to respond to the realities of Canada's digital divide and the inequality it creates among Canadians in areas such as latency (delays in transmission), bandwidth, security, infrastructure and service levels.[8] Realizing Canada's digital strategy will be a challenge, as the Government of Canada lacks the fundamental infrastructure to support a shift to digitization.

> ## "Nothing short of a complete rethink of the operating model of government is required to transition to the digital, interconnected era in which we live."
>
> **Alex Benay, Canada's Chief Information Officer**

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[6]PwC. (n.d.). Seven trends in digital government. Retrieved from https://www.pwc.com/ca/en/industries/public-sector-government/digital-government.html

[7] https://www.canada.ca/en/treasury-board-secretariat/services/information-technology/strategic-plan-2017-2021.html

[8] Canada. (2017). Government of Canada strategic plan for information management and information technology 2017 to 2021. Retrieved from https://www.canada.ca/en/treasury-board-secretariat/services/information-technology/strategic-plan-2017-2021.html#toc3-1

# GOVERNMENT NEEDS TO RECRUIT HIGHLY SKILLED TALENT

To succeed in its vision for digital transformation, the federal public service needs a workforce with the right set of skills and a strategy to attract the best and brightest. More specifically, it needs a diverse workforce able to attract not only workers with digital skills, but also workers with "hybrid" skills, in which technical skills are coupled with an understanding of the business value of reforming government through technology.

Unfortunately, Canada is experiencing a shortage in the highly skilled talent that government requires; at present, 40 percent of public sector organizations are not prepared for digital transformation.[9] To make matters worse, the public sector has not fared well competing with the private sector for these relatively scarce workers.

Compounding the challenge, government has shown poor performance attracting women and certain minorities into its technical ranks. This is troubling, as high-performing organizations value the richness that gender parity and diversity bring to major projects, and the important role they play in eliminating bias in processes, products and services.

## THE CHALLENGE OF ATTRACTING DIGITAL SKILLS

As digitization increases across industrial sectors, demand for skilled talent has never been greater. Canada has an estimated 1.5 million information communications technology (ICT) workers, of which two-thirds are in industries not traditionally considered part of the ICT sector. The widening skills gap between the public and private sectors is worrying, as it suggests the private sector is doing a better job of drawing from an already-scarce digital talent base. As businesses hire, government organizations are left with a smaller pool to draw from.[10]

Alex Hilton, Chief Executive of Cloud Industry Forum, commented, "Working with the technology that underpins digital transformation, such as on-demand cloud computing services, requires a different skill set from the traditional, proprietary IT technology of the past. Historically, many government departments and agencies have outsourced their ICT services to system integrators (SIs), in some instances believing they had also outsourced the risk by doing so. This reliance on SIs, combined with the cutbacks imposed by years

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[9] Cloud Industry Forum (n.d.). Public sector IT skills shortages puts brakes on digital transformation of government services. Retrieved from https://www.cloudindustryforum.org/content/public-sector-it-skills-shortages-puts-brakes-digital-transformation-government-services

[10] Thomson, A., Veall, M., & Sweetman, A. (2018). Is there evidence of an information and communication technology labour shortage in the Canadian labour force survey? *Canadian Public Policy, 44*(1), S1-S12.

of austerity, has left many public sector organizations without the necessary skills and staff in-house to confidently adapt to new approaches to ICT such as the cloud."[11]

Recent research has identified potential shortages in specific ICT occupations. For example, Employment and Social Development Canada (ESDC) identified 10 of 13 jobs that are in-demand and for which there is insufficient domestic labour supply.[12] The jobs identified do not include emerging, in-demand job roles that include both highly specialized skills (e.g., AI or AI developer) and hybrid roles (e.g., AI project manager, AI sales manager), where competition is particularly acute. According to Linkedin's latest report on the Skills Companies Need Most in 2019, cloud computing is the most sought after skill by companies, followed by artificial intelligence. In response to this gap, Amazon Web Services (AWS) launched AWS Educate, a global initiative offering training for roles in cloud computing.

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FIGURE 1
## Information and communications technology government jobs identified as having shortages

- Computer and information systems managers
- Computer engineers (except software engineers and designers)
- Information systems analysts and consultants
- Database analysts and data administrators
- Software engineers and designers
- Computer programmers and interactive media developers
- Web designers and developers
- Information systems testing technicians
- Producer, technical, creative and artistic director and project manager–Visual effects and video game (SUBSET)
- Digital media designers (SUBSET)

(Source: ESDC, 2018)

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Government job types (called national occupation classification codes) may not reflect the full range of digital skills needed in Canada, such as those in data management, analytics and visualization. They also

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[11] Cloud Industry Forum (n.d.). Public sector IT skills shortages puts brakes on digital transformation of government services. Retrieved from https://www.cloudindustryforum.org/content/public-sector-it-skills-shortages-puts-brakes-digital-transformation-government-services

[12] Employment and Social Development Canada. (2018). Global talent stream. Retrieved from https://cdn.ymaws.com/www.cerc.ca/resource/resmgr/immigration_symposia/2018/Global_Talent_Stream_ESDC.pdf

underplay the importance of business, management and hybrid skills.[13] Policy-makers and managers in government need better labour market information and an updated understanding of the competencies—rather than credentials—required to perform in emerging digital roles.

Some researchers question the ways in which the skills gap has been presented, arguing that, were it acute, there would be more evidence of salary inflation. Part of this, they posit, results from an influx of highly skilled immigrants, which has helped bridge the gap.[14] But imprecise definitions have created challenges. "ICT professional" is considered synonymous with a computer science or engineering degree, even though the range of ICT-intensive roles is dramatically changing. Recent estimates put the number of government ICT workers at roughly 17,000, yet there are serious skills shortages and unfilled positions. This has led some to call for a dramatic rethink of hiring and training practices.[15]

Meanwhile, taxonomies for digital skills are challenging to understand because they are continually changing. In general, we differentiate between deep technical skills (those that can typically be performed only by computer science or engineering graduates), business technology skills, and basic digital literacy (see Figure 2).

