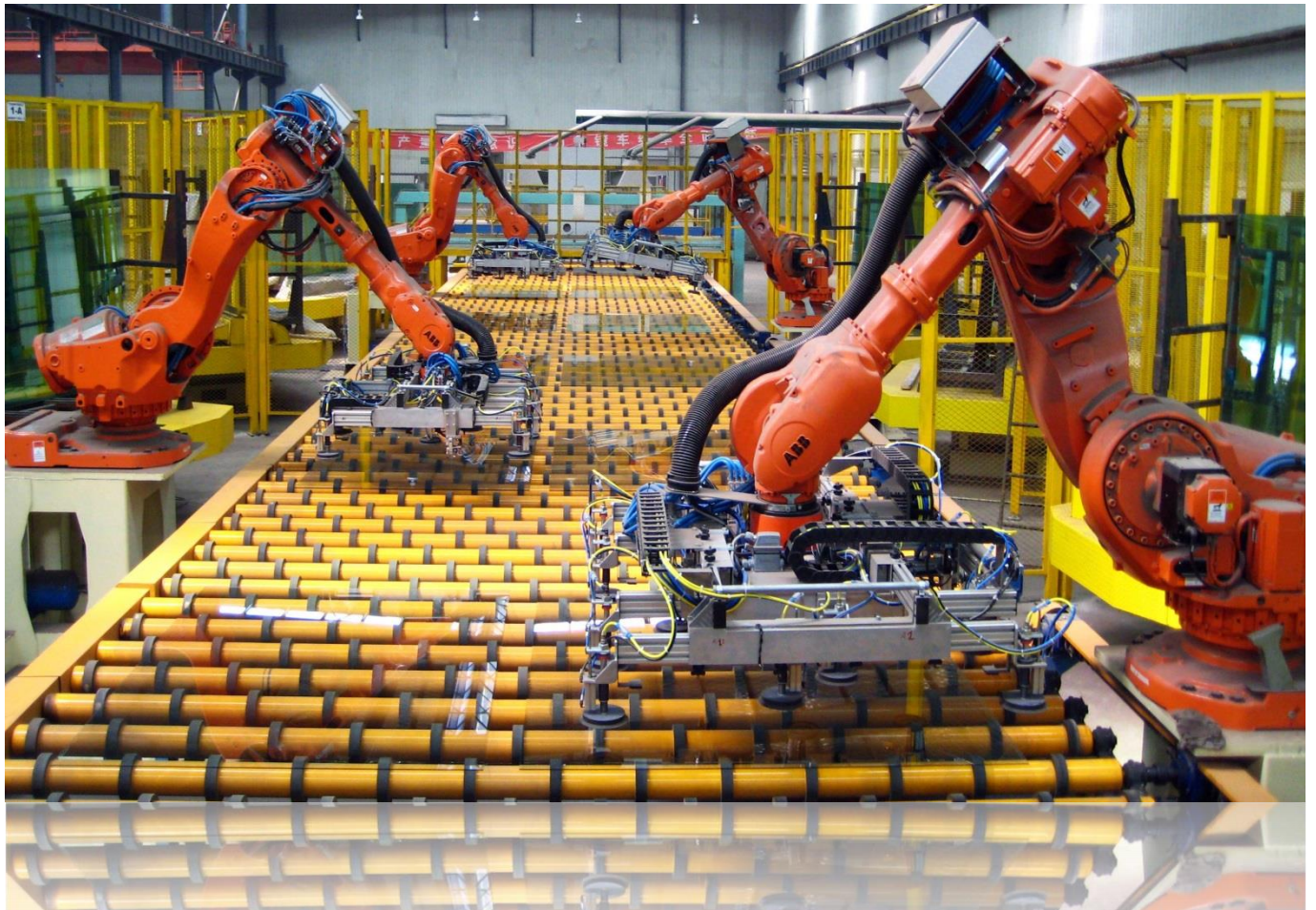


CHANGING NATURE OF WORK



Report October 2017

A workshop series hosted by Employment and Social Development Canada's Economic Policy Directorate, Policy Horizons Canada, and Innovation Lab



Changing Nature of Work

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EXECUTIVE SUMMARY

New technologies have the potential to have profound implications for the ways that Canadians live and work. To better understand the potential impacts, Employment and Social Development Canada hosted an intensive “Policy Innovation Hub” on the changing nature of work in October 2017. The Policy Innovation Hub brought together academics, think tanks, industry representatives, labour organizations, and government employees to explore a range of plausible futures given what is currently known about technological advancements in areas such as automation, artificial intelligence and robotics. Participants then used this information to brainstorm the potential impacts for employers, job seekers, workers, and governments.

Participants hypothesized that in the future there is likely to be greater instability and volatility in the labour market with a greater portion of the labour force working in the gig economy. With more workers on short-term contracts, it is expected that fewer people will have long-term employee-employer relationships. In addition, participants identified cross-border telework as a factor that may increase labour competition and challenge labour laws. As rapid changes in technology occur, some workers may not be able to keep up or may find themselves displaced of the labour market, while others may have difficulty entering the workforce in the first place. Participants expected that these trends would likely be felt across the labour market, and would include the highly experienced and highly educated. In addition, participants highlighted the community implications of a volatile work environment; if jobs become increasingly virtual and labour market participation becomes less consistent, feelings of social connectedness may be eroded. Furthermore, these changes could have implications for government services which are based on the assumption that full-time employment and stable employer-employee relationships are the norm.

Participants explored a number of solutions that could be used to respond to the challenges described above. To maximize the number of innovative solutions coming out of the session, participants divided into four groups to explore different themes under two groups: “Addressing Challenges” and “Deeper Analysis of Surfaced Solutions”. Each group used a different experimental processes for the discussions.

The solutions summarized below were chosen to demonstrate a range of possible action areas, but have not yet been assessed based on novelty, usefulness, impact and feasibility. They represent the beginning of a discussion about how to respond to the changing nature of work and should not be interpreted as an exhaustive list.

