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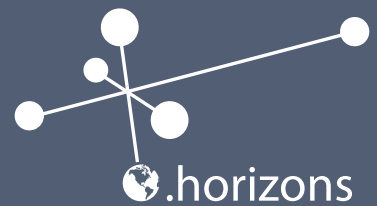
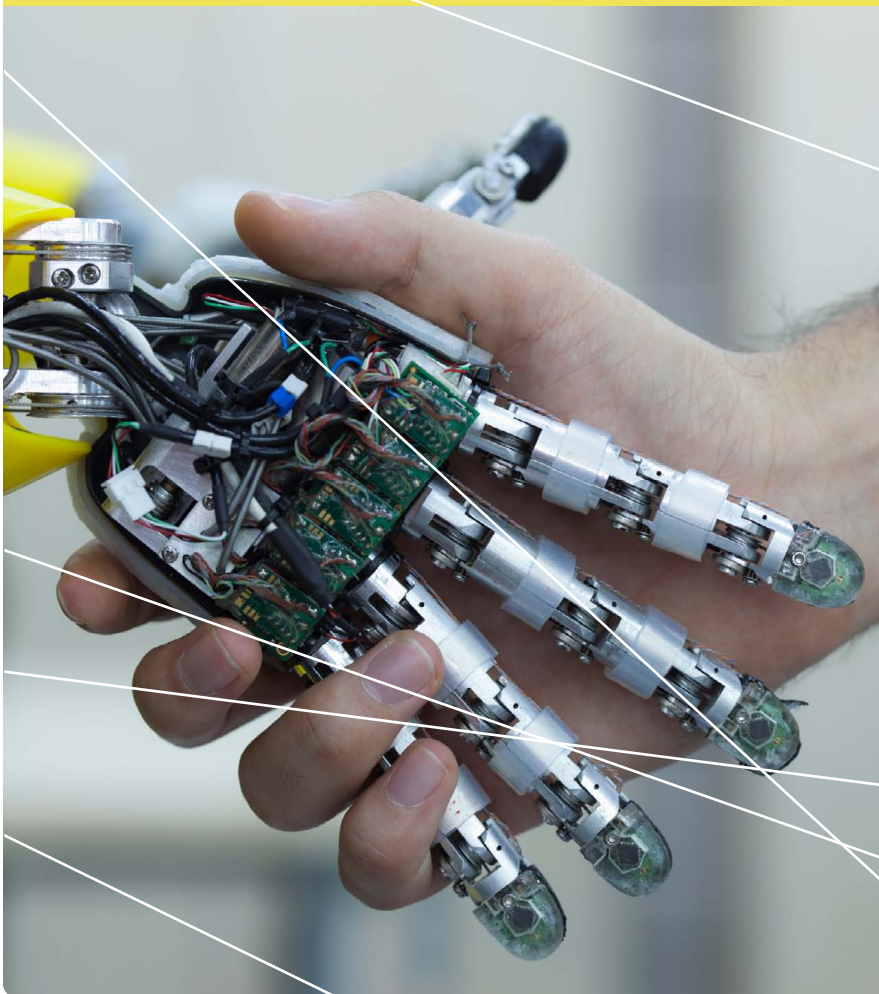
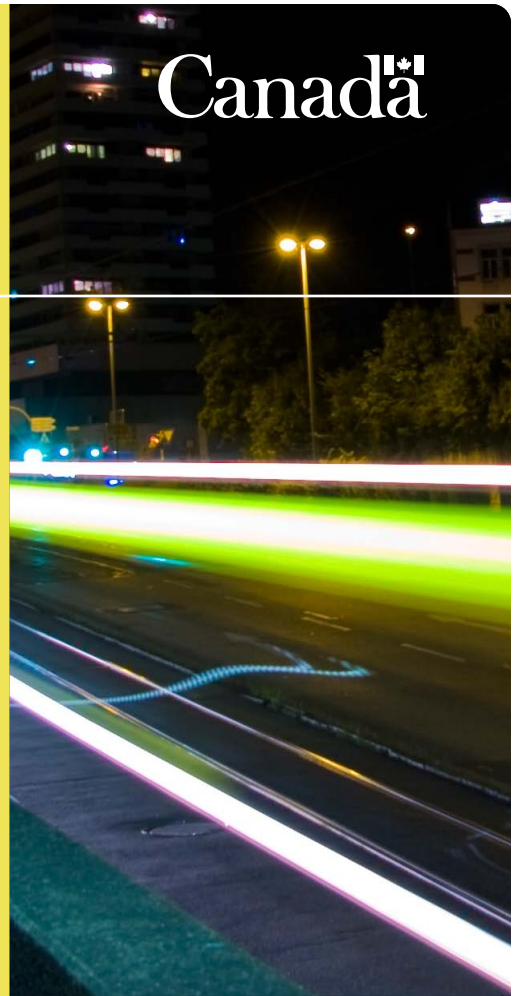
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METASCAN 2

