Future Skills Centre | Centre des Compétences futures

AUGUST 2023

# THE IMPACT OF DIGITAL TECHNOLOGIES

## on quality of work in Canada

ICTC CTIC
Information and Communications Technology Council | Conseil des technologies de l'information et des communications

Future Skills Centre | Centre des Compétences futures

The Future Skills Centre (FSC) is a forward-thinking centre for research and collaboration dedicated to preparing Canadians for employment success. We believe Canadians should feel confident about the skills they have to succeed in a changing workforce. As a pan-Canadian community, we are collaborating to rigorously identify, test, measure, and share innovative approaches to assessing and developing the skills Canadians need to thrive in the days and years ahead. The Future Skills Centre was founded by a consortium whose members are Toronto Metropolitan University, Blueprint ADE, and The Conference Board of Canada, and is funded by the Government of Canada's Future Skills Program.

ICTC CTIC
Information and Communications Technology Council | Conseil des technologies de l'information et des communications

The Information and Communications Technology Council (ICTC) is a not-for-profit, national centre of expertise for strengthening Canada's digital advantage in a global economy. Through trusted research, practical policy advice, and creative capacity-building programs, ICTC fosters globally competitive Canadian industries enabled by innovative and diverse digital talent. In partnership with an expansive network of industry leaders, academic partners, and policy makers from across Canada, ICTC has empowered a robust and inclusive digital economy for over 25 years.

Canada

The Impact of Digital Technologies on Quality of Work in Canada is funded by the Government of Canada's Future Skills Program.

The opinions and interpretations in this publication are those of the author and do not necessarily reflect those of the Government of Canada

**Publication Date:**
August 2023

## Authors

### TREVOR QUAN

SENIOR RESEARCH & POLICY ANALYST

Trevor Quan is a Senior Research & Policy Analyst at the Information and Communications Technology Council (ICTC). Trevor has worked for more than a decade in the technology and innovation sector with a focus on public policy development. He has written numerous reports that examine the intersection of government strategy and the development of technology clusters.

Trevor has presented at provincial and national conferences on topics such as government strategy, AI ethics, education technology, labour market impacts and the gig economy. He is particularly interested in the areas of algorithmic bias, economic inequality and the impacts of digital technology on personal privacy.

### TODD LEGERE

ECONOMIST AND RESEARCH ANALYST

Todd Legere is an Economist and Research Analyst at the Information and Communications Technology Council (ICTC). He brings more than five years of experience in economic research and consulting, supporting international trade and sustainable development initiatives. Todd also has extensive experience working with community organizations, supporting capacity development initiatives and working in technology-based start-ups.

Todd holds a Certified International Trade Professional (CITP) designation from the Forum for International Trade Training and is an active member of the Economic Developers Association of Canada. Todd also holds a Master of Business Administration in Community Economic Development (MBA-CED) from Cape Breton University and a BA in Economics and Criminology from St. Thomas University. His research interests include community economic development, export development and technology adoption to support inclusive development.

**HEATHER MCGEER**
RESEARCH & POLICY ANALYST

Heather McGeer is a Research and Policy Analyst at the Information and Communications Technology Council (ICTC). Before joining ICTC, Heather worked at the Council of Canadian Academies (CCA), supporting their communications and research teams; as an emerging researcher on the Explanatory Journalism Impact and Uptake Project (XJO), which explored the character and influence of academic explanatory journalism related to COVID-19; and at CivicAction, helping support thought leadership and initiatives for more inclusive cities.

Heather holds a Master of Professional Communication from Toronto Metropolitan University (formerly Ryerson University) and an Honours Bachelor of Arts in English with a minor in business from the University of Guelph. She enjoys bringing her interdisciplinary background to work on research focused on the future of work, environment and sustainability, EDI and the digital economy.

**JUSTIN RATCLIFFE**
ECONOMIST AND RESEARCH ANALYST

Justin Ratcliffe is an Economist and Research Analyst at the Information and Communications Technology Council (ICTC). His policy interests include exploring the structural aspects of the Canadian economy as it relates to industry diversification, competition, emerging sectors and social well-being through economic opportunity. Justin believes in bringing an empirical and evidence-based approach to the policy research and design process. In the past, his research has included topics in industrial policy, community development finance, trade and firm entry.

Justin holds a Master of Public Policy degree from the University of Chicago, specializing in economic and quantitative methods for public policy evaluation and analysis.

## Acknowledgements

The contributions to this report by our key informant interviewees and advisory committee are greatly appreciated. We would like to acknowledge all the contributors to this report, along with the following specific individuals:

**Kai-Hsin Hung**, PhD candidate at HEC Montréal
**Hamza Khan**, Partner, SkillsCamp
**Giovanna Mingarelli**, Co-Founder and CEO, M&C Consulting
**Anne Marie Fannon**, Director, Work-Learn Institute, University of Waterloo
**Julia Colyar**, Vice President, Research and Policy, Higher Education Quality Council of Ontario

We would also like to thank Alexandra Cutean, Erik Henningsmoen and the rest of the ICTC team.

# Table of contents


1 Executive summary

3 Introduction – Why look at quality of work?

5 Research project overview

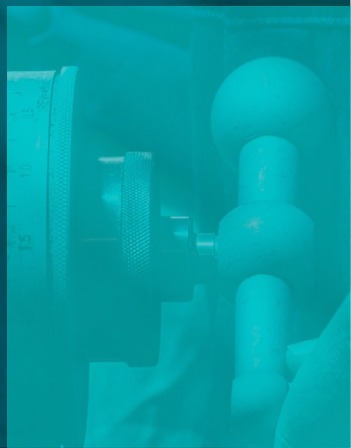
7 Findings

11 Implications and future directions

15 Conclusions

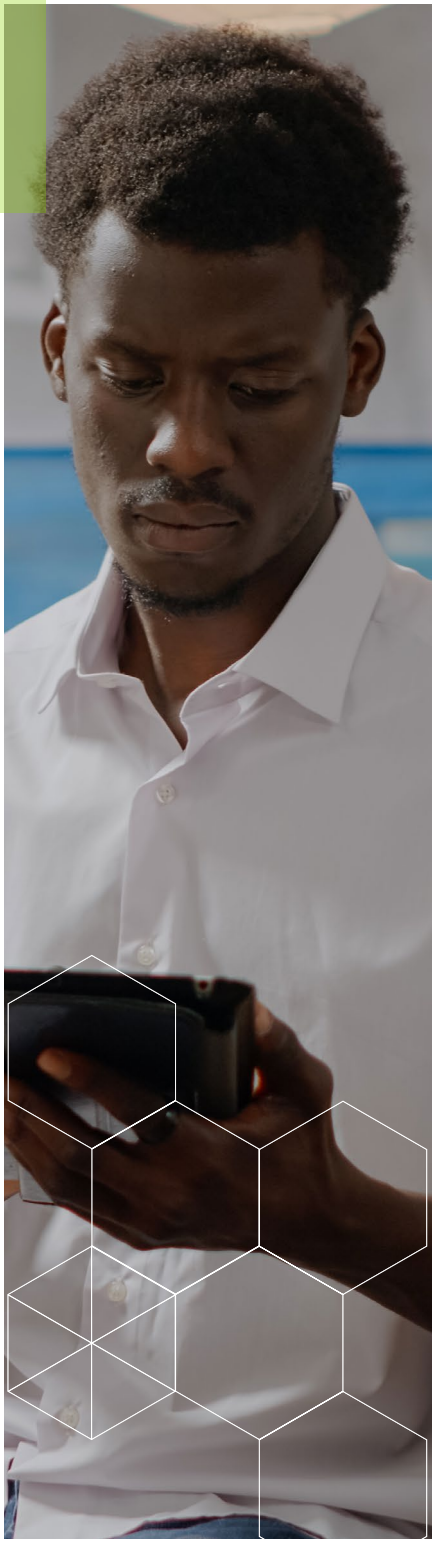
17 Annex: Supporting materials

18 Endnotes

# Executive summary

*Technology is altering the quality of work for Canadians in numerous ways and offers both opportunities and challenges for worker well-being. This paper uses primary research based on a series of interviews with subject matter experts and secondary research to explore the ways that technology affects the world of work, skills needs and developments, and associated policy implications. This research is part of the Future Skills Centre's efforts to better understand the different elements of quality of work in a Canadian context. The larger initiative aims to better define, understand and measure quality of work, a multi-dimensional concept encompassing factors that shape the overall well-being of workers.*



Historically, technology has been perceived as a force that bolsters productivity, at times, resulting in job creation or job loss. While this is true to an extent, today's interconnected and complex worlds necessitate a better understanding of the impacts of technology on work quality — or in other words, does technology make work better or worse? This project explores themes related to technology's impact on worker well-being and its ability to change the nature of work for Canadians. It explores what this change may mean for job skills evolution and capitalization on labour market opportunities.

Alongside productivity gains, Canadians have also experienced the augmentation of labour and tasks as a result of technology. Although larger bodies of research have explored the impact of automation and robotization on physical labour, there is uncertainty about technology's potential to disrupt knowledge work and change the nature of intellectual labour. Artificial Intelligence (AI) and other novel technologies offer the possibility of increased productivity and allow workers to avoid unpleasant, repetitive or arduous tasks. However, technological advancements can also create unforeseen needs, like rapid upskilling or reskilling to keep workers employed. Workers across sectors will require some digital skills and competencies to make use of new technologies. Equally important are human or transferable skills, such as critical thinking, interpersonal communication, emotional intelligence, adaptability, leadership and collaboration.