Addressing challenges	Deeper analysis of surfaced solutions
<ol style="list-style-type: none"> 1. Basic Needs: Respond to employment instability and income volatility by developing portable insurance and health benefits for individuals. 2. Individual Growth: Respond to rapidly evolving work requirements through personalized lifelong learning opportunities, formal recognition of informal learning, access to career coaching and guidance, and learning agendas focused on the skills of the future. 3. Connectedness: Encourage personal and professional community connections through mutual associations for non-traditional workers, reimagined urban landscapes, mixed-use buildings, and social connection programs. 4. Reducing Costs and Increasing Revenue for Government: Leverage new technologies to reduce the cost of public services; tax robots; accept non-currency tax payments; nudge citizens toward healthy lifestyle choices; and reduce service duplication. 5. Enabling Infrastructure and Enforcing Standards: Provide outcome-based funding, using artificial intelligence for real-time assessment and labour market information; international coordination of labour standards, regulation of online platforms; and require a portion of robotic labour to be dedicated to social good. 	<ol style="list-style-type: none"> 1. Basic Income: To respond to income volatility, provide unconditional money that adjusts in real-time to citizen circumstances. 2. Living Wage: To address downward pressure on wages from global work platforms, create international agreements to coordinate wage policy with similar countries. 3. Social Wage: To increase the resilience of the population in the context of higher levels of volatility, increase access to lifelong learning opportunities and provide wrap around supports (e.g. affordable daycare, family support). 4. Make Goods and Services Cheaper: If it's not possible to raise people's wages, governments could work with others to use new technologies to lower the costs of essential goods and services, like housing and food, to improve the situation of people with precarious work (e.g. 3D printed housing). 5. Income Predistribution: In the context of reduced labour market participation, full-time work could be redefined to reduce weekly hours and encourage job sharing. Government could pay citizens to do public benefit work that is unmet by the market or social programs, and recognize the value of unpaid work.

The Policy Innovation Hub contributed to the department's understanding of the range of plausible futures and potential responses, however, more work is required to validate these findings with clients and stakeholder and to further explore initiatives that would increase the resilience of our programs and services.

INTRODUCTION

Canadians, governments, and civil society are increasingly focused on technological change and the impact on jobs, skills, work, and quality of life. There are signs that the pace and breadth of advances in areas such as artificial intelligence will not only create opportunities for innovation and growth, but could also have adverse impact on individuals and their families. Accordingly, understanding the potential implications of the changing nature of work, including its intersections with the goal of inclusive growth, has emerged as an important priority for government.

While there is no standard definition of the changing nature of work, this term tends to refer to changes in the organization of jobs and the economy, both underway and predicted, usually associated with recent technological advances (e.g. artificial intelligence, big data, the internet of things, 3D printing, automated vehicles, online platforms, etc.) that could see workers, employers and governments forced to adjust to a number of potential challenges, such as diminished income, job insecurity, diminished access to labour market and social supports, and rapid changes in skill demands.

The changing nature of work has profound implications for Employment and Social Development Canada (ESDC), a department that works to improve the standard of living and quality of life for all Canadians, including by promoting a labour force that is highly skilled, and contributing to an efficient and inclusive labour market. In this context, ESDC hosted an intensive "Policy Innovation Hub" on the changing nature of work in October 2017 as part of a broader portfolio of work exploring how the department can respond to the changing needs of the workforce.

The Policy Innovation Hub would bring together participants from academia, think tanks, industry, labour organizations, ESDC, and other government departments to help generate insights on the changing nature of work, including what it might mean for employers, job seekers, workers, and governments. At the same time, it would serve as an experiment, testing a new approach to policy development by bringing together a wide range of individuals with varying perspectives and expertise in a compressed period of time to address a priority issue.

The Policy Innovation Hub consisted of three half day sessions:

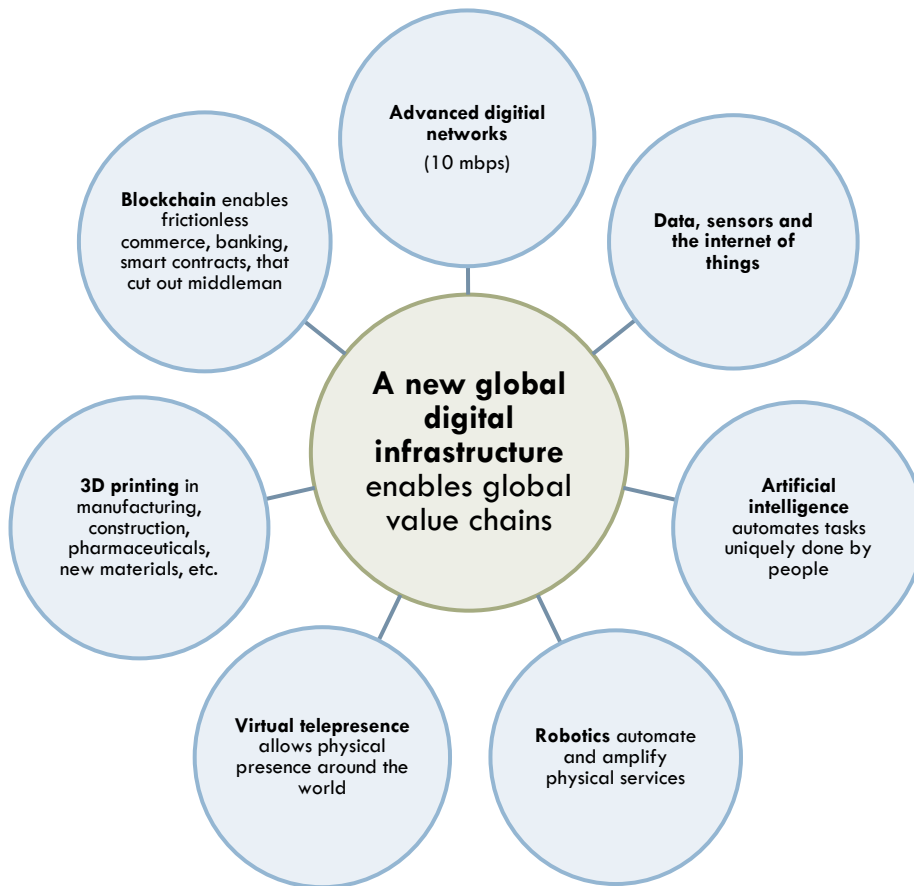
- Session 1 explored a range of possible futures and identified potential new client groups
- Session 2 identified possible future client needs and resulted in a better understanding of the zones of vulnerability for the department
- Session 3 proposed solutions to address the zones of vulnerability and address the challenges identified in Sessions 1 and 2