BUILDING RESILIENCE IN THE TRANSITION TO A DIGITAL ECONOMY AND A NETWORKED SOCIETY

October 2012



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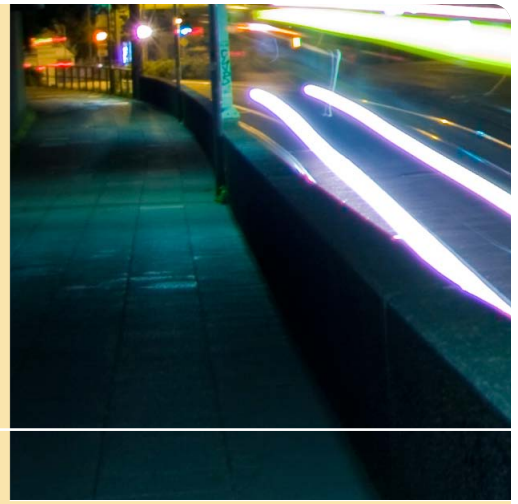
ACKNOWLEDGEMENTS

This study is a collaborative effort that draws insights from several foresight studies and exercises that Policy Horizons Canada prepared between November 2011 and August 2012, including:

The Next Economy and **Driving Policy on a Shifting Terrain**. Those studies involved interviews and workshops with a wide cross-section of national and international participants from government, the private sector, civil society and universities. These participants are listed in each of the studies. Policy Horizons Canada is grateful to them for sharing their ideas and insights.

Horizons 2012 MetaScan Team was composed of Peter Padbury, Steffen Christensen and Nicola Gaye with assistance from all of the Horizons staff who participated in numerous conversations and workshops that shaped this study including: Katherine Antal, Imran Arshad, Teresa Bellefontaine, Stefanie Bowles, David Cavett-Goodwin, Colin Dobson, Alain Denhez, Blaise Hébert, Jean Kunz, Andrew MacDonald, Marissa Martin, Craig McNaughton, Emma Moore, Alan Painter, Peter Reinecke, Julie Saumure, Gary Sawchuk, Cara Vanayan, Jean-Philippe Veilleux, Nancy White, Eliza Lavoie and Greg Wilburn. As well as Horizons' Corporate Staff who helped in other ways: Wanda Baburek, Marie de Beaumont, Louis-Philippe Gascon, Kelly Ann Lambe, Claudia Meneses and Elizabeth Vu. With special thanks to our Directors General Paul De Civita and Judy Watling for helpful strategic oversight and to Naomi Kuhn for the graphic design and layout.

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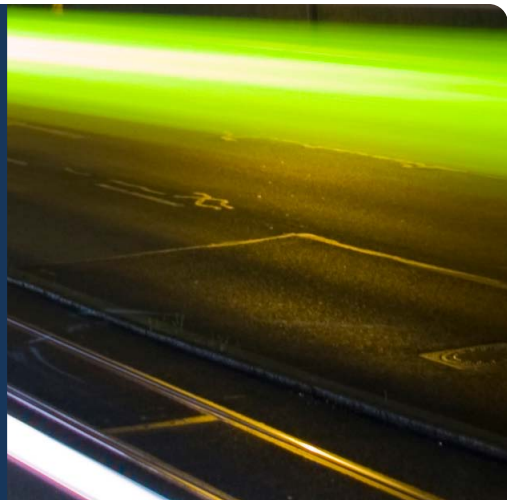


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LEGEND OF INTERACTIVE ICONS



VIDEO LINK



WANT TO KNOW MORE?



EXECUTIVE SUMMARY

PURPOSE OF THIS STUDY: Over the last year, Policy Horizons Canada prepared foresight studies and exercises on [The Next Economy](#) and [Driving Policy on a Shifting Terrain](#). What clearly emerged across all these studies is how influential digital technologies – including virtual telepresence, sensors, data analytics, robots, artificial intelligence, and 3D printing - will be shaping our world. This study picks up where the others left off and takes a closer look at how five rapidly emerging digital technologies will shape the economy, society and governance. How might our economy and institutions change? What policy challenges and opportunities should we prepare for?