Technology can also provide flexibility for workers. Continued advances in video conferencing, collaborative tools and productivity software have expanded the options for when and where work is completed, but they also create new workplace expectations. The large-scale shift to remote work during the pandemic is a key example of this multifaceted reality. Although remote work provided a necessary lifeline to sustain business operations during a difficult time, it also brought challenges in work-life balance. Concepts like the right to disconnect, the idea that there is adequate separation between work and home life, is an increasingly crucial consideration for the quality of work.

In some cases, technology is also changing relationships between employees and employers. Gig or informal work is a key example. Technology can elevate opportunities for meaningful work, but it can also challenge the boundaries of privacy and autonomy. Undesirable outcomes of technological advancements for the workforce may include increased surveillance, reduced autonomy and displacement. At the same time, labour-saving technologies may also encourage employees and employers to automate time-consuming tasks, develop new high-quality employment opportunities and offer more value-added tasks to improve quality of work.

# Introduction – Why look at quality of work?

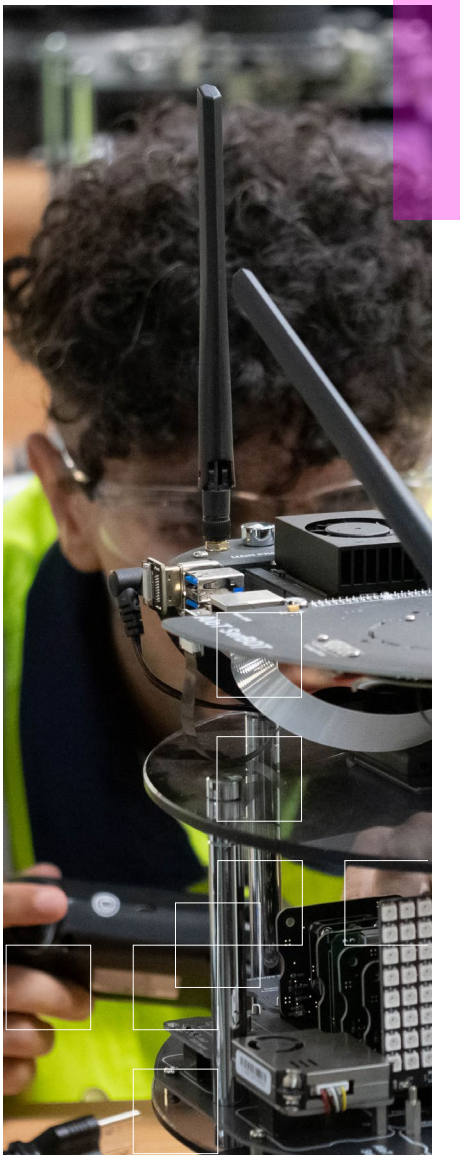
*Quality of work is a complex term that has different meanings depending on the context or stakeholder group. As such, quality of work[1] does not have a single or accepted definition.*

Instead, it is regarded as a subjective measure that can refer to a combination of aspects of worker well-being, including "finding voice, purpose, and connection with work, opportunities for advancement and access to training, safe and supportive work environments, job security, in addition to earning a living wage, health care benefits, and secure and predictable work hours."[2] Quality of work may have different meanings to workers, employers and policymakers, but each has a stake in these discussions.

**TABLE 1**
**Quality of Work Framework**

| Main Theme | Sub-Components |
|---|---|
| Income and benefits | Hourly wage / Level of pay |
| | Benefits |
| | Wealth-building opportunities |
| Skills and prospects | Training |
| | Job security and stability |
| | Career prospects |
| Working conditions | Work intensity |
| | Work schedule and hours |
| | Work flexibility |
| | Managerial support |
| | Resources |
| | Worker voice and autonomy |
| Safety and rights | Freedom from discrimination |
| | Equity and fairness |
| | Psychological safety |
| | Physical safety |
| | Right to representation |
| Social environment | Belongingness |
| | Meaningfulness |
| | Recognition |

*Source: Raag Bhatia and Daniel Olsen, "Quality of Work Literature Review," Future Skills Centre, 2023*



Historically, researchers have looked at variables influencing quality of work through lenses such as management science and productivity measures or as part of a more holistic consideration of the nature of work and its impact on individual lives. Work quality guides how individuals participate in the labour force, how much effort they invest in their roles, and their financial health. Since a notable portion of many people's waking hours are spent working, one's relationship with their workplace plays a significant role in overall feelings of satisfaction. Employers, governments and civil society groups are increasingly interested in the quality of work, sometimes associated with similar terms like 'good jobs' or 'good work.' For these stakeholders, work quality goes beyond the simple availability of work.[3] [4] In other words, having a job is just one component among other important elements such as social cohesiveness, civic engagement, health and personal or family lives.

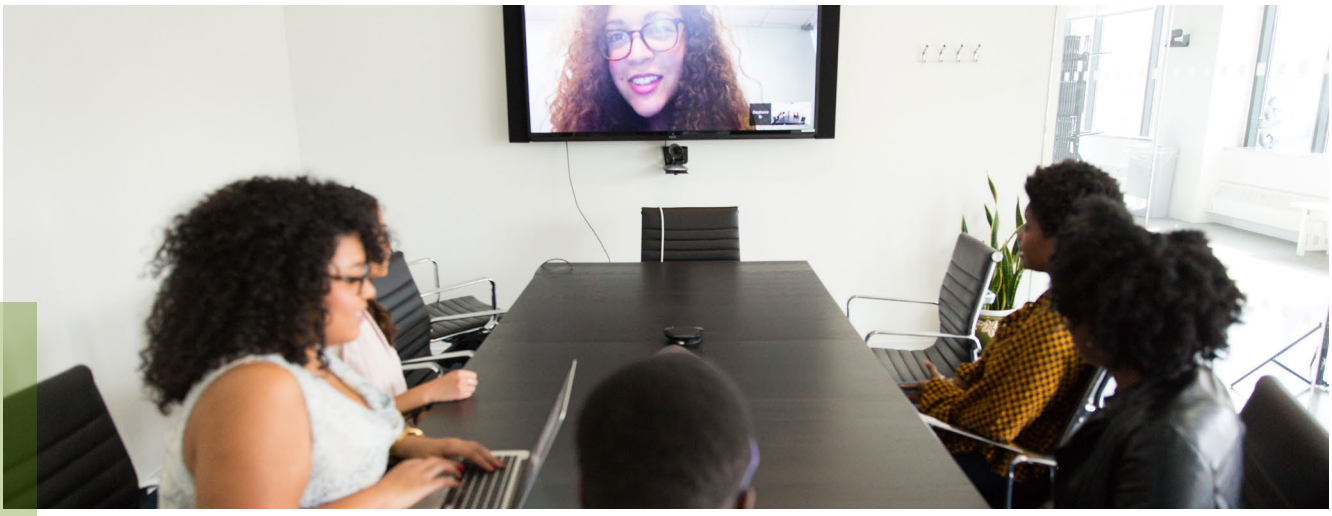
Global disruptions that emerged in the wake of the COVID-19 pandemic accelerated the adoption of digital technologies[5] while also impacting economies and the nature of work itself.[6] Non-traditional forms of work — such as remote work, gig work and the sharing economy associated with the concept of the future of work — grew in recent years as well. Societal changes made many workers and employers rethink their relationship with work.[7]

Although there has been substantial research in recent years on the digitalization of the economy and technology adoption, the intersection of technology and work quality is yet unclear. Pandemic-induced changes like physical distancing and the widespread use of remote and hybrid work have only accelerated the role of technology in the workplace. COVID-19 acted as a catalyst or "a great accelerator" of digitalization.[8] For example, one international survey finds that companies digitized "20 to 25 times faster during COVID-19."[9]

While new technologies have increased productivity and the overall demand for employment, they undoubtedly also create new considerations for the quality of work.[10] This report explores a series of related research questions, including:

- How is technology affecting worker well-being?
- What technologies are particularly disruptive?
- What skills, competencies and supports are needed to help workers adjust to these changes?

This paper investigates the intersection of the world of work and technology to understand how occupations and employment can be impacted by technology.



# Research project overview

*Digital technologies can affect various dimensions that are recognized as themes in quality of work such as income and benefits, skills and career prospects, working conditions, safety and rights and social environments.*[11]

This exploratory research examines how digital technologies affect the quality of work through primary research derived from 15 key informant interviews (KIIs), as well as secondary research data from Canadian and international sources. This project began with a literature review of academic research and public-facing information related to technology and quality of work and similar terms to better understand these intricacies. This information was used to help guide the design of the interview questions and draft lists of relevant subject matter experts as interview subjects. A second literature review was conducted later in the research process to investigate new topics identified by interviewees.

To garner a variety of perspectives, interviewees were selected to include subject matter experts with different areas of expertise and lived experiences. The sample included individuals from the private sector, government, organized labour, post-secondary institutions and workforce development organizations.

In-depth interviews were undertaken to explore emerging developments in quality of work in a Canadian context while supplementing existing secondary research. In so doing, existing findings were validated and, in some cases, challenged, and new ideas or subjects to investigate surfaced. These interviews allowed a wide range of subject matter experts to share their insights and concerns. The semi-structured interview process also encouraged in-depth conversations across different dimensions of technology and work quality. Interviews were transcribed and coded using the grounded theory method. The process was aided by qualitative research software (NVivo) to find insights and overarching themes related to the research goals. However, given the large scope of the topic, some limitations exist. Notably, interviews were time-limited and there are inherent limitations of sample size.