There is, however, a growing focus on core competencies across functions and disciplines, including critical thinking and communication abilities. Historically, the notion was that technical skills were foundational and "soft skills" could be added. But recent discussions have shifted the focus toward "soft skills are hard" (i.e., difficult to learn and use effectively) and that technical skills for many job functions can be learned more easily. In fact, despite the significant emphasis on introducing coding at earlier stages of education, some anticipate that as AI transforms the platforms used to develop applications, traditional coding skills will become less important than technical literacy and intelligence — the ability to understand user needs, functional requirements and expectations, and to match technological solutions to them.[16]
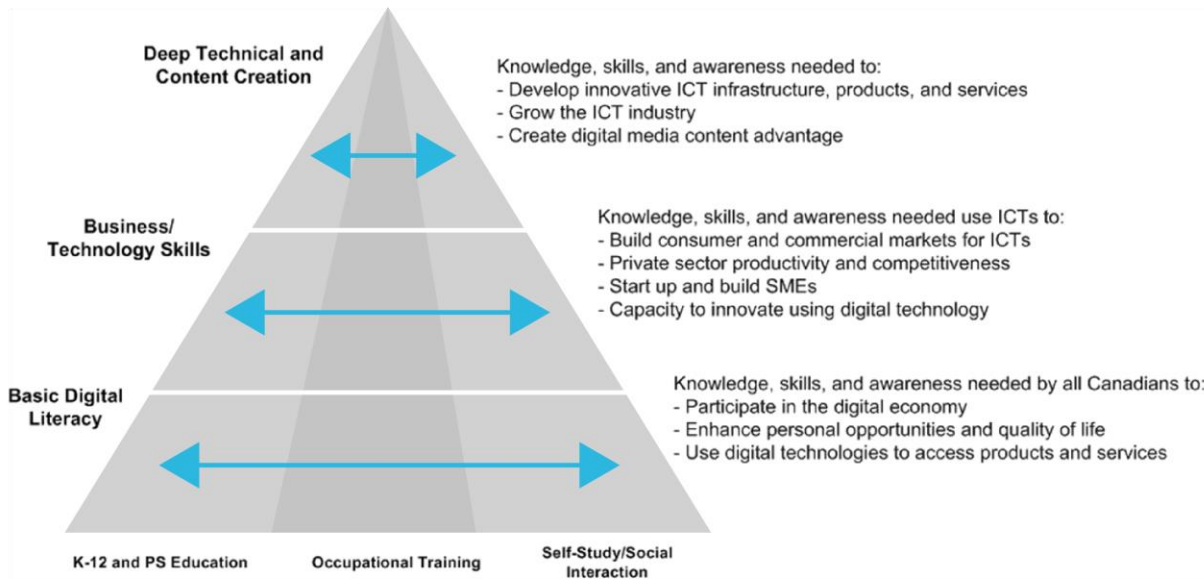
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[13] Komarnicki, E. (2012). Labour and skills shortages in Canada: Addressing current and future challenges. Retrieved from https://www.ourcommons.ca/Content/Committee/411/HUMA/Reports/RP5937523/humarp09/humarp09-e.pdf

[15] May, K. (2018). Feds launch 'Digital Academy' for public service. Retrieved from https://ipolitics.ca/2018/10/18/feds-launch-new-digital-academy-for-ps-to-help-drive-technology-makeover/

[16] Huynh, A., & Do, A. (2017). Digital literacy in a digital age. A discussion paper. Retrieved from https://brookfieldinstitute.ca/wp-content/uploads/BrookfieldInstitute_DigitalLiteracy_DigitalAge.pdf

**FIGURE 2**
**ICT Skills Taxonomy[17]**

Deep Technical and Content Creation

Knowledge, skills, and awareness needed to:
- Develop innovative ICT infrastructure, products, and services
- Grow the ICT industry
- Create digital media content advantage

Business/ Technology Skills

Knowledge, skills, and awareness needed use ICTs to:
- Build consumer and commercial markets for ICTs
- Private sector productivity and competitiveness
- Start up and build SMEs
- Capacity to innovate using digital technology

Basic Digital Literacy

Knowledge, skills, and awareness needed by all Canadians to:
- Participate in the digital economy
- Enhance personal opportunities and quality of life
- Use digital technologies to access products and services

K-12 and PS Education     Occupational Training     Self-Study/Social Interaction

# THE NEED FOR TECHNOLOGY-SAVVY LEADERSHIP

Computer scientists and engineers with deep technical skills will be critical participants in Canada's digital transformation. Still, these workers must also have operational, project management and service-delivery skills.

Large-scale technology projects have failed not because of the technology, but because of insufficient strategies for organizational change, project management, accountability mechanisms, and contract and relationship management. Government has been plagued by large-scale IT project failures that, unlike private sector failures, often become politicized. This has fueled risk aversion, which can impede innovation. The skills needed in government are both multidisciplinary and include the full range of digital skills.[18]

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[17] Media Awareness Network. (2010). Digital literacy in Canada: From inclusion to transformation. Retrieved from https://mediasmarts.ca/sites/mediasmarts/files/pdfs/publication-report/full/digitalliteracypaper.pdf

[18] Cukier, W., Yap, M., Holmes, M., & Rodrigues, S. (2009). Diversity and the skills shortage in the Canadian

The federal government needs new approaches to human resource planning and organizational culture that challenge the status quo. Traditional bureaucratic values that focus on hierarchy, rules, risk avoidance, and preserving the status quo need to be balanced with more entrepreneurial approaches that encourage innovation (Figure 3).

FIGURE 3
## Bureaucratic Culture vs. Entrepreneurial Culture [19]

| DIMENSION | TRADITIONAL | ENTREPRENEURIAL |
|---|---|---|
| Strategy | Status quo, conservative | Future oriented |
| Risk | Averse | Rewarded |
| Opportunity | Limited | Integrated |
| Leadership approach | Top-down | Democratic, empowered |
| Power | Controlled | Shared |
| Decision making | Centralized | Decentralized |
| Structure | Hierarchical | Flexible, adaptable |
| Creativity | Tolerated | Encouraged |

Across virtually all dimensions of organizational culture, an entrepreneurial approach brings innovative, creative, and shared thinking and problem solving. At the same time, tradition, hierarchical processes, risk management and control are characteristic of government. Striking the appropriate balance is important.

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information and communications technology sector: A critical interrogation of discourse. Retrieved from
https://www.ryerson.ca/content/dam/diversity/academic/Diversity%20and%20the%20Skills%20Shortage%20in%20the%20Can adian%20Information%20and%20Communications%20Technology%20Sector%20A%20Critical%20Interrogation%20of%20Disco urse_2009.pdf

[19] Tapscott, D. (1996). *The digital economy*. New York: Mc-Hill.