OVERVIEW OF BRAINSTORMING HUBS

Session 1: Possible Futures

The objective of Session 1 was to immerse participants in plausible futures by exploring the changing nature of work using a sector lens. Participants were presented with a number of technological advancements that are affecting (and will likely continue to have an impact on) how people work across the economy, the number of people working in existing sectors, and which sectors will drive economic growth in the future. These technologies include:



Source: Policy Horizons Canada

Participants were encouraged to think about how these technologies could impact workers:

- Some technologies-artificial intelligence, robots and robotics, and 3D printing-will substitute for worker's functions, resulting in changes to the tasks performed by employees;
- Other technologies-telepresence, telerobotics, work unbundling, and the gig economy-will transfer work from place to place, impacting where individuals live and work; and

- Some technologies will eliminate work altogether, leading to worker displacements. These include artificial intelligence and machine learning, digitalization, fintech, blockchain, smart contracts, access to do-it-yourself tutorials, and the digitally intermediated mesh economy.

Following a presentation that introduced the future of work, participants broke out into tables focused on one of four sectors¹ :

1. Mining
2. Retail trade
3. Transportation and warehousing
4. Finance, insurance, and real estate (FIRE)

Facilitators guided participants through a visualization exercise that required participants to imagine themselves in the future, and then launched into the work of generating potential futures in that sector. While each table generated different sector-specific potential futures, several themes emerged from the discussion around the room. Overall, participants hypothesized that:

- As jobs are displaced by technology, new jobs will emerge. However these may not be a one to one replacement.
- There will be winners and losers in the new economy. Success will hinge on the ability of workers to adapt to new conditions, particularly through education, training, and skill adaptation. In addition, the extent to which workers are impacted is likely to depend on the extent of global competition in the economy and labour market.
- Global wages could converge as more work moves online and an increasing number of teleworkers use global platforms to bid for work in an international labour pool, lowering Canadian wages over time.
- People who are unable to participate in the formal economy may rely increasingly on the grey economy to trade their labour. In this context the bartering economy may grow and there could be a value shift away from materialism.

Based on these discussions, participants made inferences about the kinds of Government clients that could emerge in the new context. They identified five types of workers² as especially important to explore because of their likelihood of being key government clients in the future:

¹ Experience from a previous ESDC foresight exercise suggested that the sector approach would effectively ground participants in a concrete reality and allow them to make more meaningful inferences about the future. These particular selections represent a reasonably diverse cross-section of sectors, in terms of rural/urban impact, the speed at which technological adaptation could occur, and workforces with different skills and skill levels.

² While workers from each type are present in today's labour market, the Session 1 foresight work suggested that rapid changes in the size and nature of these groups had the potential to significantly disrupt existing government policies and programs in the near future.

Worker Types

Teleworkers rely on technology to work and deliver services for an employer who is based in a different geographical region. They may or may not work within the same provincial/territorial or national borders as their employer. Teleworkers may work in a gig style or they may have a more traditional employer-employee relationship.

Gig workers earn income through temporary jobs. This could include task-based gigs, a series of contract positions, or some combination of both. This type of work is often facilitated by an online platform that connects the gig worker with individuals or firms requiring labour. Gig workers tend to have greater autonomy and independence, but less income stability compared to traditional workers. Their relationship to any given employer tends to be weak and informal.

New employees hold a part-time or full-time position within an organization and have an established employee-employer relationship. Despite holding this traditional position of “employee,” they work in the new context of the future. New employees could include individuals at any life stage, ranging from recent post-secondary graduates to those with years of experience.

Forced-out workers are unable to re-enter the labour market after a separation, despite their desire to do so. The reasons for being forced out could relate to a wide range of factors (e.g., personal characteristics or circumstances, shifting societal values, eliminated need for skill set, etc.).

Excluded individuals never form a meaningful attachment to the labour market. They may not form this attachment because of a conscious decision to pursue an alternative path, or because they have given up after initial unsuccessful efforts to enter the labour market, or because of some other reason. Some may rely on the financial support of government or family and friends to get by; others may achieve self-sufficiency through their participation in a sharing or informal economy.

Session 2: Client Needs

Session 2 built on the insights generated through Session 1, exploring the implications of the changing nature of work for the specific worker types. Participants were presented with the insights that had been developed from the first session and it was noted that while the worker types were not necessarily “new,” the proportion of the labour force population that they represent could change dramatically in the near future. Participants were introduced to the concept of the “relevancy gap”—as labour market conditions change over time, policies that were developed for the realities of today will become increasingly irrelevant.

Participants were invited to choose a worker type and develop a “*persona*” of someone belonging to that worker group. Building on that *persona*’s perspective, participants explored the potential challenges and opportunities for individuals from these five worker groups, as well as for their families, communities, and employers (where applicable). Assumptions underlying the government’s ability to meet these needs were also examined. This work helped identify where current systems and assumptions were most at risk of not aligning with the realities that Canadians could face in the future—certain systems were not designed to respond to certain conditions that are a plausible reality for workers in the future and may need to be redesigned.

1. Participants discussed the increasing levels of employment volatility in Canada, which are expected to continue into the future. This presents a challenge for governments because the existing social safety net is largely based on models of insuring against only occasional and periodic breaks or transitions in work.
2. In addition, it is plausible that in the future workers will be at risk of displacement and uncertainty regardless of their highest level of education. This challenges current models and policies that promote higher education as a safeguard, particularly when degrees are emphasized over skills adaptability.
3. In this context, governments may increasingly lose independent capacity to generate revenue for social systems and regulate labour conditions, challenging the taxation and regulatory models on which the social system is funded and governed.
4. Lastly, in the future as the nature of work changes, having a job may no longer support social wellbeing and community belonging. This challenges assumptions on which current policies and supports have been built – namely that employment is a central gateway for achieving other social objectives.

Based on the participant discussions and data generated throughout the first two sessions, four zones of risk or vulnerability for government were identified because they reflect reasonable conditions of potential futures and they challenge some core assumptions on which current policies are built.