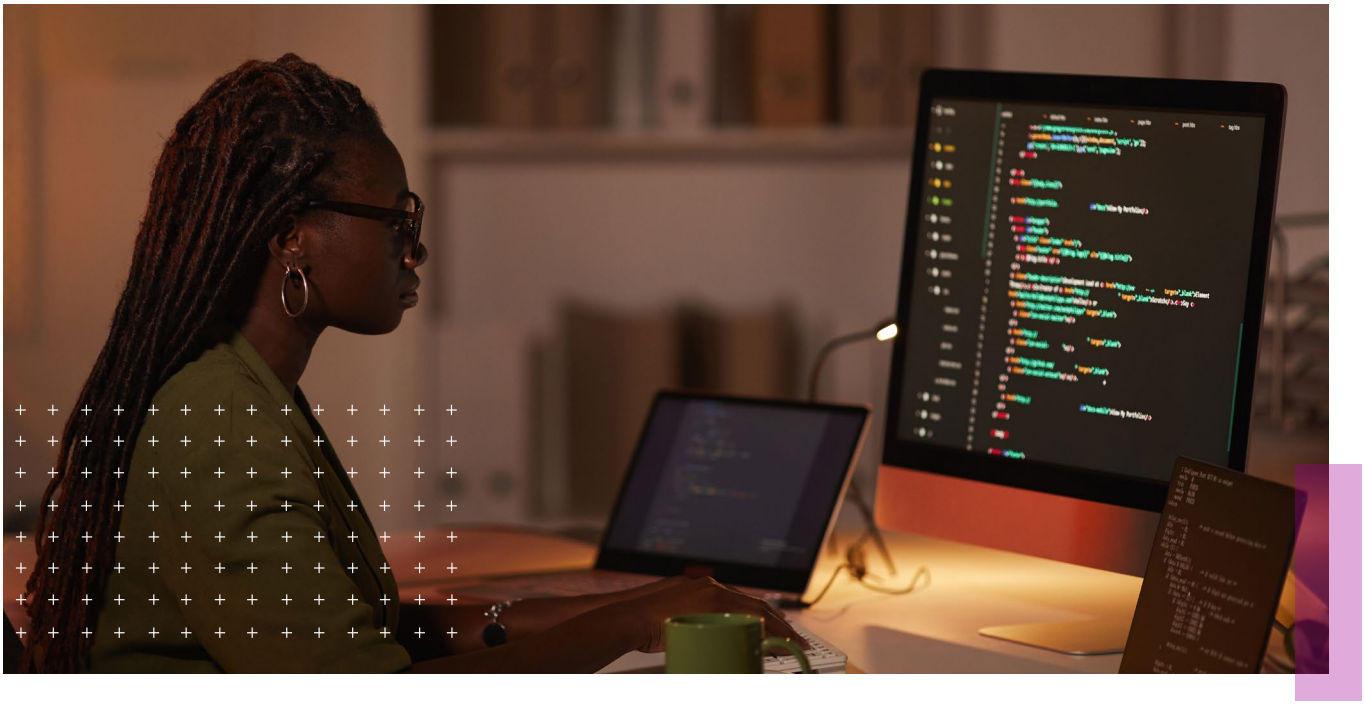
This research was supplemented with quantitative analysis and modelling designed to investigate possible relationships between technology and quality of work. Data used to support this work came from Statistics Canada. For example, the 2020 Canadian Internet Usage Survey (CIUS) and Public Used Microdata File (PUMF). A variety of statistical methods were used to extract information from the survey, including linear regressions, logistic regressions and conditional

probabilities. The data touches on various measures of workplace activities, training, life satisfaction, remote work and internet connectivity, as well as breakdowns by various demographics. However, interpretation of quantitative information should be done cautiously as there are limits of inference, especially in the case of causal inference. Specific to the 2020 CIUS, respondent beliefs have likely changed over the last few years, especially considering the increasing acceptance of remote work and the growing role of technology. CIUS is conducted intermittently, and represents a snapshot of internet usage in Canada, which limits the ability to monitor changes year to year. In future, we will have data that captures post-pandemic life available for comparison through CIUS.

As noted by research participants, there are questions about how to classify technology-related jobs, and where to draw boundaries for what is considered technology and what is not. It becomes challenging to accurately group roles if almost every job has elements of digital technology integrated into it. As a result, interviews and secondary research considered the work implications of technological integrations across a variety of roles. Various technological impacts and unique considerations are highlighted as illustrative examples when considering larger themes.

Technology has significant diversity, equity and inclusion (DEI) implications and this project made an effort to investigate specific effects on workers belonging to equity-deserving groups through both the primary and secondary research.[12] Interview questions were designed to explore the positive or negative implications of technology in the workplace on diversity, equity and inclusion. The overrepresentation of equity-deserving groups in gig work, as well as the potential vulnerability of workers in informal work arrangements, is also a reason to continue research in these areas.[13] DEI considerations have been factored into interview questions as well as engagement with a diverse range of stakeholders.

Ultimately, this project explores various impacts, implications and future-oriented strategies for post-secondary institutions, policymakers, and the private sector to ensure people who work in Canada are prepared to navigate these changes and access high-quality work.



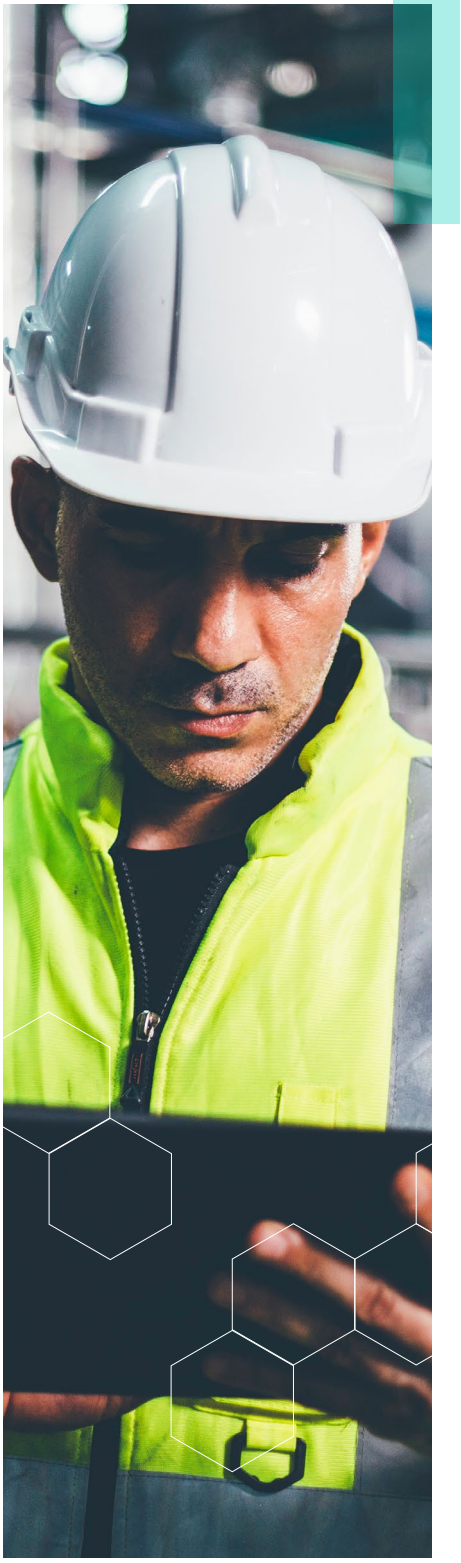
# Findings

*Interviews conducted for this study revealed a wide range of potential challenges and opportunities for technology to improve the quality of work. Although these discussions also revealed some level of ambiguity and uncertainty about how to think about technology in terms of the effects on different elements of quality of work, certain examples stood out:*

- Growing digital technology usage and its amplification during the COVID-19 pandemic has led to widespread adoption of remote work
- Disruptive technologies like AI are becoming increasingly adopted in the workplace
- Technology can facilitate the breaking apart of work, for example tasks being outsourced or complemented with non-traditional employment, such as gig work or freelancing

Despite some uncertainty over how these and other changes will affect the workplace, several sub-themes emerged:

- AI and other technologies may automate certain tasks
- Technology provides flexibility for workers, but it is important to ensure workers have the right to disconnect
- Technology can create or enhance opportunities for meaningful work
- The capacity for employer surveillance enabled through increasing digitalization can negatively impact work quality
- Technology is changing the nature of some employment relationships



## New capabilities in AI and automation

Advancements in AI technology have allowed consumer-grade AI applications to enter the Canadian workplace.[14] While these new technological capabilities could potentially bolster productivity in some jobs, they also risk disrupting or replacing others.[15] Unlike previous forms of technological advancement, there may be new patterns of disruption in knowledge work as "higher-skill jobs are themselves vulnerable to automation by AI."[16] A recent analysis from the United States indicates that approximately 19 per cent of all jobs have at least 50 per cent of their tasks exposed to language learning models used in AI.[17]

This research notes how roles that are heavily reliant on science and critical thinking skills are less exposed to AI disruption. Conversely, programming and writing skills are more exposed.[18]

Interestingly, other quality of work research highlights numerous negative impacts on work conditions through AI and other forms of automation. Technology stress stems from constantly changing skill and job requirements and excessive demands for employees to adapt.[19] Other research on the technological impacts on quality of work notes that automation can diminish worker well-being, leading to mental distress and decreasing overall job satisfaction.[20] The need for technological progress must be coupled with an evolving assessment of its effects on work quality. That is, technology deployment in the workplace should be done in a human-centric way, with the consent and involvement of those affected. For optimal work quality, technology changes should be made *with* workers, rather than *to* them. At the same time, adapting to an increasingly digital-forward workplace requires a focus on worker training and consideration of how to best leverage human capabilities.