# THE CHALLENGES OF COMPETING FOR DIVERSE TALENT

The federal public service has been seen for decades as an employer of choice because it provided secure employment, competitive benefits and ample opportunity for career advancement. Young job-seekers, particularly women, are often attracted to mission-driven work and a relatively progressive focus on diversity and equity.[20]

However, the civil service "brand" is not strong outside of its traditional source programs (e.g., public administration), and certain features of government jobs are becoming less attractive to younger generations. As one example, the hierarchy, formality and structure of the bureaucracy are often viewed unfavourably, and the workplace may lack appealing tools, flexibility and reward systems—important considerations for millennials, particularly in the technology sector. Levels of compensation, particularly perks, tend to be less competitive in government than in the private sector; and the relatively flat structure, with constant threats of cutbacks, limits opportunities for advancement.

While private sector companies have begun to develop their talent pipelines early, including recruiting high school students, the government participates less actively in recruiting for co-op and summer jobs, and is often limited in its outreach. The reasons are many.

To start, the social networks that support government recruitment tend to spring up through policy and public administration networks. This means that traditional disciplines that feed into the public service—such as politics, public administration, and the arts and social sciences—can lack even basic foundational skills compatible with technology and management practice. Recruitment processes are limited by budgetary and travel restrictions, and public sector employers generally are less proactive than private sector companies in competing for top talent.

Additionally, the federal civil service faces many constraints in recruitment, hiring and advancement processes. These processes are highly structured and shaped by complex regulations and collective agreements negotiated between public service unions and government. Structures of employment, including long, formal recruitment cycles, and requirements such as bilingualism, also limit the pool. High levels of unionization present barriers, particularly to movement up and across ranks, or to alternative pathways into employment. These impede the ability to attract talent, especially women.

Jobs that require candidates be bilingual in Canada's official languages creates challenges for tapping into skilled immigrant ICT workers, who may speak multiple languages, but not French and English. Given that 37 percent of ICT workers in Canada are immigrants, most of whom are not bilingual in both official languages, this presents another barrier to attracting diverse talent.

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[20] Henstra, D., & McGowan, R. (2016). Millennials and public service: An exploratory analysis of graduate student career motivations and expectations. *Public Administration Quarterly, 40*(3), 78-104.

Public administration training—still a core discipline for public sector recruitment—does not include project management, finance or technology, creating a further disconnect between people seeking public sector jobs and what the public sector actually needs.

Years of cutbacks have made it difficult for government to provide the level of professional development high performers need to stay current. While new initiatives are being designed to help develop existing employees, they are still in their early stages. Multiple strategies are needed—pipeline development, reskilling, partnering—to meet the federal public service's ambitious goals for implementing digital government.

While diversity and inclusion are important to the Government of Canada, there is no overarching strategy, and hiring targets and assessments are uneven.[21] To modernize the public service through digital technology, government must rethink and adapt its human resources functions, including how it recruits, selects, develops and advances employees.

## Diversity in the workforce can reduce bias in systems and boost innovation

Evidence is mounting that a failure to embrace diversity in the digital workforce can lead to the replication and entrenchment of bias in the design of systems. This is sparking calls to embed inclusive design, which draws on the full range of human diversity, along the entire value chain and design processes so that products and services meet the needs of diverse users.[22] What's more, says Denise Shortt, Interim President and CEO at the Information Technology Association of Canada, "research shows that increased diversity leads companies toward greater innovation, productivity and competitiveness. It also ensures that we can attract the best and the brightest in the global war for talent."

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[21] Cooper, J., & Jackson, S. (2017). Rethinking public sector HR: Canadian HR executives speak. Ottawa: The Conference Board of Canada.

[22] Holmes, K. (2018). The no. 1 thing you're getting wrong about inclusive design. Retrieved from https://www.fastcompany.com/90243282/the-no-1-thing-youre-getting-wrong-about-inclusive-design

# THE CHALLENGE OF ATTRACTING SKILLED WOMEN

As government grapples with the dual challenges of gender equity in technology roles and ensuring a long pipeline of digital talent, it needs to accommodate new approaches to training and hiring that offer alternative pathways to digital roles. While engineering and computer science remain important foundational disciplines, there are increasingly more roles for "hybrids"—those that combine technology with an understanding of organizations, processes, human behaviour and service delivery. For many roles, the foundation must include a variety of disciplines to which the requisite technology skills can be added. Flipping the paradigm opens pathways for women and other under-represented groups and allows upskilling long-time employees.

In general, the public service in Canada is an attractive place for women to work. Levels of representation in the civil service at all levels is higher than in the private sector. Compared to the private sector, there are few gender differences in overall employee engagement surveys and women in the public service often report higher overall levels of satisfaction than men do.[23]

While women have achieved parity across the federal public service, comprising 55 percent of all workers, they are only 47 percent of executives.[24] The percentage of women in executive positions is lower than among the non-executive workforce in 30 of the largest departments in the federal public service. Shared Services Canada is the exception: women make up 31 percent of the workforce, but 39 percent of executives.[25]

When the data is broken down further, troubling trends emerge for recruiting a diverse digital workforce. Women fill just 27 percent of all positions in computer science in the federal government, and this percentage is on the decline.[26] While women constitute about 30 percent of computer science workers between the ages of 40 and 60, only 16 percent are younger than 40. This suggests the public service is struggling to attract young women with a technology background.

Numbers will likely continue to decline due to intensified competition from the private sector. Another reason is a push in the ICT sector to increase the representation of women at a time when the pool of computer science graduates is increasingly limited (see Figure 4).

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[23] Canada. (2018c). 2017 Public service employee survey results for the public service by question 114. What is your gender? Retrieved from http://www.tbs-sct.gc.ca/pses-saff/2017-2/results-resultats/bq-pq/00/dem114-eng.aspx#s9