Instability and Volatility is a Constant

- More workers are likely to work on short term contracts or in the gig economy.
- For many, this may provide greater work-life balance and increase autonomy.
- New work platforms may also increase opportunities for unrepresented groups to participate in the work force (e.g. people with certain disabilities).
- However, this shift could also mean a high degree of income volatility and uncertainty for a growing proportion of the workforce.
- Contract and gig workers may not be able to rely on work-related benefits packages (e.g., health care, pension, training, etc.), requiring individuals to be far more self-reliant than previous cohorts.
- As the relationship of individuals to work changes, this may have impacts for the roles of citizens and business in our social security infrastructure.
- The division of work and private life may blur as work moves into private spaces.
- Unpredictable hours may result in difficulty providing care for children and aging parents or making arrangements for professional support.
- In addition, the stress associated with high levels of variability could contribute to increased rates of mental health issues (e.g., anxiety, depression, addiction).

The Regulatory System and Funding Model for the Social Safety Net “Break”

- Technological advancements could produce greater efficiency, allowing for cheaper goods and services and a lower cost of living.
- At the same time, the workforce may shrink, and employers may choose to locate in only the most favourable locations (from a tax and regulatory perspective), putting pressure on traditional sources of government revenue and the ability of national or local governments to regulate the conditions of labour.
- If the traditional employer-employee relationship is eroded, social programs funded by joint contributions may be impacted.

The Highly Experienced and Highly Educated Are Not Guaranteed Security

- Rapid changes in the way that we work may increase productivity and overall prosperity.
- New technology may increase speed of training and upskilling (e.g., Google glass/artificial intelligence)
- In some areas, new jobs may require high levels of new skills (in, e.g., robotics, artificial intelligence, IT, etc.) and existing jobs may be eliminated.
- Many people, particularly older workers, may be displaced and have difficulty reskilling and finding new jobs.
- Workers may not know how to find employers or promote their skills.
- Family burdens and financial constraints may make it harder to adapt.

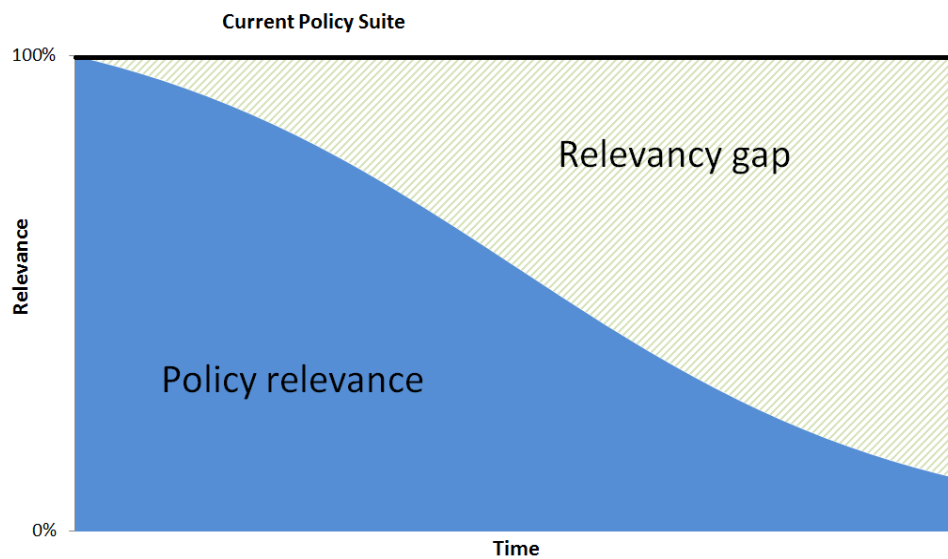
Labour Market Participation Does Not Equal Social Connectedness

- Greater flexibility in work hours could allow more time with loved ones.
- People may also have more time to volunteer or become involved in their communities.
- However, changes in the way that people work could also lead to feelings of isolation and more “disconnected” living arrangements.
- Ties to communities and national systems may become more tenuous.
- Greater income disparity could contribute to rising tensions between groups or individuals.
- Some individuals may reap large benefits under these new conditions while others could feel a deep sense of displacement, loss and/or unfairness

Session 3: Service Solutions

Government of Canada participants returned for a third session that aimed to generate new solutions to address the zones of vulnerability identified in the earlier sessions. Participants were reminded of the “relevancy gap” concept (as conditions change over time, policies that were developed for the realities of today may become increasingly irrelevant or incompatible with the emerging realities) and were asked to keep this in mind as they developed solutions that would be required to address the needs of Canadians.

The following diagram illustrates the relevancy gap. The left edge represents the current reality, with the blue shaded area representing a given issue. For example, the shaded area could represent the percentage of the labour market in permanent, full-time employment. The horizontal line across the top of the diagram could represent the current suite of employment insurance programs and programs to support labour market attachment. As the nature of work changes (for example, if full-time, permanent employment decreases dramatically and part-time gig work becomes the norm), our current policy suite could become less effective at meeting the needs of Canadians. If it were to remain unchanged, the relevancy gap (pale shaded area) would grow.



Source: Policy Horizons Canada

To maximize the number of innovative solutions coming out of the session, participants were divided into four groups to explore different themes. Two different experimental processes were used for the discussions. Participants generated upwards of a hundred solutions and as a result, the department gained a better understanding of the ecosystem of potential responses to the changing nature of work. To bring order to the wide ranging scope and scale of participants’ ideas, as well as to harness the collective insights of the group, the solutions data were aggregated and explored under the following themes:

Addressing challenges	Deeper analysis of surfaced solutions
<ol style="list-style-type: none"> 1. Basic Needs 2. Individual Growth 3. Connectedness 4. Reducing Costs and Increasing Revenue for Government 5. Enabling Infrastructure and Enforcing Standards 	<ol style="list-style-type: none"> 1. Basic Income 2. Living Wage 3. Social Wage 4. Make Goods and Services Cheaper 5. Income pre-distribution

ADDRESSING CHALLENGES – GROUPS 1 AND 2

Basic Needs

Ideas under this theme were focused on ensuring the basic needs of Canadians are met in the future:

- Developing portable insurance and health benefits (in the context of decreasing employment stability)
- Capitalizing on 3D printing technology in building to ensure housing needs are met

Individual Growth

Participants generated a number of solutions that would afford individuals opportunities to grow and achieve an acceptable quality of life in the context of the changing nature of work. Under this theme, solutions generated related primarily to training and education:

- Developing more tailored and flexible educational curriculums that reflect skills of the future
- Increasing access to lifelong learning opportunities
- Providing formal recognition of learning gained through on-the-job training and job shadowing
- Increasing guidance and coaching for those looking to (re)enter the workforce
- Focusing learning agendas on skill sets and competencies anticipated to be important in the future

Connectedness

Participants identified a range of solutions that ultimately serve to increase human connectedness:

- Several of the solutions focused on enhancing individuals' in-person or virtual networks, to:
 - Increase job opportunities
 - Facilitate bartering for goods or services
 - Improve social support
 - Foster understanding between diverse groups
- Other solutions identified the need to bring diverse groups of people closer together in physical space:
 - Reimagined urban landscapes
 - Mixed-use buildings

- A program that involves travelling throughout the country with a group of individuals from varied backgrounds and upbringings
- Mutual associations for non-traditional workers, similar to the Freelancers' Union, which advocates on behalf of freelancers and provides portable benefits for those who opt-in
- In addition, participants identified the need to provide unemployed individuals with the opportunity to contribute to the public or community good

Reducing costs and increasing revenue for Government

A new work landscape could adversely impact governments' ability to collect the revenues required for providing the traditional social safety net, and participants generated a number of solutions to offset this risk:

- Many of these solutions focused on taxation:
 - Taxing robots
 - Using blockchain to implement an adaptive tax rate
 - Accepting non-currency forms of tax payments (e.g., bartered services or volunteer hours)
 - Adjusting tax rates on goods as prices go down
 - Revising corporate law to require that firms pay a fair share for protection
- Other solutions focused on decreasing the cost of government:
 - By “nudging” people toward healthier lifestyles and choices.
 - Coordinating programs and services to reduce transaction costs
 - Exploiting artificial intelligence to reduce the cost of education and health care

Enabling infrastructure and enforcing standards

Meeting the needs of Canadians in the plausible future requires new approaches to enabling infrastructure:

- Transforming public services and international governance bodies
- Providing funding to service providing organizations based on outcomes rather than outputs
- Government adopting a venture capital approach
- Operating Government with fewer people
- Introducing greater flexibility in program eligibility
- Using artificial intelligence to support real-time assessment and evaluation of program impacts
- Providing real time labour market information to help individuals choose career paths
- Cross-subsidize “non-economic” jobs
- Modifying or adopting standards and regulations at the domestic or international level:
 - Introducing reduced work hours to distribute jobs among more people
 - Establishing global agreement on a set of labour laws
 - Reforming labour laws (including the very definition of “employment”)
 - Regulating online work platforms
 - Requiring that some proportion of robot productivity be dedicated to social improvements

ADDRESSING CHALLENGES – GROUPS 3 AND 4

Basic Income

A **basic income** is a regular, unconditional payment provided to all citizens regardless of income, while a guaranteed minimum income is a regular, means-tested payment provided to all citizens who fall under a certain income threshold. Ideas raised by participants when discussing these concepts and income support more broadly included:

- A real-time basic income that would be broad-based and adjust to real-time circumstances of each citizen
- A cradle-to-grave basic income
- Old Age Security and Guaranteed Income Supplement for everyone
- A flexible social policy budget specific to individual and family needs

Living Wage

A **living wage** is a wage that allows working people to meet their basic needs (shelter, food, transportation, childcare, etc.). It varies based on the actual cost of living in any given location. Ideas raised by participants when discussing this concept and related ideas about minimum wage included:

- Minimum wage rates could vary by province and become more region-specific
- In a more global, digital economy, harmonizing international policies on wages may be necessary to avoid a race to the bottom

Social Wage

A **social wage** was understood in these discussions to be government provision of public services, such as free post-secondary education, universal health and dental care, or public transit, in place of monetary transfers to citizens who cannot meet these needs on their own. Ideas raised by participants when discussing this concept included:

- Reducing government costs, with technologies like blockchain and AI, to increase revenue available for social programs
- Increase access to lifelong learning opportunities
- Provide wraparound supports (e.g. affordable daycare, family support), to help individuals who are working to improve their economic opportunities

Income Predistribution

Income predistribution includes measures such as job creation to prevent inequality from developing in the first place (as opposed to using redistributive policies to tackle inequality after it has occurred). Ideas raised by participants when discussing this concept included:

- Helping firms to create better quality jobs
- Making access to digital infrastructure a basic right
- Implementing job creation tax credits
- Job sharing measures

- Redefining full-time employment; reduced work weeks
- Helping “the little guys” to automate and/or globalize
- Paying people to do public benefit work consistently unmet by the market or current social programs (e.g. care work)
- Government creates work, hires people who are typically excluded from the labour market
- Salary caps for executives (CEOs, etc.)

Make Goods and Services Cheaper

Participants also discussed how automation and digitization could **reduce the costs of goods and services** for all, including the government, as they roll across different sectors. This may free up more revenue to be spent on providing public services to citizens and/or create opportunities where technology could be used to reduce costs of certain goods and services. Participants saw possibilities for government involvement in areas such as:

- The growing barter and sharing economies
- Access to digital infrastructure
- Urban farming to provide food
- 3D printing to build houses
- Using artificial intelligence to bend cost curves in healthcare and education

Next Steps

The Changing Nature of Work Policy Innovation Hub was a first-of-a-kind partnership between the Innovation Lab and Policy Horizons Canada. As an experiment to test a new approach to policy development, the Hub demonstrated value in bringing together a diverse cross-section of individuals to work intensively over a short period of time to tackle a wicked problem. According to participant feedback forms, a large majority of participants learned something at each session that they could apply in their work. All participants reported that the sessions had met or exceeded their expectations. Although the sessions were a success in this regard, a small number of participants questioned whether the work from the Hub had the potential to drive concrete outcomes.