## Technology enables flexibility but can make it difficult to disconnect

One of the greatest benefits of growing technology usage is increased flexibility of when and where work occurs. The widespread adoption of remote work provides benefits such as reduced commuting and increased control over working time, including scheduling and breaks. In some cases, remote work allows people to work from new settings such as homes, coffee shops, or even different cities or countries. Workplace flexibility is seen as a positive attribute in various quality of work frameworks.[21] The Information and Communications Technology Council's (ICTC) analysis of Statistics Canada data also appears to show a positive and statistically significant relationship between working from home and self-reported life satisfaction for women.[22]

One of the greatest benefits of growing technology usage is increased flexibility of when and where work occurs. The widespread adoption of remote work provides benefits such as reduced commuting and increased control over working time, including scheduling and breaks.

While the importance of flexibility was a consistent theme throughout this research, some interviewees noted that not all workers prioritized flexibility. Some workers may want the regular scheduling of a nine-to-five job where they can leave work at the office or prioritize job stability given uncertain economic conditions.[23] In other cases, the flexibility of working from home can be a challenge for extroverts who desire in-person interactions and parents who have competing childcare responsibilities in the home.[24]

When working from home is well executed, it can increase worker productivity and organizational performance and reduce costs.[25] One core consideration with the growing normalization of remote work is the right to disconnect.[26] Interviewees from various industries pointed to the need for legislation like Ontario's "Right to Disconnect", which makes changes to the Employment Standards Act to include the right to not engage in work related communications, including emails, telephone calls, video calls or sending or reviewing other messages.[27]

Difficulty disconnecting from work is validated by Statistics Canada data, making it a key indicator of work quality. The analysis finds that working from home correlates to the expectation that workers remain connected after standard working hours.[28] The inability to disconnect can lead to a lack of work-life balance, burnout and psychological harm,[29] making it a core consideration for the quality of work.[30]

## Technology can lead to meaningful work

Interviewees highlighted the potential for technology to help enhance quality and meaning in work by removing some of the monotonous and dangerous tasks, and leaving room for more fulfilling aspects of work.

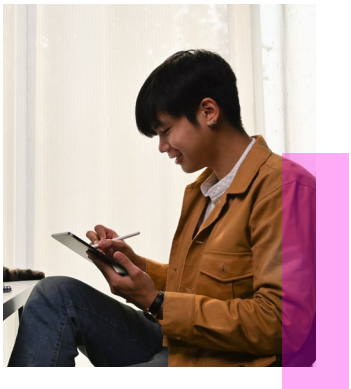
Indeed, there is a strong relationship between measures of job quality and workers' access to meaningful work.[31] This aligns with existing quality of work frameworks where the social environment has an impact on how people engage in their work. It is important that "workers have a perception of an authentic connection with their work, often leading to feelings of pride and achievement."[32] As noted by one interviewee, high quality of work means avoiding "managing workers like machines." Despite the increasing integration of digital technology in the workplace, focusing on the human aspect, including aligning individual goals with business needs, is key to helping employees find meaning in their work.[33]

## Technology and workplace surveillance

Workplace surveillance has long been a concern for both employers and workers alike. For example, in the early 1900s, Ford automotive factories included forms of surveillance on assembly lines as well as in employees' homes.[34] The implementation of digital tools and processes potentially widens the scope of modern workplace surveillance. Digital technologies played a critical role in connecting employers with employees during pandemic lockdowns, but they can also allow employers to track, monitor and analyze workers in novel and innovative ways.[35] Current workplace surveillance software varies greatly by employer needs, and only some provinces have drafted legislation on the requirements for disclosure of electronic monitoring. This may be a growing concern, as one recent study of remote workers in Canada found that 70% "identified at least some aspect of their work as digitally monitored."[36]

Recent research by the Government of Canada studied the implications of workplace surveillance and remote work and found that 1) given the considerable latitude to monitor employees, new technologies are challenging the amount of data collection that is considered appropriate and 2) employers need guidance with policies protecting privacy rights and fostering trust.[37] Challenges of balancing employer business interests for a safe, secure and productive workplace with employee privacy are core to the quality of work themes of safety and worker rights.[38] Surveillance of workers can increase fears of negative consequences and negatively impact feelings of safety and trust in the workplace.[39] This has been further validated by Canadian research that found that heightened surveillance is inversely correlated to job quality (due to lower level of work satisfaction and increased stress).[40]

## Technology is changing employment relationships and enabling gig work



Digital technology is contributing to evolving relationships between employees and employers throughout Canadian workplaces. If technologies like videoconferencing software or employee performance analytics tools are managed poorly, they can contribute to lower engagement, diminished workplace culture and job-hopping.[41] If managed well, they can improve the quality of work through better work-life balance while increasing loyalty to companies.[42]

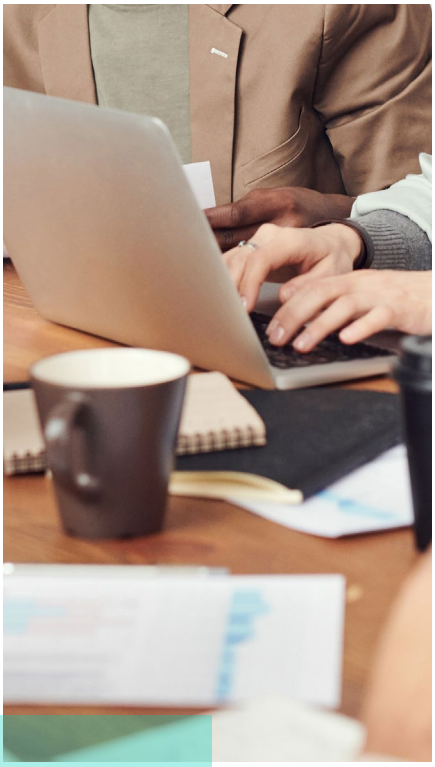
People engaging in digitally intermediated work may receive few benefits or labour protection, with intentional or non-intentional misclassification identified as the root cause of many problems faced by gig workers.

Interviewees echoed the challenges of developing relationships when interactions are digitally intermediated, with one interviewee noting, "I do think there's a massive need for being able to build that rapport with your colleagues, being able to trust them in that one-on-one, like in-person relationships, where you build trust in your colleagues."

Some employers are increasingly using digital platforms to find freelancers, consultants or other specialists as needed for projects.[43] One prominent form of these new working relationships is the gig economy.

Gig work, enabled by digital technology, has grown in recent years and stands in stark contrast to typical employee-employer relationships. According to a recent Statistics Canada study, one in 10 Canadians participate in gig work.[44] Furthermore, research continues to highlight the participation in gig work when workers lose their jobs, such as during the economic disruption caused by the COVID-19 pandemic.[45]

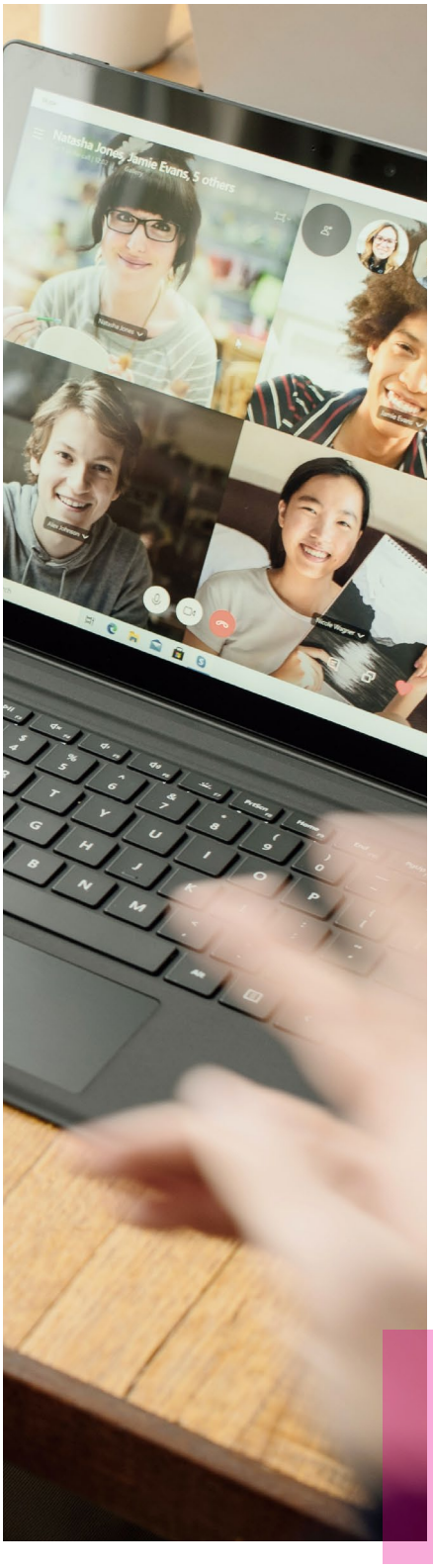
However, technology-enabled gig work has a complicated fit within the quality of work models that provide a framework for good jobs and high-quality employment. For example, gig work is often criticized for its lack of opportunity for advancement, training, safe and supportive environments, job security, a living wage, health care benefits and predictable work hours. Yet it is preferred by many. Conversely, the benefits of autonomy, flexibility and potentially better work-life balance are positive contributors to quality of work.[46]