[24] Canada. (2018). Demographic snapshot of Canada's federal public service, 2017. Retrieved from https://www.canada.ca/en/treasury-board-secretariat/services/innovation/human-resources-statistics/demographic-snapshot-federal-public-service-2017.html#toc4
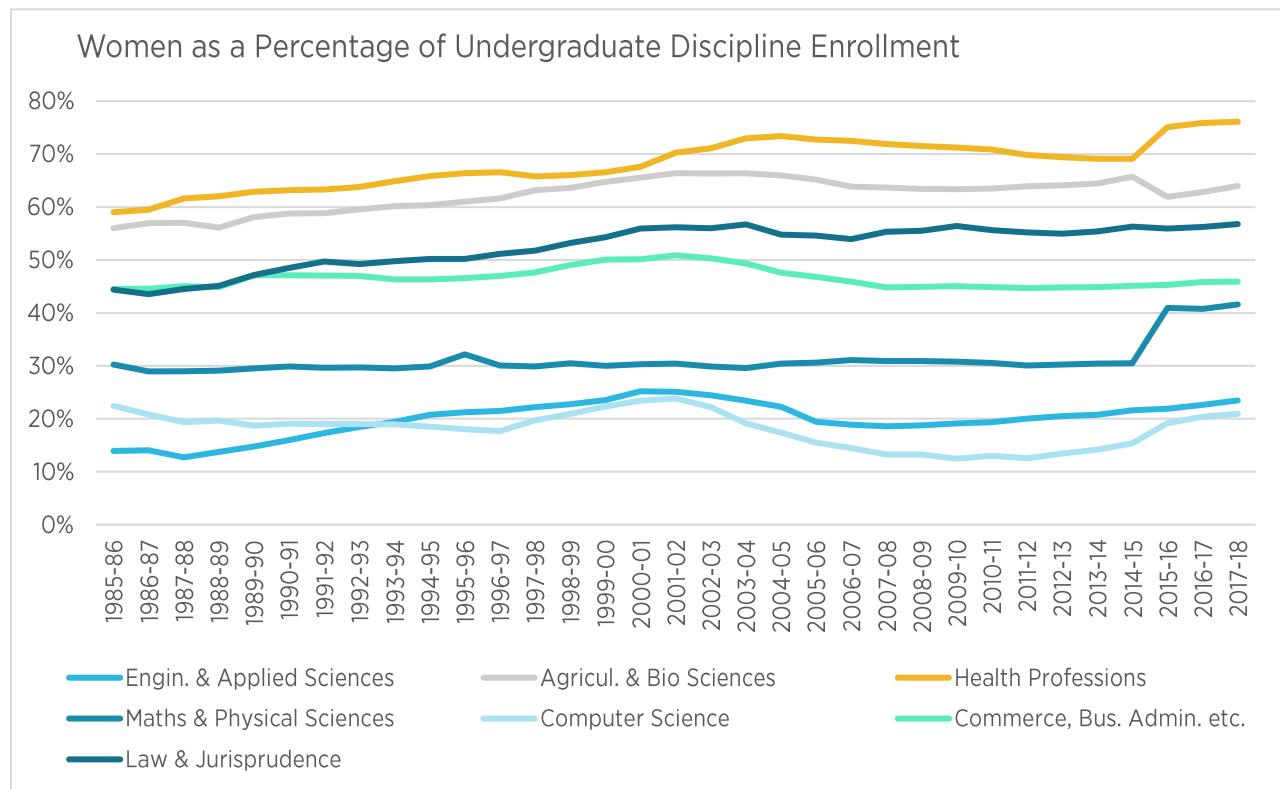
[25] Griffith, A. (2017). Diversity in the public service's executive ranks. Retrieved from http://policyoptions.irpp.org/magazines/october-2017/diversity-in-the-public-services-executive-ranks/

[26] Canada School of Public Service. (2016). Women in technology—Addressing the gender gap. Retrieved from https://www.csps-efpc.gc.ca/events/wm-tech/index-eng.aspx

These realities have profound implications for the skills gap as it applies to gender. The proportion of women in engineering and computer science has scarcely budged, despite 30 years of advocacy and education, leading some to argue that new strategies are needed. Those strategies must use levers, such as legislation, procurement and accreditation, which have demonstrated results.[27]

FIGURE 4
## Women in science, engineering, technology and math

The percentage of women in engineering is only marginally higher than in 1985, and the percentage of women in computer science has declined:

Women as a Percentage of Undergraduate Discipline Enrollment

Legend: Engin. & Applied Sciences, Agricul. & Bio Sciences, Health Professions, Maths & Physical Sciences, Computer Science, Commerce, Bus. Admin. etc., Law & Jurisprudence

(Source: Council of Ontario Universities, 2015)

However, gaps persist in specific areas. The Professional Institute of the Public Service of Canada's study of women in public sector science revealed differences in perceptions of gender bias: 42 percent of women surveyed saw gender as a barrier to their career progress, and 27 percent believed that men are favoured in opportunities for leadership roles. Almost a quarter of respondents mentioned that they lacked mentors and role models in their field. This is a challenge across technology fields. Programs like AWS's We Power Tech aim to nurture diverse talent for technology roles. The program identifies role models and provides them with opportunities to speak about their experiences and inspire those seeking to work in technology fields.

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[27] Engineers Canada. (n.d.). Women in engineering. Retrieved from https://engineerscanada.ca/diversity/women-in-engineering

Women also reported having significantly more care responsibilities compared to men—a factor that also negatively affected their careers.[28] Challenges also persist with respect to "the chilly climate," particularly for women in science and technology, where women feel unwelcome.

At the same time, there are significant variances in the proportion of women in STEM programs across universities, suggesting that some have policies and curriculum that are friendlier towards women.[29] Traditionally, some have assumed that girls are weak in math, but that is not the case. The picture is much more complex and connected to the deep structures and the socialization of women, as well as the ways in which engineering and computer science disciplines are constructed and taught.[30] With profound changes in the nature of digital work—including the impact of AI on the task of coding itself—government needs to rethink many of the ways in which we have historically framed digital skills.

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[28] O'Donnell, S., Oppen, K., & Wright, C. (2018). Women in public sector science: From analysis to action. Ottawa: Professional Institute of the Public Service of Canada. Retrieved from http://www.pipsc.ca/sites/default/files/comms/womeninsciencefullen.pdf

[29] Cukier, W. (February 2, 2018). (Discussant). Disruptive technology and inclusive innovation: Can our education and training systems adapt? Roundtable discussion on the Socioeconomic Impacts of Disruptive Technologies. Privy Council. Ottawa, Ontario.

[30] Finnie, R., Mueller, R.E., & Sweetman, A. (2018). Information and communication technology talent: The skills we need—framing the issues. *Canadian Public Policy, 44*(1), Siii-Six.

# THE WAY FORWARD

The demand for digital skills, and the reality of a skills gaps, is prevalent across Canada's industrial sectors. The public service can learn from the private sector's promising practices in recruiting, attracting and retaining highly-skilled workers, particularly women. The recommendations offered below can help create a diverse and digitally-savvy workforce in the federal public service.