Overall, the Changing Nature of Work Policy Innovation Hub could be understood as the beginning of a journey to transform how Government meets the needs of Canadians in the future. Further work is required to deepen and expand exploration of the more transformational changes that may occur and to turn the insights generated from this exercise into action. This could be achieved, in part, through a deeper mining of the most striking and important implications that emerged from these discussions, including from the perspective of participants and other stakeholders. In this pursuit, participants were invited to submit their key takeaways from the sessions and they are attached for reference.

ANNEXES

Sector Handouts

Finance, Insurance, and Real Estate (FIRE) Sector

Importance to the Canadian Economy

\$180B
(Real output/GDP 2015)

2.8% Real GDP Growth Rate
0.9% Real employment Growth
1.9% Average annual productivity increase (2007-2016)

Over 30,197* Canadian Companies
(*real estate excluded)

Average wage **\$29.61/hr**

1.1M Direct Jobs
Finance and Insurance account for 72% of all workers

90% Full-Time Workers
55% Women
41% Aged 45 to 64
44% University degree or +

Changing Nature of the FIRE Sector

FINANCE Institutions and Banks Government Currencies	INSURANCE Agencies and Brokers	REAL ESTATE Firms and Agents
High Return on Rents	Insurtech start-ups Advanced web platforms and artificial agents Export of insurance services	Virtual agents Searchable platforms (e.g., MLS direct)
Online mobile banking Fintech Bitcoin Blockchain Kensho Lower labour and transactional costs		

TRANSFORMATION...

FAVOURS HIGHER SKILLED WORKERS

- Leveraging potential of digital technologies will require firms have access to thousands of IT specialists
- Automation of repetitive tasks reduces demand for workers of lower skill

AFFECTS CANADIAN JOBS

Over last five years, 1% contraction in employment levels for banking; stagnant employment levels in insurance

Over past decade, securities and portfolio management had an average 3.4% annual increase in employment levels

Specialized skills in information technology will be in demand

Fintech: Using technology to provide financial services
Insurtech: Using technology to provide insurance services
Bitcoin: Using peer-to-peer technology to operate with no central authority or banks; transaction management and issuing of bitcoins is carried out collectively by the network
Blockchain: A machine-to-machine exchange allowing for direct payment between individuals
Kensho: Combining the latest big data and machine-learning techniques to analyze how real-world events affect markets

Transformation Is Already Happening

CASE STUDY: The United Nation's (UN) "Building Blocks: The Future of Cash Disbursement for the World Food Program"

- The World Food Program (WFP) transfers ~\$880M/year in cash to 80 countries; launched "Building Blocks" in 2016 to explore potential of blockchain in work
- In 2017, began one-month pilot involving 10,000 of the more than 50,000 people living in the Azraq refugee camp in Jordan



- Identities of Syrian refugees were authenticated using iris recognition devices set up at checkout counters of the camp's supermarket
- Purchases recorded using blockchain
- Used Ethereum currency

- ✓ \$1M dollars distributed to 10,500 beneficiaries through 100,000 transactions
- ✓ No funds advanced to financial service providers
- ✓ 98% reduction in local bank fees
- ✓ Beneficiary data better protected (kept internal to UN)
- ✓ Reconciliation completed based on UN data
- ✓ Experience from beneficiary (refugee) perspective remained the same

Case Study 2: Fukoku Mutual Life Insurance

- Replaced 30 employees with artificial intelligence (AI) system that calculates payouts to policyholders
- The cognitive technology can think like a human, enabling the analysis and interpretation of complex information, including unstructured text, images, audio, and video
- The technology could increase productivity by 30%
- Anticipated savings of about ¥140M (~\$1.5M CDN) per year after ¥200M (~\$2.2M CDN) AI system is installed

What does this mean?



The role and importance of financial institutions is changing

The digital economy is bringing a major shift to financial services. My view is that in five years the financial services industry won't be the same as it is today. That puts a lot of pressure on us and the other financial institutions to adjust, adapt, and change.

Monique F. Leroux, CEO Desjardins Group
From PWC Canadian Banks

The reality is that these are still early days for block chain in the insurance sector. However, evidence from across the financial services sector suggests that block chain technology could help enable greater efficiency, growth and competitive advantage.

4th Annual Canadian Insurance Industry Opportunities and Risks Survey
KPMG International, 2017

Adoption of technology—as demonstrated in the UN case study—across the private and public spheres will impact the profitability and sustainability of the FIRE sector, as well as employment opportunities

Transportation and Warehousing Sector

Importance to the Canadian Economy



The Transportation and Warehousing Sector employs 907,400 people directly, with an average salary of \$25.36 per hour. The Sector includes several key occupations:

Representative Occupations	Number employed
Transport truck drivers	304,000
Bus drivers, subway operators and other transit operators	81,900
Taxi and limousine drivers and chauffeurs	53,700
Delivery and courier service drivers	69,800
Shippers and receivers	113,700
Storekeepers and parts persons	21,600
Dispatchers	36,900
Purchasing and inventory control workers	28,100

Business Case for Automation

There is no plausible future where automation does not disrupt the transportation and warehousing sector.

Warehousing
Robots learn 7-14x faster than people and make 1/10 of the errors of workers, reducing the risk of accidents.

Much of Canada's infrastructure is nearing the end of its lifespan.

Automation pays for itself within 3 years on average.

Technology already on the move...

MOVING PEOPLE

Transit Systems

- Autonomous buses and trains; driverless taxis
- Autonomous commercial aircrafts

MOVING GOODS

Surface Transportation & Logistics

- Increased robotics for warehousing functions; Driverless trucks;
- Advanced AI platforms for logistics management

MOVING GOODS

Air & Sea Transport

- Autonomous sea transport; Delivery drones;
- Advanced GPS, detailed 3d mapping sensors

Automation Is Already Happening

Advances in artificial intelligence are allowing for the automation of complex tasks in unpredictable and unstructured environments...