The issue of classification of gig workers — whether they are truly independent contractors rather than employees — has been an area of contention in Canada and abroad.[47] Gig work can encompass a range of situations but typically refers to paid employment where workers are not employed on a long-term basis by a single firm. Instead gig workers enter various contracts to complete a specific task or for a specific period.[48] This can include independent contractors, freelancers, or on-demand workers hired for jobs mediated through online platforms.[49] Some companies emphasize that workers need to remain contractors to keep their flexible hours, while gig worker organizations and labour advocates dispute the notion that flexibility and security are mutually exclusive. Some interviewees noted the negative impacts of digital platforms, arguing that, increasingly, technology enables work relationships where individuals assume additional risks and liabilities.[50] People engaging in digitally intermediated work may receive few benefits or labour protection, with intentional or non-intentional misclassification identified as the root cause of many problems faced by gig workers.[51] If digital platform companies misclassify gig workers as independent contractors, this can reduce their protection against job loss, injury, discrimination and harassment, and denies other benefits that workers are entitled.[52]

# Implications and future directions

*The following analysis explores ways that stakeholders can adapt to ensure Canadians are prepared to access and benefit from quality work throughout their careers.*



## Clear and validated employment pathways for Canadians

With changing labour market dynamics, the importance of timely and granular labour market information is paramount. Recent research by the Organization for Economic Co-operation and Development (OECD) done in collaboration with the Future Skills Centre and the Labour Market Information Council has shown that the use of career guidance services in Canada is less than half of the average (19 per cent versus 39 per cent) in OECD countries.[53] There could be an opportunity to increase participation with these services and to educate workers on the need for transferable digital skills. For example, the 2022 Global Digital Skills Index by Salesforce Research found that 81 per cent of Canadians said they did not have the tools and resources needed to acquire digital literacy.[54] Furthermore, marginalized groups are particularly disadvantaged in their ability to participate in the digitally mediated workforce.[55]

Career guidance providers can inform workers on the need for digital skills and competencies that are increasingly applicable across many roles, not only digital roles. There is an opportunity for improving access to career supports and expanding worker understanding of transferable digital skills that can be used in different jobs and workplace settings throughout one's career.

**What are transferable digital skills?**

1. Universally applicable across various disciplines
2. Adaptable within specific domains or industries
3. Do not become obsolete with new/emerging digital technologies[56]

It can be challenging to formally categorize these broadly applicable digital skills. Instead, they can be generally framed as comprehensive digital literacy across various disciplines. Digital literacy is defined as the ability to use digital technologies, communication tools and networks to function effectively in the global economy, as well as navigate and adapt to an evolving digital landscape.[57]

This application to digital and non-digital work emphasizes technological literacy traits and capabilities that focus on functionalities, rather than specific platforms or applications. Four core areas can be identified as outlined in Table 2.

**TABLE 2**
**Digital Literacies**

| Classification of Digital Literacies: Core Areas | |
|---|---|
| Tools and interface | Concerned with basic familiarity with computer systems; knowing how to interact with hardware and software, applications and design concepts |
| Information and data | Skills related to retrieving, thinking about, processing and using information |
| Sharing and creation | Includes all digital skills and literacies in line with the traditional notion of literacy: the ability to read, write and communicate ideas and information, including basic modern communication, multimedia consumption and production, and the ability to share digital creations and persona in the interconnected global economy |
| Historical and cultural context | The ability to recognize that technologies are developed within cultural, economic and political systems, and therefore reflect the values and contexts of these systems |

*Source: Jeremy Riel, Sonya Christian and Brad Hinson, "Charting digital literacy: A framework for information technology and digital skills education in the community college."*

Ultimately, career guidance can benefit from timely, granular, and validated data that helps quantify job demand, identify digital skills needed and provide better access to career and training services through collaboration.[58]

Career guidance to expand worker understanding around these universal aspects of digital skills and literacy may be particularly valuable for certain groups, such as longer-term unemployed job seekers or those in roles that have been transformed by technology.[59] Meanwhile, newcomers to Canada may require additional support to address language barriers, work eligibility, recertification and systemic discrimination.[60]

Through a better understanding of digital literacy and skills demand, career guidance services and training providers can provide clear and validated employment pathways to job seekers across all industries.

Through a better understanding of digital literacy and skills demand, career guidance services and training providers can provide clear and validated employment pathways to job seekers across all industries.

## Skills training begins early: The case for work-integrated learning

Interventions and programs that expand hands-on learning and work-integrated learning opportunities across sectors should be considered by educators and policymakers. Today, high school students and post-secondary students must contend with the complexities of technological advancement and the growing need for specific certifications and education.[61] Interviews with employers highlighted the importance of continuous learning as the rate of change accelerates. This speaks to the larger value of nurturing a culture of lifelong learning where people have opportunities to participate in training and skills development at any time in their career journeys.

## Human, automation-resistant and transferable skills

As automation and AI continue to transform the Canadian job market, human skills, transferable skills and automation-resistant skills will be crucial. Technological developments are quickening the need to develop skills that are not easily replicated. For example, skills like critical thinking are highly associated with roles that are less vulnerable to AI language learning models.[62] Ensuring workers have these skills will contribute to quality of work and increase access to stable jobs and improved career prospects.[63]

Labour demand is shifting toward workers with cognitive skills, technological skills, and social and emotional skills.[64] However, in 2019, only about one third of post-secondary strategic plans and annual reports explicitly acknowledged social-emotional skills.[65] This indicates an opportunity to expand and integrate social-emotional human skills into current educational programs, or provide stand-alone courses.[66] Table 3 outlines several key human skills that future-ready workers will increasingly need:

**TABLE 3**
**Human Skills**

| Skill | Reasons to Develop These Skills |
|---|---|
| Critical thinking, creativity and problem solving | Machines can process data and perform routine tasks quickly and accurately, but they cannot create new things, generate original ideas, or solve complex problems |
| Interpersonal communication | Workers who can build and maintain relationships with others, and communicate effectively with customers, clients and colleagues are critical[67] |
| Emotional intelligence | Social and emotional skills related to high emotional intelligence such as managing their own emotions and understanding the emotions of others are increasingly valued |
| Adaptability and flexibility | Workers need to adapt to changing circumstances, learn new skills quickly and perform a wide range of tasks |
| Leadership and management | Workers who can inspire and motivate others, and who have strong leadership and management skills, will be in demand |
| Collaboration | Collaboration is complex and requires the combination of human skills not easily replicable by technology |

*Source: Emergent Employment: Canadian Findings on the Future of Work. Information and Communications Technology Council, 2021.*

Interviewees mentioned many of these skills and particularly emphasized creativity, critical thinking, interpersonal communication, emotional intelligence (such as empathy), collaboration and adaptability. Intercultural competency and the ability to work with diverse teams were also highlighted.

## Future-ready skills for in-career adults

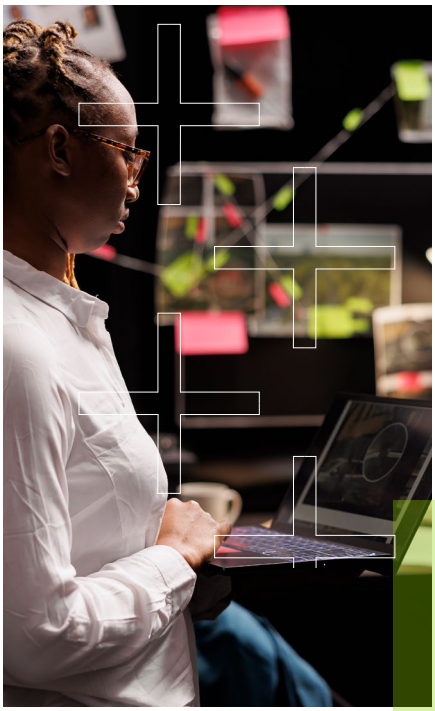
Interviewees and secondary research identified the need for investing in adult education and training.[68] Here, technology can play a prominent role by being the enabling tool to offer large-scale access to rapid and impactful training for in-career adults who cannot take time off or commit to in-person learning.

Where possible, employers could commit to paying for worker training in the skills needed for the role. Fortunately, a 2022 Canadian survey indicated that between 2020 and 2022, the percentage of employers who invested in digital training programs doubled.[69] There may be opportunities for future research on the effectiveness of various types of digital skills training and different delivery methods.