1. **Demonstrate the political will to build a digitally-ready public service**

   High-performance organizations commit at the executive level to supporting and implementing gender diversity practices and policies across the organization. Leadership in the federal public service must emulate this by communicating its strategy and strengthening its brand as an innovative, inclusive and meaningful place to work.[31]

2. **Benchmark and develop accountability mechanisms**

   It is critical for organizations to "walk the talk" of supporting women, including integrating gender equity into all programs, structures and delivery mechanisms. Better evidence and analysis are needed to assess how women in digital roles perceive the environment, the attitudes of leaders and colleagues, and the perceptions of those with the appropriate skills who are not seeking employment in the federal public service.

   Apply accountability mechanisms, including measurable targets (which are distinct from quotas) and regular reporting, to set goals and track progress on the recruitment, development and advancement of digital talent. Ensure consistent tracking of the talent pipeline to understand who is being reached, who is applying, and who is being interviewed and selected, to inform an evidence-based strategy.

3. **Build a digitally-ready and inclusive organizational culture**

   Federally-regulated companies, including most financial institutions, ICT companies and many consulting firms, all depend on attracting the best and the brightest. These firms have exemplary systems for reporting on representation across diversity categories, as well as on talent pipeline analysis and employee engagement levels which are tied to performance evaluations and reward systems.

   These systems are helpful for building an inclusive and innovative organizational culture, reinforcing norms, customs, beliefs and behavior to support the mission. But the best-laid change strategy can be completely undermined by culture that reinforces the status quo. Changing culture is one of the

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[31] Bahl, M. (2018). Inclusion and diversity by the numbers. Retrieved from
https://www.cognizant.com/futureofwork/article/inclusion-and-diversity-by-the-numbers

most challenging impediments to advancing Canada's digital strategy, and the federal public service needs a complete rethink on policies that relate to such areas as child-care, flexible work, hierarchies, harassment and many more.

## 4. Modernize human resources and hiring practices

Government can attract, develop and retain individuals from diverse groups by applying a gender diversity lens to the pipeline analysis data, as well as to the processes associated with recruiting, developing, managing and engaging with employees. This includes engaging women role models, speakers, mentors and advisers, and intentionally developing and sponsoring talent.

Extensive work on competency-based assessment and asset-based approaches that build on the skills people have (versus what they lack) is key in the ICT space. New, agile staffing models such as the Government of Canada's "Talent Cloud"—an experimental hiring platform for project based employment—are attracting international attention.

## 5. Adopt "hybrid" training practices

New approaches to training can offer alternative pathways to digital roles, assess and develop competencies, support upskilling existing talent, and build on assets such as "soft skills" or sector knowledge. A new brand of digital-savvy leadership training is also necessary for managing in this new environment. While engineering and computer science remain important foundational disciplines, there are increasingly more roles for "hybrids"—those that combine technology with an understanding of organizations, processes, human behaviour and service delivery.

Rather than assuming technology skills as the foundation to which "soft skills" can be added, recognize that for many roles, the foundation can be laid through a variety of disciplines to which the requisite technology skills can be added. Flipping the paradigm opens pathways for women and other under-represented groups, as well as for upskilling long-time employees.

## 6. Apply a gender and diversity lens across the value chain

Gender and diversity need to be considered at every level of corporate strategy and function. New tools, such as Gender Based Analysis Plus, inclusive design tools, and the Diversity Institute's Diversity Assessment Tool, provide systematic approaches to asking key questions across the organization and open up the possibility of new approaches to "mainstream" inclusion. Think about all dimensions of operations in applying gender and diversity lenses. This is becoming increasingly important in ICT, as inclusive design principles have uncovered how bias can be unintentionally built into technology and systems.

### 7. Build public-private partnerships

In the short term, the federal public service simply cannot staff up quickly enough to meet the needs of its ambitious strategy. One strategy is to build partnerships, within appropriate risk-management frameworks, with private sector firms, universities, colleges and other organizations to gain access to much needed skills. There are opportunities to influence the curricula of public administration programs so they will include more of the technology, information systems, project management, finance and "practical" skills that are more typically associated with MBAs.

As one example of a successful partnership, AWS, in collaboration with the University of Ottawa Professional Development Institute, has developed AWS DigiGov, a free, two-day program to teach the Canadian government to use the cloud to deliver digital services that are citizen-centric.[32]

### 8. Rebrand, market and promote government service

Innovative outreach and communication are important run to build the skills pipeline. Some organizations recruit women by appealing to their social conscience. For example, Capital One dramatically increased its recruitment of young women by hosting socially progressive hackathons in collaboration with non-profit organizations. It gave women ICT professionals an opportunity to learn more about the values of the organization and is credited with increasing women participation in the Capital One ICT department.

Modernizing the work environment and leadership to be more inclusive will appeal to millennials. For example, Lakeridge Health Care Centre in Oshawa, Ont. used the successful,"we don't care what's on your head. We care what's in it," campaign to recruit diverse Quebec healthcare professionals. (The campaign ran amid the launch of the Parti Québécois' controversial secular values charter, which targeted hijab-wearing Muslims.) Similarly, debunking some of the myths about government jobs, akin to the Chartered Professional Accountants of Canada campaign debunking the idea that accounting jobs are boring, could be fruitful.

While it will be important to ensure that the reality matches the promise, leveraging diverse, inclusive, tolerant and supportive work environments can help attract the talent that the Government of Canada needs to succeed in a digital world.

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[32] https://pdinstitute.uottawa.ca/en/event/aws-digital-government-digigov-program-leveraging-cloud-digital-services

# CONCLUSION

Canada's public service has charted an ambitious and comprehensive information management and technology strategy, and talent is one of its pillars. Finding innovative approaches to attracting, developing, and retaining the best and brightest requires rethinking many traditional assumptions and harnessing new approaches — not just to human resources management, but also to leadership, culture, the value chain, marketing and communications, and the government brand.

In its 2018 budget, the Government of Canada presented a gender results framework with ambitious targets across all aspects of society, including the creation of a new department with full status—Women and Gender Equality—to drive change. While the Government of Canada has made significant progress in its overall advancement of gender equality, more can and should be done, particularly with respect to the ways in which it tackles the digital skills shortage in the public sector. Embracing innovative practices and embedding a gender and diversity lens on the ways in which it defines digital skills, thinks about pathways to digital roles and challenges traditional structures and processes will ensure not only that the playing field is level, but also that it has the talent needed to provide accessible, digitally enabled services for Canadians.