MetaScan 2 does not predict the future. The study, however, explores a range of plausible futures and identifies a number of potential “surprises” or policy challenges, and assumptions that may no longer be appropriate to help shape public policy. The objective of this study is to encourage dialogue and debate on these challenges to help develop robust policy strategies to address them.

CONTEXT: There have been amazing changes in the economy and the way it is organized over the last 20 years. It is hard to imagine a world without Google, instant communications and global supply chains offering cheap products from everywhere. Several of the authors cited in this study say we are entering the third industrial revolution or the digital economy. Over the next decade, emerging digital technologies such as data analytics, sensors and artificial intelligence will transform or replace many products, processes and jobs. They will enable new kinds of tools and processes for co-creation, co-production, co-monitoring and co-consumption. They will fundamentally affect established roles and responsibilities among societal actors, and may even change how we define government, business and civil society. To build a prosperous and resilient economy and society we will need to understand these changes.

There are many other forces driving change and shaping our world, such as geo-economic and geo-political realignment; the debt crisis and reduced public funds; growing environmental pressures; and the growing diffusion of power among societal actors. These changes have been explored in earlier foresight work by Policy Horizons Canada. While not covered explicitly in this study, they are an important context and have influenced this analysis in a profound way. New foresight work will focus on emerging technologies, Canada’s place in the world and explore possible impacts on issues such as security, communities and organizations.

EMERGING POLICY CHALLENGES:

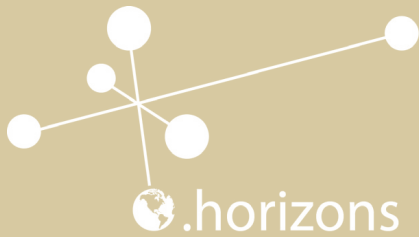
The following is a summary of the key policy challenges identified in this study. Often buried within most challenges are opportunities.

- **THE ACCELERATING RATE OF TECHNOLOGY-DRIVEN CHANGE:** We have been hearing about these digital technologies explored in this study for a decade. It is easy to be complacent, but these technologies have matured to the point where they are entering the market and the workplace in a very significant way. The key uncertainty is how fast these technologies will be integrated into life and business practices. Ignoring or underestimating the rate of change will undermine our preparedness and resilience.
- **THE EMERGENCE OF DIGITAL SUPPLY CHAINS:** The technologies described in this study, especially 3D printing, will enable supply chains that are almost entirely digital for a growing number of goods and services. An all-digital supply chain means workers can live anywhere in the world.
- **THE RISE OF VIRTUAL WORKERS:** Virtual workers use online collaborative tools to work across national boundaries on contracts that can last hours, days or longer. A growing number of sophisticated websites currently facilitate match-making, employer/contractor relations and task monitoring. Virtual work is a way to recruit skilled foreign workers, expand job opportunities for Canadians, and diversify trade in high and low skilled services. As the number of international virtual workers expands, it could lead to a rebalancing of wage rates around the world and in Canada.
- **GROWING INCOME INEQUALITY:** Digital technologies will increase productivity often using fewer or different workers. Both high and low skilled areas from professional services to retail will be affected. While there are many counteracting factors, digital technologies could lead to more job de-skilling and possibly job loss, and the possibility of greater income stratification.
- **JUST-IN-TIME SKILLS DEVELOPMENT:** Having the right skills for the digital economy will improve competitiveness and productivity. Colleges and universities will eventually integrate the new technologies in their programs. But what about existing workers that do not have access to educational institutions and the unemployed? Are there new, faster ways of learning and certifying? There are currently more than 2 million online courses. Is there a need to re-assess and re-tool the educational system to enable students and workers to learn in a more flexible, just-in-time fashion?
- **POOL OF SKILLED VIRTUAL WORKERS AS A COMPETITIVE ADVANTAGE:** The global competition for skilled workers is fierce now and is poised to intensify in the coming years due to aging demographics in developed nations. In the emerging digital economy, firms will increasingly be virtual, international, project-oriented networks drawing on skilled workers wherever they live. Beyond education, are there other changes in policies, taxes and infrastructure that would support skilled individuals in participating in this new game and give countries strategic and competitive advantages.
- **GROWING PRESSURE TO COLLABORATE AND NETWORKED GOVERNANCE:** Over the next decade, new digital technologies and other drivers will reshape national and global economies; the policy landscape will get more complex, dynamic and interactive. Building consensus and mobilizing the expertise and resources of other actors in society may be essential to solve emerging challenges. Government, business and civil society will need to learn new skills, work in new ways, provide new kinds of services and take on new roles.



REPORT

BUILDING RESILIENCE IN THE TRANSITION
TO A DIGITAL ECONOMY AND A
NETWORKED SOCIETY





CHANGE DRIVERS

These developments will play a significant role in shaping the economy and governance over the next 15 years

What are they?