**TABLE 4**
**Upskilling and Reskilling Activities that Businesses Are Investing In**

| Activity | 2020 | 2022 |
|---|---|---|
| Digital training programs | 33% | 69% |
| Micro-credentials | 14% | 37% |
| Bootcamps | 10% | 27% |
| Programs created with PSIs | 17% | 24% |
| Other | 17% | 16% |
| In-house training | N/A | 100% |
| Off-site training | N/A | 55% |

*Source: "Empowering People for Recovery and Growth: 2022 Skills Survey Report," Business + Higher Education Roundtable.*

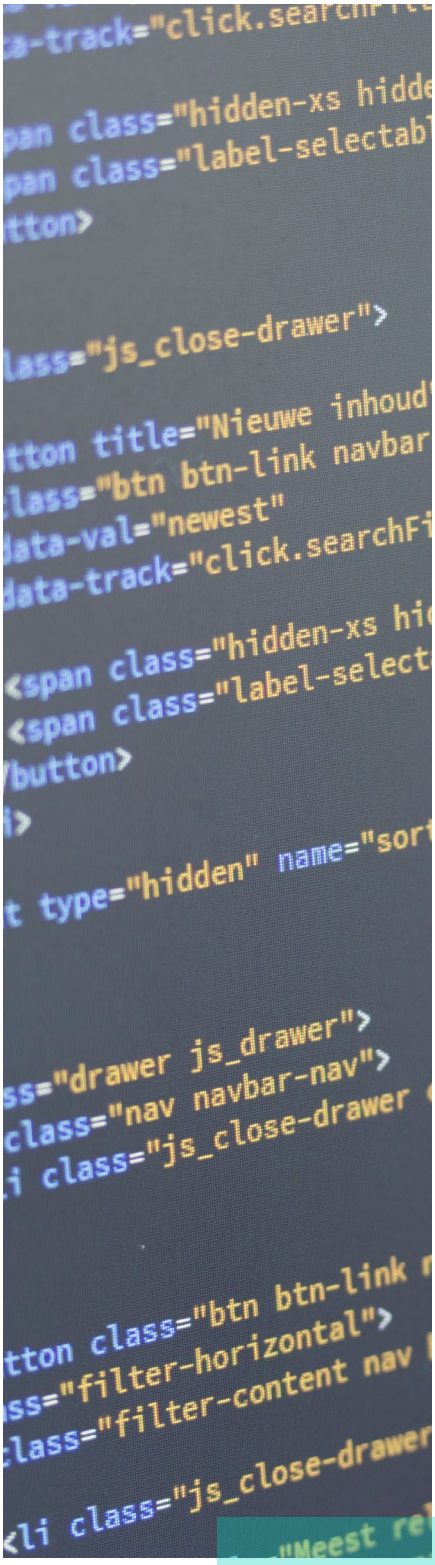


## Leverage worker insights

Technological changes in the workplace should be done with careful consideration of the impact on workers. One interviewee described a scenario in the resource extraction industry where there was a failure in designing automation processes, with workers being removed from in-person machine operations to remote supervision of these machines. This move did not consider the impact on the workers. Instead, processes and technology were developed to put machines first, and humans were "an afterthought," as one interviewee noted. While it was assumed that the rollout of this technology would benefit workers, allowing them to work off-site, for example, the workers felt disconnected from their roles, causing lower engagement and increased job turnover. Avoiding situations like this requires engaging workers in the design and deployment of such changes from the outset.

# Conclusion

*The influx of technology into the workplace and society as a whole requires a better understanding of its impact on the quality of work in Canada. There has been significant research on the role of technology in boosting productivity and affecting broad labour market shifts, such as jobs losses or gains. Nevertheless, it is also crucial to consider how it impacts employee well-being across different dimensions, such as job stability, work intensity, flexibility, autonomy or meaningfulness.*




As quality of work is an important factor in labour force participation, worker motivation, engagement, productivity and attraction, technology's role in work quality is relevant to numerous stakeholders, such as policymakers, industry and education institutions.

This exploratory research provides a starting point to describe current technological impacts and offers context. The primary and secondary research in this study found numerous effects of technology on quality of work. While individual use cases varied by industry or role, several overarching themes emerged:

- Advanced digital technologies such as AI are being adopted into the workplace and have the potential to drastically alter tasks and employee roles. While it is difficult to know what jobs are ultimately at risk, there is a need for workers to focus on building and refining human skills and competencies that cannot be easily replicated or automated

- Technology-enabled remote and hybrid work has provided great benefits for employees, including increased flexibility in work location and work hours. However, remote work may also contribute toward undesired outcomes like difficulty disconnecting from work or lower levels of social connection and trust among co-workers

- Digital adoption and automation can create opportunities for more meaningful work across the board. If managed well, automation can help workers concentrate on fulfilling and meaningful work rather than arduous or repetitive tasks. In some cases, this can also help workers feel more empowered and find meaning in their work

- Technology in the workplace, especially with remote work, raises risks of increased surveillance. Reduced privacy and invasive digital monitoring tools can lead to diminished psychological safety among workers. In some cases, surveillance may be tied to software that encourages employees to perform certain tasks or meet performance objectives, which could either be helpful or reduce autonomy, depending on how it is used. For example, various AI-driven call centre software can analyze conversations with customers and provides guidance to help sell new offerings and track on-the-job performance[70]

- Technology is ultimately changing employment relationships and expectations. One example is the growing trend of digitally enabled freelancing and gig work. While freelance or gig work offers benefits like flexibility and the freedom to choose between projects, drawbacks include a lack of benefits, unreliable income and unpredictable working hours

As the labour force continues to change and evolve, the importance of adapting skill sets will become increasingly tied to the notion of quality of work. With the integrated support of institutions, programs, employers and policy, workers in Canada who can develop and demonstrate in-demand skills will be well-positioned for success in this evolving workplace. Ultimately, by taking a proactive approach to address these challenges, we can create a future where technology serves to enhance the human work experience.

As the labour force continues to evolve, the importance of adapting skill sets will become increasingly tied to the notion of quality of work.

# Annex: Supporting materials

## I) Supplementary Information

### Case Study: Technology in Canadian Manufacturing Providing Meaningful Work

In Canadian manufacturing, the increasing use of sensors and digital progress tracking helps workers see production progress and their contributions to multi-step processes.[71] This was described by an interviewee as giving workers greater ownership of the work and has been recognized as a key aspect of advanced manufacturing in Canada.[72] Technology-enabled measurements and process tracking can provide positive benefits, as workers can be empowered to help assist in quality assurance, leading to enhanced feelings of responsibility.

### Case Study: Examples of Workplace Surveillance

Workplace surveillance software can range from capturing computer keystrokes and screengrabs to turning on webcams to monitor employee activity.[73] Additionally, workplace productivity applications can track and predict the movement of workers, including office workers, warehouse workers or transportation providers.[74] The most used tools by employers are focused on employee presence and performance, two areas where managers have lost oversight due to the prevalence of remote work and a lack of organizational policies and procedures.[75] Interestingly, one Canadian research study found that there was correlation between low satisfaction working remotely, low trust, and a lack of perceived control over their work performance.[76] Preliminary studies have shown that 35 per cent of surveyed Canadian employees said they work in a company that uses at least one employee-monitoring tool — 28 per cent of these respondents said these tools were already in place before the pandemic, and seven per cent said they were brought in during or after COVID-19.[77] However, there are many misconceptions about what employers can view, and that can lead to increased employee discomfort and turnover.[78]

### Case Study: A Role for Organized Labour

One possible way of protecting workers to ensure access to quality work and employment is through organized labour, such as workers engaging in collective bargaining through unions. This was noted by interviewees with expertise in organized labour and also by interviewees who recognize that individuals pushing back against negative uses of workplace technology may not be as effective as collective efforts.

Some organizations, like the Economic Policy Institute, argue that the protection of labour standards or working conditions go beyond the negative impacts of technology and unionized settings and may spill over to a wide range of workplaces and changing expectations for employees and employers.[79] However, other organizations argue that addressing these issues such as workplace privacy can occur as part of organizational best practices since “consent and transparency will be crucial in maintaining employee trust” or through overarching legislative protection.[80]

# Endnotes

1 For the purposes of this research, quality of work is used as an inclusive term and is used interchangeably with similar and related terms. Quality work describes high-quality or "good" work, in contrast to work that could be associated with negative outcomes for worker well-being.

2 Raag Bhatia and Daniel Olsen, "Quality of Work Literature Review," (Future Skills Centre, 2023), https://fsc-ccf.ca/research/quality-of-work-literature-review/

3 "Good work: Policy and research on the quality of work in the UK," (UK Parliament House of Commons, June 6, 2022), https://commonslibrary.parliament.uk/research-briefings/cbp-9561/

4 Andrew Schwede et al., "The Working Future: More Human, Not Less," (Bain & Company, 2022), https://www.bain.com/contentassets/d620202718c146359acb05c02d9060db/bain-report_the-working-future.pdf

5 Amankwah-Amoah J, Khan Z, Wood G, Knight G. "COVID-19 and digitalization: The great acceleration." Journal of Business Research (2021): 602-611. doi: 10.1016/j.jbusres.2021.08.011.

6 Ng MA, Naranjo A, Schlotzhauer AE, Shoss MK, Kartvelishvili N, Bartek M, Ingraham K, Rodriguez A, Schneider SK, Silverlieb-Seltzer L, Silva C. "Has the COVID-19 Pandemic Accelerated the Future of Work or Changed Its Course? Implications for Research and Practice." International Journal of Environmental Research and Public Health (2021 Sep 28;18(19):10199) doi:10.3390/ijerph1819101999

7 Greg Iacurci, "Why labor economists say the remote work 'revolution' is here to stay," (CNBC, Dec 1, 2022), https://www.cnbc.com/2022/12/01/why-labor-economists-say-the-remote-work-revolution-is-here-to-stay.html ; Boston College Centre for Work & Family, "2022 Trends," accessed Apr 2023, https://www.bc.edu/content/dam/files/centers/cwf/homepage/BCCWF%20-%202022%20Trends.pdf ; Ahu Yildirmaz, Mita Goldar, and Sarah Klein, "Illuminating the Shadow Workforce: Insights Into the Gig Workforce in Businesses," (ADP Research, Feb 2020), https://www.adp.com/-/media/adp/resourcehub/pdf/adpri/illuminating-the-shadow-workforce-by-adp-research-institute.ashx

8 Amankwah-Amoah J, Khan Z, Wood G, Knight G. COVID-19 and digitalization: The great acceleration. Journal of Business Research (2021 Nov); 136:602-611. doi: 10.1016/j.jbusres.2021.08.011. Epub 2021 Aug 11. PMID: 34538980; PMCID: PMC8437806.