# REFERENCES

Accenture. (2018). Inclusive Future of Work: A Call to Action. Retrieved from
https://www.accenture.com/t20181001T231814Z__w__/us-en/_acnmedia/PDF-87/Accenture-Inclusive-Future-
of-Work-Full-Report.pdf

Accenture. (2017). Smart Nation Workforce. Retrieved from
https://www.accenture.com/t20170522T061124Z__w__/sg-en/_acnmedia/Accenture/Conversion-
Assets/DotCom/Documents/Local/sg-en/Accenture-Smart-Nation-Workforce-SG-Slideshare-FINAL.pdf

Aitken, K. (2018). Governance in the Digital Age. Retrieved from https://www.ppforum.ca/wp-
content/uploads/2018/09/GovernanceInTheDigitalAge-PPF-SEPT2018-EN.pdf

Allahar, H. (2014). The Changing Nature of Work, Jobs of the Future, and Strategic Human Resource
Framework. *Journal of Human Resource, 2*(8):1-21.

Andersson, L. (2017). 11 Leadership Guidelines for the Digital Age. Retrieved from
https://knowledge.insead.edu/leadership-organisations/11-leadership-guidelines-for-the-digital-age-5516

Baker, S., Denis, A., & Stinson, J. (2016). Women and Changing Public Services in Ottawa. Retrieved
from http://www.criaw-icref.ca/images/userfiles/files/WOMEN%20CPS%20NCRFINAL.pdf

Benay, A. (2017). The Government of Canada's Information Technology Strategic Plan. Retrieved from
https://publicsectordigest.com/article/government-canada%E2%80%99s-information-technology-strategic-plan

British Columbia Public Service. (2014). Reflecting Our Communities. Building a Diverse BC Public
Service. Retrieved from https://www2.gov.bc.ca/assets/gov/careers/about-the-bc-public-service/diversity-
inclusion-respect/reflecting-our-communities_2014-report.pdf

British Columbia Public Service. (2012). WORKPOINT. Rethinking How and Where We Work in the BC
Public Service. Retrieved from https://www2.gov.bc.ca/assets/gov/careers/all-employees/work-
arrangements/workpoint.pdf

Canada. (2018). Demographic Snapshot of Canada's Federal Public Service, 2017. Retrieved from
https://www.canada.ca/en/treasury-board-secretariat/services/innovation/human-resources-
statistics/demographic-snapshot-federal-public-service-2017.html#toc4

Canada. (2018b). Government of Canada launches Digital Academy. Retrieved from
https://www.canada.ca/en/treasury-board-secretariat/news/2018/10/government-of-canada-launches-digital-
academy.html

Canada. (2018c). 2017 Public Service Employee Survey Results for the Public Service by Question 114. What is your gender? Retrieved from http://www.tbs-sct.gc.ca/pses-saff/2017-2/results-resultats/bq-pq/00/dem114-eng.aspx#s9

Canada. (2018d). Report to the Clerk of the Privy Council: A Data Strategy Roadmap for the Federal Public Service. Retrieved from https://www.canada.ca/en/privy-council/corporate/clerk/publications/data-strategy.html

Canada. (2018e). Building a Diverse and Inclusive Public Service: Final Report of the Joint Union/Management Task Force on Diversity and Inclusion. Retrieved from https://www.canada.ca/en/treasury-board-secretariat/corporate/reports/building-diverse-inclusive-public-service-final-report-joint-union-management-task-force-diversity-inclusion.html#toc1

Canada. (2017). Government of Canada Strategic Plan for Information Management and Information Technology 2017 to 2021. Retrieved from https://www.canada.ca/en/treasury-board-secretariat/services/information-technology/strategic-plan-2017-2021.html#toc3-1

Canada. (2017b). 2017 Public Service Employee Annual Survey: Summary Report of Results for the Overall Public Service. Retrieved from https://www.canada.ca/en/treasury-board-secretariat/services/innovation/public-service-employee-survey/summary-report-results-overall-public-service-2017.html

Canada. (2017c). Infographic: Understanding and Attracting Millennials. Retrieved from https://www.canada.ca/en/employment-social-development/corporate/reports/2016-renewal-progress/recruit/student-strategy.html

Canada. (2017d). Demographic Snapshot of Canada's Federal Public Service, 2017. Retrieved from https://www.canada.ca/en/treasury-board-secretariat/services/innovation/human-resources-statistics/demographic-snapshot-federal-public-service-2017.html#toc4

Canada. (2017e). Employment Equity in the Public Service of Canada 2015–2016. Retrieved from https://www.canada.ca/en/treasury-board-secretariat/services/values-ethics/diversity-equity/employment-equity-annual-reports/employment-equity-public-sevice-canada-2015-2016.html

Canada. (2016). Scan of Emerging Issues. The Changing Nature of Work. Retrieved from http://publications.gc.ca/collections/collection_2016/hpc-phc/PH4-159-2016-eng.pdf

Canada. (2016b). Information Technology Strategic Plan 2016-2020. Retrieved from https://www.canada.ca/en/treasury-board-secretariat/services/information-technology/information-technology-strategy.html

Canada. (2013). Getting Started-Getting Your Views Building Tomorrow's Public Service Together. Retrieved from http://publications.gc.ca/collections/collection_2015/bcp-pco/CP22-101-2013-eng.pdf

Canada School of Public Service. (2016). Women in Technology—Addressing the Gender Gap. Retrieved from https://www.csps-efpc.gc.ca/events/wm-tech/index-eng.aspx

Clark, A. (2018). How can the public sector overcome the digital skills barrier? Retrieved from https://www.govtechleaders.com/2018/04/27/how-can-the-public-sector-overcome-the-digital-skills-barrier/

Clark, A. (2017). Digital skills and sharing key to public service transformation, survey finds. Retrieved from https://www.govtechleaders.com/2017/09/15/digital-skills-and-sharing-key-to-public-service-transformation-survey-finds/

Cloud Industry Forum (n.d.). Public sector IT skills shortages puts brakes on digital transformation of government services. Retrieved from https://www.cloudindustryforum.org/content/public-sector-it-skills-shortages-puts-brakes-digital-transformation-government-services

Cooke, G. and Muir, R (2012). The Relational State. Retrieved from https://www.ippr.org/files/images/media/files/publication/2012/11/relational-state_Nov2012_9888.pdf?noredirect=1

Cooper, J., & Jackson, S. (2017). Rethinking Public Sector HR: Canadian HR Executives Speak. Ottawa: The Conference Board of Canada.

Cukier, W. (2017). Diversity Leads - 2011 - 2017. Retrieved from https://www.ryerson.ca/content/dam/diversity/reports/C25_Presentation-for-senior-leadership_4Oct2017.pdf

Cukier, W. Gagnon. S., et. al., (2014, 2017) Diversity Leads. Toronto: Diversity Institute, Ryerson University.