In a world of causes and effects, change drivers are developments that cause a significant alteration in the system under study.

How can you use change drivers?

Many environmental scans focus on change drivers and their implications. In a foresight study, surprises and challenges emerge as the change drivers interact with each other and the system under study.

1

VIRTUAL TELEPRESENCE

Virtual telepresence allows users to feel as if they are present at another location in a way that approaches actual presence. This technology is already being used in education, health care and other services. The technology is expected to improve greatly over the next decade and become increasingly affordable. Sunglasses with heads up displays, virtual reality glasses and data gloves that allow remote touch will exist, along with multiple digital surfaces and tracking 3D cameras for telepresence. Corning's vision of the future, based in part on technology available today, helps us imagine what the future could be like. These technologies will change the way we work, where we work and with whom we work: either across town or across the globe. They could have a number of benefits, such as reducing greenhouse gases, but also challenges such as device access, affordable bandwidth and ensuring cyber security.

A Day Made of Glass 2:

Unpacked (a walk through of the technologies featured in this video)

A Day Made of

Glass 2 (Corning's vision of the future)



2 DATA ANALYTICS, SENSORS AND THE INTERNET OF THINGS

Data analytics is the process of merging and analyzing data from diverse sources to gain insight for decision making. Web behaviour monitoring and data set integration are now commonplace in many government and commercial applications. Sensors will be embedded in everyday devices, such as shoes, toilets, refrigerators and cars. Data streams from these sensors will connect via the internet of things enabling assessment of individual and population health status, location of goods in a warehouse and water quality at the end of a pipe. Combined with powerful cloud-based data visualization and management tools, real-time data aggregation will enable customized services for individuals and more informed policy.

3 ARTIFICIAL INTELLIGENCE

Artificial intelligence (AI) includes such traits as reasoning, planning, learning, communication, perception and the ability to move and manipulate objects. AI is in wide use today: in Apple's Siri for voice recognition, Google goggles for image search, Facebook's face recognition, NASA's rovers, and algorithmic stock trading. AI innovations are software, and tend to be incorporated rapidly and passively into systems as new features, often at little incremental cost. AI adds capabilities in significant steps, as technologies mature enough to be useful. Many tasks will be able to be automated through AI, improving efficiency and productivity.

EMERGING ARTIFICIAL INTELLIGENCE AREAS

| ABILITY | APPLICATION |
|--|--|
| Augmented reality | Display overlays for glasses and windshields |
| Real-world 3D object identification | Real-world search, robotics |
| Automatic data fusion of disparate databases | Evergreen infographics using live data |
| 3D environment modeling from images | Interior mapping and usage models |
| Speaker following and tracking | Live event translation and interpretation |
| Personality and emotion modeling; facial expression recognition | "Pleasant" user interfaces; seamless and friendly responses |

4

ROBOTS

Today, robots are used in experiments involving such tasks as inventory stock-taking, load-moving, housework, elder care, remote sensing and virtual telepresence. As AI improves, they will get smarter and more capable. Task-specific robots could do tasks as diverse as surgery, cooking and driving. Businesses will continue to be early adopters, with home use following on as prices decline and features become more competitive.

[Robots equipped with tactile sensor better able to identify materials through touch than humans, enabling more lifelike prosthetics](#) (article)

[New Honda Robot ASIMO 2012](#)

[The Latest Advances in 3D Printing](#)



5

3D PRINTING IS CHANGING MANUFACTURING

3D printing — also known as additive manufacturing — allows highly customized parts and products to be printed on demand, anywhere. It is already being used to produce a wide array of products from furniture, clothes, bones and prostheses to auto, airplane and building parts. Boeing is working on printing airplane wings without rivets. R&D efforts are increasing the capability to print with a growing number of materials, allowing for ever increasing sophistication of the products that can be made with 3D printing. Their expanding use will change the economics and location of manufacturing. In 2012, the US government established the [National Additive Manufacturing Innovation Institute](#) (NAMII) in partnership with the private sector to promote innovation in 3D printing and help transform the manufacturing sector.

[Revolution in Art & Design Using 3D Printing](#) (interview w/ Neri Oxman, Director of the Mediated Matter lab at MIT)



[Bioprinting](#) (article)



THE SCENARIOS

What are they?

Scenarios are a systematic way of exploring how change drivers interact to create a range of plausible futures. Effective scenarios move beyond conventional wisdom and the expected future to explore low probability but high impact futures that are plausible but often discounted or ignored. Scenarios help identify potential challenges and surprises. With this information and a deeper understanding of how the system may behave, we can develop more robust policies, plans and strategies.