9 "A pandemic digital silver lining: Companies digitized many activities 20 to 25 times faster during COVID-19," (McKinsey, 2020) https://www.mckinsey.com/featured-insights/sustainable-inclusive-growth/chart-of-the-day/a-pandemic-digital-silver-lining-companies-digitized-many-activities-20-to-25-times-faster-during-covid-19

10 James Bessen, "Automation and jobs: when technology boosts employment," Economic Policy, Volume 34, Issue 100, (October 2019), 589–626, https://doi.org/10.1093/epolic/eiaa001

11 Bhatia and Olsen, "Quality of Work Literature Review"

12 Rachel Osikoya, "How We Can Use Tech to Improve Diversity in The Workplace," (World Economic Forum, June 23, 2020), https://www.weforum.org/agenda/2020/06/technology-ally-inclusion-diversity-work/ ; Brandi Goswick, Kristi Lamar, and Anjali Shaikh, "Exploring tech-enabled DEI solutions," (Deloitte, Nov 3, 2021), https://www2.deloitte.com/us/en/insights/topics/value-of-diversity-and-inclusion/diversity-and-inclusion-in-tech/technology-dei-workplace.html

13 Risa Gelles-Watnick and Monica Anderson, "Racial and ethnic differences stand out in the U.S. gig workforce," (Pew Research, Dec 2021), https://www.pewresearch.org/fact-tank/2021/12/15/racial-and-ethnic-differences-stand-out-in-the-u-s-gig-workforce/

14 Joe McKendrick, "AI Adoption Skyrocketed Over the Last 18 Months," (Harvard Business Review, Sept 27, 2023), https://hbr.org/2021/09/ai-adoption-skyrocketed-over-the-last-18-months

15 Aaron Mok, "ChatGPT may be coming for our jobs. Here are the 10 roles that AI is most likely to replace," (Business Insider, Feb 2, 2023), https://www.businessinsider.com/chatgpt-jobs-at-risk-replacement-artificial-intelligence-ai-labor-trends-2023-02

16 Jean-Phillipe Deranty and Thomas Corbin, "Artificial intelligence and work: a critical review of recent research from the social sciences." AI & Society (2022), https://doi.org/10.1007/s00146-022-01496-x

17 Tyna Eloundou, Sam Manning, Pamela Mishkin, and Daniel Rock, "GPTs are GPTs: An Early Look at the Labor Market Impact Potential of Large Language Models," (OpenAI, Open Research, and University of Pennsylvania Working Paper, March 2023), https://arxiv.org/pdf/2303.10130.pdf

18 Eloundou, Manning, Mishkin, and Rock, "GPTs are GPTs: An Early Look at the Labor Market Impact Potential of Large Language Models"

19 Martin Krzywdzinski, Detlef Gerst, and Florian Butollo, "Promoting human-centred AI in the workplace. Trade unions and their strategies for regulating the use of AI in German" Transfer, https://doi.org/10.1177/10242589221142273

20 Sarah A. Burgard and University of Michigan Katherine Y. Lin "Bad Jobs, Bad Health? How Work and Working Conditions Contribute to Health Disparities," American Behavioural Science, 2013; 57(8): doi:10.1177/0002764213487347

21 Bhatia and Olsen, "Quality of Work Literature Review"

22 Results are from analysis of Statistics Canada's 2020 Canadian Internet Usage Survey (CIUS) Public Used Microdata File (PUMF).

23 Megan Leonhardt, "The Great Resignation was fueled by workers' obsession with flexibility. Big Tech layoffs have scared employees reprioritizing what they need," (Fortune, January 26, 2023), https://fortune.com/2023/01/26/workers-want-job-stability-not-flexibility/

24 Anthony Evans, Christina Meyers, and Olga Stavrova, "Extroversion and Conscientiousness Predict Deteriorating Job Outcomes During the COVID-19 Transition to Enforced Remote Work," Sage Journals, Vol. 3, Issue 13. September 06, 2021, https://doi.org/10.1177/19485506211039092 ; Ruth Igielnik, "A rising share of working parents in the U.S. say it's been difficult to handle child care during the pandemic," (Pew Research Centre, Jan 26, 2021), https://www.pewresearch.org/fact-tank/2021/01/26/a-rising-share-of-working-parents-in-the-u-s-say-its-been-difficult-to-handle-child-care-during-the-pandemic/

25 Analysis of Statistics Canada data shows a strong relationship with individual's having a university degree and working from home full-time. It is important to ensure there are systems in place to support equal access to WFH opportunities, particularly for equity-deserving groups that have lower rates of education qualifications.

26 "Final Report of the Right to Disconnect Advisory Committee," (Government of Canada, February 2022), https://www.canada.ca/en/employment-social-development/corporate/portfolio/labour/programs/labour-standards/reports/right-to-disconnect-advisory-committee.html

27 Aya Al-Hakim, "Ontario's right to disconnect act has kicked in. Experts say it's good 'in theory'," (Global News, June 5, 2022), https://globalnews.ca/news/8894368/canada-right-to-disconnect-work/

28 ICTC analysis of Statistics Canada's 2020 Canadian Internet Usage Survey (CIUS)

29 Kumara Somasundram, Amy Hackney, Marcus Yung, Bronson Du, Jodi Oakman, Behdin Nowrouzi-Kia, and Amin Yazdani, "Mental and physical health and well-being of Canadian employees who were working from home during the COVID-19 pandemic," (BMC Public Health, October 31, 2022), https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-022-14349-5

30 Daniel Schneider, and Kisten Harknett, "Consequences of Routine Work-Schedule Instability for Worker Health and Well-Being," Sage Journals, February 01, 2019, https://journals.sagepub.com/doi/full/10.1177/0003122418823184

31 Dahl, Svenn-Åge and Nesheim, Torstein and Olsen, Karen Modesta, "Quality of Work: Concept and Measurement (2009)," (REC-WP Working Papers on the Reconciliation of Work and Welfare in Europe No. 05-2009), http://dx.doi.org/10.2139/ssrn.1489881

32 Bhatia and Olsen, "Quality of Work Literature Review"

33 "The Working Future: More Human, Not Less," (Bain & Company, 2022), https://www.bain.com/insights/the-working-future-more-human-not-less-future-of-work-report/

34 Ruqaiyah Zarook, "The Boss is Watching," (Current Affairs, Oct 2022), https://www.currentaffairs.org/2022/10/the-boss-is-watching

35 M.J. Masoodi, Nour Abdelaal, Stephanie Tran, Yuan Stevens, Sam Andrey & Karim Bardeesy, Workplace Surveillance and Remote Work, (Cybersecure Policy Exchange, Sept 2021), https://www.cybersecurepolicy.ca/workplace-surveillance

36 Mohammed (Joe) Masood et al. "Monitoring Remote Work in Canada: Support or Surveillance?" (Future Skills Centre, The Dais, The Human Factors Engineering Lab at Toronto Metropolitan University, July 2023), https://fsc-ccf.ca/wp-content/uploads/2023/07/Monitoring-Remote-Work-in-Canada-Support-or-Surveillance_Report.pdf

37 "Workplace surveillance and remote work: Exploring the impacts and implications amidst COVID-19 in Canada," (Government of Canada, April 2022), https://www.sshrc-crsh.gc.ca/society-societe/community-communite/ifca-iac/evidence_briefs-donnees_probantes/skills_work_digital_economy-competences_travail_economie_numerique/masoodi_bardeesy-eng.aspx

38 "Workplace Monitoring: Best Practices for Employers," (go2HR, April 2023), https://www.go2hr.ca/legal/workplace-monitoring-best-practices-for-employers

39 Bhatia and Olsen, "Quality of Work Literature Review"

40 Mohammed (Joe) Masood et al. "Monitoring Remote Work in Canada: Support or Surveillance?" (Future Skills Centre, The Dais, The Human Factors Engineering Lab at Toronto Metropolitan University, July 2023), https://fsc-ccf.ca/wp-content/uploads/2023/07/Monitoring-Remote-Work-in-Canada-Support-or-Surveillance_Report.pdf

41 "The role of HR analytics in performance management," (HRWorld, Nov 17, 2022), https://hrsea.economictimes.indiatimes.com/news/hrtech/the-role-of-hr-analytics-in-performance-management/95555407 ; Andrew Hill, "Remote work's loyalty problem: Risk of 'culture crisis' rises with employees isolated at home," (Financial Post, Dec 2021), https://financialpost.com/fp-work/remote-works-loyalty-problem-risk-of-culture-crisis-rises-with-employ"ees-isolated-at-home

42 Solveiga Blumberga, Santa Berga "Personnel Loyalty, Work-Life Balance During Remote Work," (International Conference on Innovations in Science and Education, March 16, 2022), DOI: https://doi.org/peb.v3.300

43 Danny Vinik,"The Real Future of Work," (Politico, Jan 2018), https://www.politico.com/magazine/story/2018/01/04/future-work-independent-contractors-alternative-work-arrangements-216212/

44 “The Changing Nature of Work,” (Statistics Canada, Jan 14, 2022), https://www.statcan.gc.ca/o1/en/plus/249-changing-nature-work