Warehousing

- Amazon aggressively automating entire logistics chain, doubled robot workforce; and reduced costs by 20%
- Sobeys new automated distribution centres (Toronto, Montreal and Calgary) to eliminate 1,300 jobs
- Hudson's Bay and Jean Coutu recently opened automated warehouses

Driverless Vehicles

- Semi-autonomous vehicles already on the market
- Announcements for fully automated vehicles: Tesla 2020; major auto-makers 2022

Public Transit

- Navya already deployed 15-passenger driverless bus in Las Vegas, Michigan, Singapore, France and Australia
- Local Motors testing 12-seater driverless minibus in Washington, Miami and Las Vegas

Shipping

- Rolls Royce developing unmanned cargo ships – expected for 2020
- Japan to launch self-navigating cargo ships by 2025

Air Transport

- US military already deploying drones and moving rapidly with plans for unmanned aircraft
- Boeing developing commercial passenger jets relying on AI

"The robots don't get tired... They always show up the morning after the Stanley Cup final. They are always there the morning after the Super Bowl. It doesn't matter if it's 35 (Celsius) and a beautiful weekend."

Eric Seguin | Senior V.P. | Sobeys

PROJECTED JOB LOSSES

907,400 Canadians directly employed

- 635,180 70% of jobs expected to be automated

= 272,220 Expected future size of sector

Note: Projection based on analysis of automation of occupations. Task-based analysis may change results.

Source: Expected Jobs Automated – Calculations based on research by Brookfield

We often overestimate how quickly technology will be adopted, but underestimate the scale of impact.

Retail Sector

Importance to the Canadian Economy

Retail Trade:

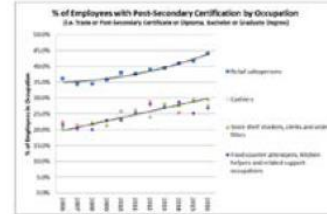
The sale (without transformation) of new or used goods for personal or household use.

Profile of the retail workers in Canada:

- Almost 2 million workers (2016)
- Accounts for 11.5% of total employment
- Average wage: \$16.94/hr (vs. \$23.85 national average)
- 50% of workers are full-time
- Age breakdown: Median age = 35
 - 29% 15-24 years old
 - 52% 25-54 years old
 - 19% 55 years old +
- 54% female

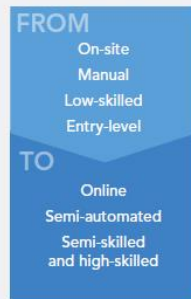
Profile of the retail establishments in Canada:

- 230,000 retail establishments
- 60% are small businesses
- 2.2% are medium-sized businesses
- 0.1% employ more than 500 employees
- 38% have less than 5 employees



Source: Statistics Canada, 2016 Labour Force Survey

Business Case for Automation



Automation Leads to:

1. Lower operation costs (reduced labour costs, increased productivity)
2. Better Control and Monitoring (automatic inventory and ordering, staffing based on customer and store use analysis)
3. Increased Worker Safety (less manual labour / fewer accidents)
4. Increased competitiveness

Common barriers to adoption have been removed:

1. Technological solutions have been developed
2. Economic benefit of deploying new technology exceeds the cost
3. Social acceptance of change

Automation Is Already Happening

Major technologies already implemented

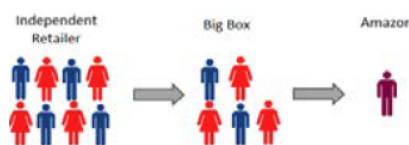
- Mobile apps and digital kiosks that provide extra product information
- Self-checkout including sensor based checkout
- Self-ordering
- Autonomous robots for re-stocking
- Smart price tags that can be changed in real time
- Sensors that detect when inventory is low
- Software that analyzes, forecasts and manages staff scheduling

In 2000, Canada had 2 million retail businesses. There are now 1.2 million.

Case Study: Amazon

- Amazon is the leading e-commerce retailer in the US with around \$136 billion in 2016 net revenues
- Started as an online bookseller in 1995. . . and now sells everything from clothing to groceries
- 2/3 of books are sold online and Amazon captures 70% of those sales
- Half of all online shopping searches in the US start directly on Amazon and Amazon captures over one-third of US online sales (~ \$343B in 2015)
- Amazon's sales are growing four times faster than e-commerce overall
- Amazon is doubling in size every 2-3 years, putting it on pace to be bigger than Walmart by decade's end
- 50% of US households subscribed to the membership program Amazon Prime
- Amazon's market power rivals or exceeds that of Walmart, and it stands only to grow: Within five years, one-fifth of the U.S.'s \$3.6 trillion retail market will have shifted online, and Amazon is on track to capture two-thirds of that share
- Amazon employs over 380,000 full- and part-time employees worldwide with over 40,000 working at HQ with an average annual compensation of \$100,000; distribution centre employees make \$10 - \$14 per hour

Illustrative example: Jobs per \$1 Million in Sales



Impacts of automation vary:

1. Workers may experience positive or negative impacts depending on their skill set
2. Rural communities are expected to see mostly negative impacts
3. Large companies are expected to see mostly positive impacts

Policy Innovation Hub Key Takeaways

Participant

- The key takeaway is that it is important to separate issues that are long-run structural from short-run business cycles. The different issues require different policies. For example, a long-run structural issue is that gig-economy jobs have highly variable income day-to-day and even year-to-year. And so the social safety net needs to be flexible enough to address such a system. A short-run issue is that artificial intelligence might lead to massive job losses in a particular industry over a short time. And so the social safety net needs to have enough slack to handle a very bad one or two years.

Participant

- A dystopian future (which is where many of our imaginations went during the exercise) is not inevitable; however, building resilience and shared prosperity for all workers and residents of Canada will take considerable effort and focused strategy. It must be the shared work of many successive governments and not the whims of one.
- Public programs have been considerably weakened over time. They need to be both revamped (or retooled) but also require significant investment in order to provide the quality and breadth of supports workers and people in Canada need and deserve.