Davidson, C. (2011). So last century. *Times Higher Education*, *28th April*: 32-6.

Deloitte. (2018). Leading Government in the digital age. Retrieved from https://www2.deloitte.com/content/dam/Deloitte/us/Documents/public-sector/us-leading-government-in-the-digital-age.pdf

Deloitte. (2017). Changing the Conversation: Millennials in the Federal Government. Retrieved from https://www2.deloitte.com/ca/en/pages/insights-and-issues/articles/millennials-need-modernize.html

Deloitte. (2016). Women in STEM Technology, Career Pathways and the Gender Pay Gap. Retrieved from https://www.itu.int/en/ITU-D/Digital-Inclusion/Women-and-Girls/Girls-in-ICT-Portal/Documents/deloitte-uk-women-in-stem-pay-gap-2016.pdf

Deloitte. (2015). The Ascent of Digital Understanding and Accelerating the Public Sector's Evolution. Retrieved from https://www2.deloitte.com/content/dam/Deloitte/uk/Documents/public-sector/deloitte-uk-ascent-of-digital.pdf

Deloitte. (2015b). Digital Government Transformation. Canada Survey Data Analysis Public Sector Research Group. Retrieved from https://www2.deloitte.com/content/dam/Deloitte/global/Documents/About-Deloitte/gx-deloitte-digital-government-transformation-canada.pdf

Deloitte. (2013). Women in ICT Perspectives and Perceptions from some of Australia's most Successful Female Technology Leaders. Retrieved from https://www2.deloitte.com/content/dam/Deloitte/au/Documents/technology/deloitte-au-technology-women-ict-information-1113.pdf

Dickinson, H. & Sullivan, H. (2014). Imagining the 21st Century Public Service Workforce. Retrieved from https://government.unimelb.edu.au/__data/assets/pdf_file/0011/2654444/MSoG-21c-Draft2_2_.pdf

Dye, D., Forsythe, J., Huff, C., Mancher, M., & Womack, K. (2014). Digital Organizations: The Public Sector's Millennial Opportunity. Retrieved from https://www2.deloitte.com/content/dam/Deloitte/us/Documents/public-sector/us-fed-digital-organizations.pdf

eSkills Malta Foundation. (2018). Guidelines to Increase and Retain Women in ICT. Retrieved from https://eskills.org.mt/en/womeninict/Documents/Guidelines_Women_In_ICT.pdf .

Gaucher, D., Friesen, J., & Kay, A. C. (2011). Evidence that Gendered Wording in Job Advertisements Exists and Sustains Gender Inequality. *Journal of Personality and Social Psychology*, 101(1), 109-128.

Global Government Forum. (2017). Women Leaders Index 2016-17. Retrieved from https://www.globalgovernmentforum.com/women-leaders-index-gender-equality-2017/

Greenwood, M. (2018). Government of Canada Launches Digital Academies. Retrieved from https://techvibes.com/2018/10/22/government-of-canada-launches-digital-academies

Griffith, A. (2017). Diversity in the Public Service's Executive Ranks. Retrieved from http://policyoptions.irpp.org/magazines/october-2017/diversity-in-the-public-services-executive-ranks/

Griffiths, M. & Moore, K. (2010). 'Disappearing Women': A Study of Women Who Left the UK ICT Sector. *Journal of Technology Management & Innovation, 5*(1):95-107

Information and Communications Technology Company–ICTC. (2017). Digital Economy Annual Review. Retrieved from https://www.ictc-ctic.ca/wp-content/uploads/2018/02/ICTC-Annual-Review-2017-EN.pdf

International Labor Organization. (2016). Promoting Diversity and Inclusion through Workplace Adjustments. Retrieved from https://www.ilo.org/wcmsp5/groups/public/---ed_norm/---declaration/documents/publication/wcms_536630.pdf

Jackson, B. (2018). 5 lessons from new technology leaders: Alex Benay, CIO of the Government of Canada. Retrieved from https://www.itworldcanada.com/article/5-lessons-from-new-technology-leaders-alex-benay-cio-of-the-government-of-canada/410907

Keathly, D. & Akl, R. (2007). Attracting and Retaining Women in Computer Science and Engineering: Evaluating the Results. Retrieved from http://www.cse.unt.edu/~rakl/KA07.pdf

Khan, S. (2016). Leadership in the Digital Age–A study on the Effects of Digitalization on Top Management Leadership. Retrieved from https://su.diva-portal.org/smash/get/diva2:971518/FULLTEXT02.pdf

LinkedIn. (2017). The Digital Workforce of the Future. Retrieved from https://business.linkedin.com/content/dam/me/business/en-us/talent-solutions/cx/2017/PDFs/digital_workforce_future.pdf

Mason, T. (2017).Women Leaders Index Gender Equality Case Study: Canada. Retrieved from https://www.globalgovernmentforum.com/women-leaders-index-gender-equality-canada-case-study/

Matteo, L.D. (2015). An Analysis of Public and Private Sector Employment Trends in Canada, 1990–2013. Retrieved from https://www.fraserinstitute.org/sites/default/files/analysis-of-public-and-private-sector-employment-trends-in-canada.pdf

May, K. (2018).Feds Launch 'Digital Academy' for Public Service. Retrieved from https://ipolitics.ca/2018/10/18/feds-launch-new-digital-academy-for-ps-to-help-drive-technology-makeover/

Meier, F. (2018). Transforming the Manitoba Public Service. Retrieved from https://www.gov.mb.ca/asset_library/en/proactive/transformation_2018.pdf

Melchor, H.O. (2013). The Government Workforce of the Future: Innovation in Strategic Workforce Planning in OECD Countries. OECD Working Papers on Public Governance, No. 21, OECD Publishing. Retrieved from http://observgo.uquebec.ca/observgo/fichiers/10454_OECD.pdf

Morris, M. (2016). Women's Leadership Matters: The Impact of Women's Leadership in the Canadian Federal Public Service. Retrieved from

https://www.researchgate.net/publication/304180173_Women's_Leadership_Matters_The_impact_of_women's_leadership_in_the_Canadian_federal_public_service

#Movethedial (2017). Where's The Dial Now? Benchmark Report 2017. Retrieved from https://docs.wixstatic.com/ugd/55c9d2_efb58fc4258b40978b5d2bc3a9d2a577.pdf