45 Sung-Hee Jeon and Yuri Ostrovsky, “The impact of firm closures and job loss on participation in gig work: A causal analysis,” (Statistics Canada, Sept 27, 2022), https://www150.statcan.gc.ca/n1/pub/11f0019m/11f0019m2022001-eng.htm

46 “Overview-Emergent Employment,” (ICTC, Oct 15, 2021), https://www.digitalthinktankictc.com/articles/overview-emergent-employment

47 Timothy Renshaw, “Report urges province to get gig worker regulations right for B.C.,” (Business in Vancouver, March 16, 2023), https://biv.com/article/2023/03/report-urges-province-get-gig-worker-regulations-right-bc ; Nandita Bose, “Uber, Lyft trade group questions Biden’s labor nominee’s gig workers stance,” (Reuters, March 20, 2023), https://www.reuters.com/business/uber-lyft-trade-group-questions-bidens-labor-nominees-gig-workers-stance-2023-03-20/

48 Sung-Hee Jeon, Huju ie and Yuri Ostrovsky, “Measuring the Gig Economy in Canada Using Administrative Data” (Statistics Canada, Dec 16, 2019), https://www150.statcan.gc.ca/n1/pub/11f0019m/11f0019m2019025-eng.htm

49 Sung-Hee Jeon, Huju ie and Yuri Ostrovsky, “Measuring the Gig Economy in Canada Using Administrative Data“

50 Michelle Cheng, “What Uber’s narrative about job flexibility leaves out,” (Yahoo Finance, Oct 23, 2020), https://finance.yahoo.com/news/uber-narrative-job-flexibility-leaves-183632727.html ; Nayantara Mehta, “Flexible Hours and Employee Status: The Truth About AB5,” (National Employment Law Project, June 21, 2019), https://www.nelp.org/publication/flexible-work-hours-employee-status-truth-ab-5/ ; Cherri Murphy, “Uber bought itself a law. Here’s why that’s dangerous for struggling drivers like me,” (The Guardian, Nov 2020), https://www.theguardian.com/commentisfree/2020/nov/12/uber-prop-22-law-drivers-ab5-gig-workers

51 Employment and Social Development Canada, “What we heard: Developing greater labour protections for gig workers,” (ESDC, March 2023), https://www.canada.ca/content/dam/esdc-edsc/documents/corporate/portfolio/labour/programs/labour-standards/reports/gig-workers-what-we-heard/WWHR-Developing-greater-labour-protections-for-gig-workers.pdf

52 Employment and Social Development Canada, “What we heard: Developing greater labour protections for gig workers,” ; Carolyn Ali, “Working in the gig economy? What you don’t know might hurt you,” (The University of British Columbia, January 19, 2023), https://beyond.ubc.ca/working-in-the-gig-economy-what-you-dont-know-might-hurt-you/

53 Magdalena Burtscher and, Katharine Mullock, “Career Guidance for Adults in Canada,” (Organisation for Economic Co-operation and Development (OECD), February 28, 2022), https://fsc-ccf.ca/research/career-guidance-for-adults-in-canada/

54 Salesforce Research, “Global Digital Skills Index 2022: Canada,” Digital Skills Index, January 27, 2022, https://www.salesforce.com/news/stories/salesforce-digital-skills-index-details-major-gaps-across-19-countries/

55 Deloitte Canada, “Digital equity: focusing on very Canadian’s digital future,” Future of Canada Centre, November 23, 2022. https://www2.deloitte.com/content/dam/Deloitte/ca/Documents/fcc/ca-catalyst-digital-equity-2022-aoda-en.pdf?icid=progress-bar-cta-en

56 Jeremy Riel, Sonya Christian and Brad Hinson, “Charting digital literacy: A framework for information technology and digital skills education in the community college” (Innovations 2012, March 2012), DOI:10.2139/ssrn.2781161

57 Jeremy Riel, Sonya Christian and Brad Hinson, “Charting digital literacy: A framework for information technology and digital skills education in the community college”

58 International Labour Organization, “ILO Brief: Inventory of digital career guidance tools,” March 2022, wcms_841523.pdf (ilo.org)

59 Schaffer, Karen and Wiens, Juliana, “Career Work in Action: Discussions and Activities for Professionals – Unemployed Long Term,” (CERIC, 2020), https://ceric.ca/wpdm-package/career-work-in-action-discussions-and-activities-for-professionals-educated-and-underemployed/

60 Schaffer, Karen and Wiens, Juliana, “Career Work in Action: Discussions and Activities for Professionals – Newcomers to Canada,” 2020, CERIC, https://ceric.ca/wpdm-package/career-work-in-action-discussions-and-activities-for-professionals-newcomers-to-canada

61 Schaffer, Karen and Wiens, Juliana, “Career Work in Action: Discussions and Activities for Professionals - Youth,” 2020, CERIC, https://ceric.ca/wpdm-package/career-work-in-action-discussions-and-activities-for-professionals-youth/

62 Eloundou, Manning, Mishkin, and Rock, “GPTs are GPTs: An Early Look at the Labor Market Impact Potential of Large Language Models”

63 Bhatia and Olsen, “Quality of Work Literature Review”

64 Jacques Bughin et al. “Skill shift: Automation and the future of the workforce,” (McKinsey, May 2018), https://www.mckinsey.com/featured-insights/future-of-work/skill-shift-automation-and-the-future-of-the-workforce

65 “The Future is Social and Emotional: Evolving Skill Needs in the 21st Century,” (The Conference Board of Canada, March 2020), https://www.conferenceboard.ca/wp-content/uploads/woocommerce_uploads/reports/24357_10628_FSC_SES_Impact_Paper_EN.pdf

66 Josh Moody, “How to Find College Courses That Teach Soft Skills,” (U.S. News, April 10, 2019), https://www.usnews.com/education/best-colleges/articles/2019-04-10/how-to-find-college-courses-that-teach-soft-skills ; “People and Soft Skills for Professional and Personal Success Specialization,” (Coursera), https://www.coursera.org/specializations/people-and-soft-skills-for-professional-success

67 Sylvie Leblanc, Emerick Mary, Khiran O’Neill, and Trevor Quan. July 2021. Emergent Employment: Canadian Findings on the Future of Work. Information and Communications Technology Council (ICTC). Ottawa, Canada. https://www.ictc-ctic.ca/wp-content/uploads/2021/07/ICTC-Future-of-Work-July-28-2021-1.pdf

68 “Lifelong Leaning as an Affordable Investment,” (OECD, 2000), https://www.oecd.org/education/skills-beyond-school/1917560.pdf

69 “Empowering People for Recovery and Growth: 2022 Skills Survey Report,” (Business + Higher Education Roundtable, 2022), https://bher.ca/publications/research-publications/empowering-people-recovery-and-growth-2022-skills-survey-report

70 Vanmala Subramaniam, “How AI is changing the jobs of call centre workers,” (The Globe and Mail, March 27, 2023), https://www.theglobeandmail.com/business/article-ai-call-centres/

71 Chris Herron, Maryna Ivus, and Akshay Kotak, “Just Press ‘Print’: Canada’s Additive Manufacturing Ecosystem,” Information and Communications Technology Council (ICTC), March 2021, https://www.ictc-ctic.ca/wp-content/uploads/2021/06/Just-Press-Print-Canada%E2%80%99s-Additive-Manufacturing.pdf

72 “Digital Twins in Manufacturing: Lessons from Canadian Manufacturers and Technology Providers,” (Trillium Network for Advanced Manufacturing and Next Generation Manufacturing Canada, 2022), https://trilliummfg.ca/wp-content/uploads/2022/09/Digital-Report-0921.pdf

73 Lee Rickwood, “Consent of the Employed: Workplace Surveillance and Employee Monitoring,” (Whatsyourtech.ca, April 2022), https://whatsyourtech.ca/2022/04/25/consent-of-the-employed-workplace-surveillance-and-employee-monitoring/

74 Rickwood, “Consent of the Employed: Workplace Surveillance and Employee Monitoring”

75 Tessa Anaya, “Workplace surveillance: How do Canadians feel about employee monitoring?,” (Capterra, May 30, 2022), https://www.capterra.ca/blog/2733/workplace-surveillance-employee-monitoring-software

76 Mohammed (Joe) Masood et al. “Monitoring Remote Work in Canada: Support or Surveillance?” (Future Skills Centre, The Dais, The Human Factors Engineering Lab at Toronto Metropolitan University, July 2023), https://fsc-ccf.ca/wp-content/uploads/2023/07/Monitoring-Remote-Work-in-Canada-Support-or-Surveillance_Report.pdf

77 Anaya, “Workplace surveillance: How do Canadians feel about employee monitoring?”

78 Sarah Dobson, Does employee surveillance lead to turnover?, (HR Reporter, Nov 2021), https://www.hrreporter.com/focus-areas/culture-and-engagement/does-employee-surveillance-lead-to-turnover/361848

79 Heidi Shierholz, “Weakened labor movement leads to rising economic inequality,” (Economic Policy Institute, Jan 27, 2020), https://www.epi.org/blog/weakened-labor-movement-leads-to-rising-economic-inequality/

80 Sam Blum, “Employee surveillance is exploding with remote work—and could be the new norm,” (HR Brew Jan 19, 2022), https://www.hr-brew.com/stories/2022/01/19/employee-surveillance-is-exploding-with-remote-work-and-could-be-the-new-norm

Future Skills Centre | Centre des Compétences futures

ICTC CTIC

Information and Communications Technology Council | Conseil des technologies de l'information et des communications