Participant

- One insight that consistently cropped up in all three sessions is the importance of challenging assumptions. Within the context of a changing nature of work, individuals' hard work may not necessarily lead to labour market success. The same is true for the department; ESDC's core assumptions about their policy/program reach, access to data, and funding could also experience drastic changes. Given a plausible rise in temporary or "gig work," we discussed the possibility of a shrinking tax base and greater demands on ESDC-led programs that could strain or break the department's current funding model.
- Individuals' attachment to the labour market serves more than just the economic function of sustaining one's livelihood. In the case of massive unemployment and underemployment, displaced workers, and the society more generally, could experience detrimental effects to social connectedness and cohesion. These ties were drawn out in Session 1 through the guided imaging exercise as well as in Session 2, which asked participants to adopt the persona of a type of future worker and thinking through their relationships to their family, their community, and their employer.
- These sessions drew on the perspectives of experts from think tanks, unions, academia, and public servants. Engaging employers in conversations about the changing nature of work and collaborating more closely may also prove fruitful to inform future policy/program directions. In most of the discussions we had during the exercises, employers were seen as monolithic and eager to lay off a large number of workers without any concerns for their wellbeing. It is possible that employers—especially larger ones with more abundant resources— could bring new ideas to the policy table on how to improve labour market supports and skills development.

Participant

- Overall, I thought that the Brainstorming Hub was an excellent event that was well organized thanks to the Innovation Lab and Policy Horizons – The exercise made good use of ideas from human-centered design and scenario thinking to get participants to think outside of the box about how jobs and people might be affected by the changing nature of work.

- To me, the value in the process was the creation of a collaborative space where people could open themselves up to alternative forms of evidence and contradictory points of view – It gave us the opportunity to reflect on and maybe challenge our assumptions – In that way, both the substance and the mood in the room helped advance the discussion.
- I've been looking at the future for a number of years and I still find it amazing that more than other topics, the 'changing nature of work', seems to ignite passion from almost everybody – this event was no different:
 - some people picture robots doing everything we don't want to do and are already heralding in the leisure society;
 - others are worried about 200,000 truck drivers set to lose their jobs tomorrow and see the beginning of the end for us all; and
 - still others only look to the past and remind us about the Industrial Revolution hoping that we'll just keep calm and carry-on.
- Who's right? The truth is nobody knows. But it's important to have shared opportunities like the hub to discuss these issues, open our minds and find common ground.
- Overall, given the discussion, I think, as a group, we leaned towards the idea that the changes we're seeing now are different than in the past because so many different sectors of the economy will be affected at the same time, and because the pace of acquiring or upgrading the skills needed to participate is unlikely keep up with the pace of technological change – we're already behind in some sectors.
- In my mind, there's an immediate need to focus on enhancing adaptive capacities in some regions (e.g. rural Canada) and reducing vulnerabilities for groups of people that will be much more susceptible to the impacts of the changing nature of work, and less able to build resilience to shocks or stresses that it causes.
- In order to embrace the positive aspects of change, the government will also need to take action to support new ecosystems (i.e. star cities) where Canada has a competitive advantage (i.e. fintech, coding, A.I), attract and retain stars in areas and find a way to unlock the potential of hidden stars.

Participant

- This was a great session and I learned so much! What stood out for me and opened my eyes was the analysis of how overall communication and social interaction between people will diminish as technology advances. It appears that we are heading towards a world that is so dependent on technology that everything regarding work will change. For example:
 - An employee's interaction with their employer for guidance on career path will likely change. We are using more online learning to develop our skills and many jobs might become obsolete with as new technology hits the market.
 - Interaction with other workers, we are moving to a more mobile world where there are many more international workers and online learning
 - Technology will change our convenience and productivity throughout the day. Yes, things will be more convenient for us such as purchasing goods, but our social interaction with other also reduces as people will start to live in a world where cyber shopping is taking over or even simple things like doing groceries could be done online. Simple things such as "uber eats" is already here where there is minimal interaction.

- Overall, I thought this was important and a good thing to think about as we are moving forward because I believe it will really have an impact on the important steps in our lives such as career, education, etc.

Participant

- The whole exercise was very good. Great ideas and learning from both sessions.
- I would say that one of most impactful things that will need to be looked at is how unemployment insurance is calculated – as jobs become different and hours of work changes employed people may be busier at certain times of the year and need some EI benefits to help at various times. Instead of being completely out of work maybe they make a smaller salary during certain times in the year and need additional support so they don't fall behind with mortgages, and other bills.
- The particulars of how this would work would need to be calculated but would help towards making sure that folks can be partially employed and still get some support through EI.
- Canada will need to look at specific rules and regulations of people being employed in Canada by other countries. How are taxes paid? What constitutes a presence in Canada for tax purposes? As the world continues to evolve in Canada how are we going to ensure that those working full time with benefits are not the ones with the full brunt of the taxes to cover those that are not working full time. Should foot prints be taxed for example if a location has 1 million square feet but a small amount of people working there because they are using methods other than humans to gain the same results obviously impacting their overall profitability.

Observer

- The thing that is sticking with me the most is the plausibility of constant instability that workers of all kinds may be encountering, more and more, in the future. Our current program architecture and the “social safety net” approach (including the use of insurance regimes) is really based on a premise that economic breaks or stumbles or transitions for people are likely for many at different moments in our life courses but these periods are more exceptions to a rule that suggests the normal state is more stable and predictable. Even more, our systems assume that several of these transitions occur at fairly predictable and definable stages of life which are shared across the population in common ways (a transition point from school to work; from “independence” to parenthood; from work to retirement;....) and so a lot of programming is built around an assumed vision of what these common transition stages look like.
- If you accept that instability becomes the norm rather than the exception, and that transitions will be happening all the time in innumerable and more individualized ways, it makes me wonder about a few things:
 - Do we need a new metaphor to underpin the social policy architecture and help us re-imagine what a new policy suite could be? From “safety net” to what? I have been toying with the idea of a safety harness rather than a safety net. What might a policy suite designed as a personalized harness, rather than a net, look like? How could we re-think how such a thing might be financed? Which parts would benefit most from collective sharing of risk, and which parts from the self-interests of the actors involved?
 - Are there ways to keep people productive and healthy (physically, mentally, financially) even during phases when wage markets may not sustain them? What is the potential role of a non-wage system of ‘labour’ that nevertheless delivers needed services and supports, and community cohesion? (ie. do we need to re-think the place of “service” in such a world?)
 - Does this potential backdrop of constant instability also suggest a different way that we would need to organize ourselves as a government? If greater volatility means also a need for more nimbleness in our capacities as governments and society to respond, what needs to change internally and with our partners in our delivery models to be able to shift more flexibly to the inevitable unpredictabilities of such a world? (I see an important link here with social innovation which may offer key answers).