Mueller, R.E. (2013). Attracting Females into ICT in Canada. Paper prepared for presentation at the Information and Communications Technology (ICT) Talent Workshop, March 21-22, 2013, Education Policy Research Initiative (EPRI), University of Ottawa. Retrieved from http://scholar.ulethbridge.ca/sites/default/files/mueller/files/attracting_females_into_ict_mueller_mar_2013.pdf?m=1458144693

Needham, C., & Mangan, C. (2014). The 21st Century Public Servant. Retrieved from https://21stcenturypublicservant.files.wordpress.com/2014/09/21-century-report-281014.pdf

Needham, C., Mangan, C., & Dickinson, H. (2014). The 21st Century Public Service Workforce: Eight Lessons from the Literature. Retrieved from https://www.birmingham.ac.uk/Documents/college-social-sciences/public-service-academy/news-events/2014/twenty-first-century-public-servant--eight-lessons.pdf

Neubauer, R., Tarling, A., & Wade, M. (2017). Redefining Leadership for a Digital Age. Retrieved from https://www.imd.org/globalassets/dbt/docs/redefining-leadership

O'Donnell, S., Oppen, K., & Wright, C. (2018). Women in Public Sector Science: From Analysis to Action. Ottawa: Professional Institute of the Public Service of Canada. Retrieved from http://www.pipsc.ca/sites/default/files/comms/womeninsciencefullen.pdf

Oelrich, K (n.d.). Reimagining Democratic Governance in the Digital Era. Retrieved from https://www.tadigital.com/blog/reimagining-democratic-governance-digital-era/

Ouye, J.A. (2011). Five Trends that Are Dramatically Changing Work and the Workplace. Retrieved from https://www.knoll.com/document/1352940439324/WP_FiveTrends.pdf

Policy Horizons Canada. (2016). Canada and the Changing Nature of Work. Retrieved from http://www.horizons.gc.ca/en/file/18716

Public Policy Forum. (2018). Innovation in Government? Conversations with Canada's Public Service Leaders. Retrieved from https://www.ppforum.ca/wp-content/uploads/2018/03/11-916G-PS-PPF-Innovation-Strategy-report-EN-WEB.pdf

Public Policy Forum. (2017). Building a Dynamic Future: The Next Generation of Public Service Talent. Retrieved from https://www.ppforum.ca/publications/building-a-dynamic-future-the-next-generation-of-public-service-talent/?pdf=131

Public Policy Forum. (2014). Flat, Flexible, and Forward-Thinking: Public Service Next. Retrieved from https://web.uvic.ca/~sdoyle/E302/News/Report%20for%20summary%20assignment.pdf

PwC. (2018). Workforce of the Future. The Competing Forces Shaping 2030. Retrieved from https://www.pwc.com/gx/en/services/people-organisation/workforce-of-the-future/workforce-of-the-future-the-competing-forces-shaping-2030-pwc.pdf

PwC. (n.d.). Seven trends in digital government. Retrieved from https://www.pwc.com/ca/en/industries/public-sector-government/digital-government.html

QA Consulting. (2018). The digital future of the UK and the digital skills gap. Retrieved from https://consulting.qa.com/blog/2018/the-digital-future-of-the-uk-and-the-digital-skills-gap

Rafter, M.V. (2018). Textio CEO Kieran Snyder on the Importance of Language. Retrieved from https://quarterly.talenteconomy.io/issue/summer-2018/textio-ceo-kieran-snyder-on-the-importance-of-language/

Roper, T.A., & Devins, J. (2017). The Modern Workplace: Managing Today's Workforce. Retrieved from http://www.lgma.ca/assets/Programs~and~Events/Conference~and~Tradeshow/2017~Conference/THOMAS%20ROPER,%20JENNIFER%20DEVINS.pdf

Simpson, M. (2018). 'Girls Who Code' empowering young girls in tech brings free coding clubs to Canada. Retrieved from https://www.itbusiness.ca/news/girls-who-code-empowering-young-girls-in-tech-brings-free-coding-clubs-to-canada/106582

Spicer, Z., Olmstead, N., & Goodman, N. (2018). Reversing the Brain Drain: Where is Canadian STEM Talent Going? Retrieved from https://brocku.ca/social-sciences/political-science/wp-content/uploads/sites/153/Reversing-the-Brain-Drain.pdf

Thomas, A. (2011). Gender Equality in the Federal Public Service: Are We There Yet? Master of Arts–Integrated Studies. Athabasca University, Alberta.

Toronto Employment and Social Services (2016). Work Force Development Annual Report. Retrieved from https://www.toronto.ca/legdocs/mmis/2017/ed/bgrd/backgroundfile-102726.pdf

Treasury Board of Canada Secretariat (n.d.). Looking to the Future: Challenging the Cultural and Attitudinal Barriers to Women in the Public Service. Retrieved from

http://www.collectionscanada.gc.ca/eppp-archive/100/201/301/tbs-sct/tb_manual-ef/Pubs_pol/hrpubs/TB_852/LF5-27E.html

Tsalikis, C. (2018). The making of a Gender-balanced Foreign Service. Retrieved from https://www.opencanada.org/features/making-gender-balanced-foreign-service/

University of Birmingham Policy Commission. (2011). 'When tomorrow comes': The Future of Local Public Services. Retrieved from https://www.birmingham.ac.uk/Documents/college-social-sciences/public-service-academy/news-events/2014/twenty-first-century-public-servant--eight-lessons.pdf

Wernick, M. (2018). 21st Century Annual Report to the Prime Minister on the Public Service of Canada. Retrieved from https://www.canada.ca/content/dam/pco-bcp/images/ann-rpt/25/rpt-25-eng.pdf

Williams, R. (2013). Like It or Not, Millennials Will Change the Workplace. *Financial Post*, September 16. Retrieved from https://business.financialpost.com/executive/careers/like-it-or-not-millennials-will-change-the-workplace

Wilson, E.J. (2015). Leading in the Digital Age. Retrieved from https://www.researchgate.net/publication/237762629_LEADERSHIP_IN_THE_DIGITAL_AGE_Ernest_J_Wilson_III_To_Appear_in_The_Encyclopedia_of_Leadership

World Wide Web Foundation. (2018). Open Data Barometer. Retrieved from https://opendatabarometer.org/?_year=2017&indicator=ODB

Wouters, W.G. (2014). Twenty-First Annual Report to the Prime Minister on the Public Service of Canada. Retrieved from http://www.clerk.gc.ca/local_grfx/docs/rpt/rpt2014-eng.pdf