How can you use the scenarios in this study?

Imagine fully immersing yourself in each scenario. Consider what challenges might emerge if we keep today's policies and institutions. Are we ready?

THE SCRAMBLE 2025 (THE EXPECTED FUTURE)

Many Western governments have been constrained by a long period of slow growth and lingering debt, but the BRICs (Brazil, Russia, India and China) have managed to grow. In 2025, they collectively account for more of the world's economy than the G7. They use their purchasing power and state capitalism to promote their own digital champions. At this time, 50% of the global population has the means and now participates in the digital economy. With the exception of a few large multinational firms, most firms are scrambling to keep up with the pace of change. There are no clear winners. This is a period of hyper-competition with much "creative destruction". Some manufacturing has returned to Canada as 3D printing and robotic assembly help firms customize for global niche markets. The business-led, government supported digital skills training centres have been unable to keep up with demand. In the search to fill skilled labour shortages, some firms hire foreign virtual workers at half the cost. Many Canadians buy customized digital goods and services but most are produced outside Canada. Ironically, in the digital age, Canada maintains a healthy balance of trade by exporting natural resources - as a major developer and producer of smart and nano-materials for 3D printers.

GLOBAL CONSOLIDATION 2025 (INCREMENTAL DECLINE)

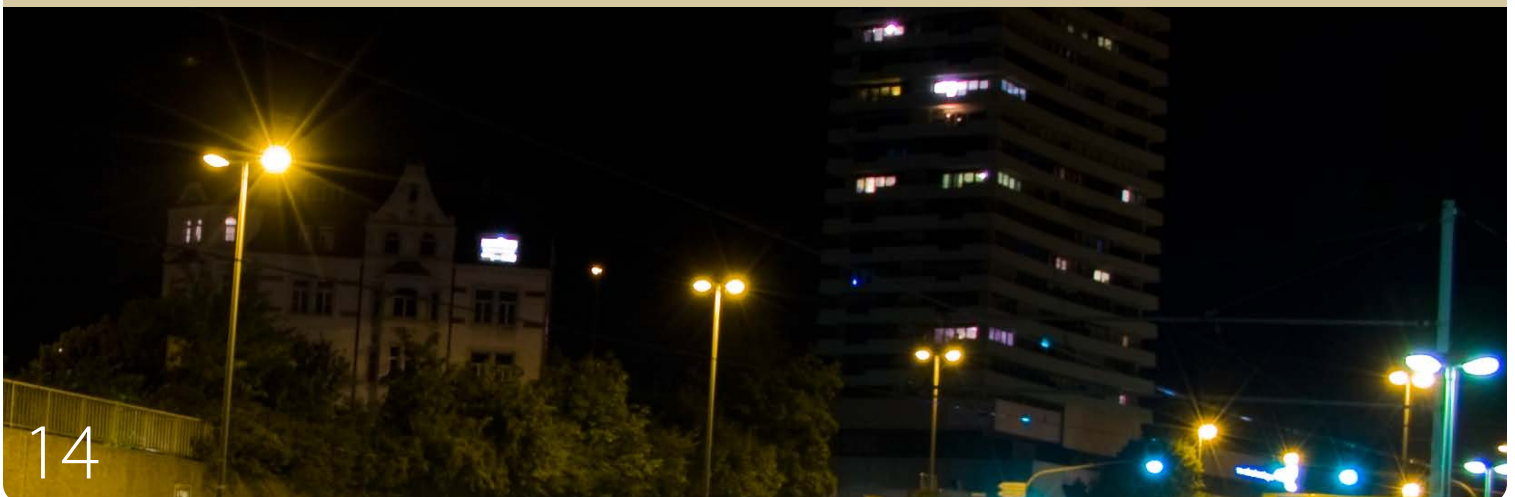
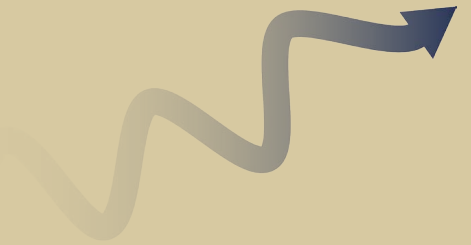
The global economy suffers from a decade-long recession. Developed and emerging economies alike have shrunk. A number of large global firms are innovating and consolidating. They are using all available digital technologies to produce low cost but highly customized goods and services for the global middle class. As these technologies increase productivity with fewer workers, unemployment grows, particularly among workers who do not have the necessary skills and knowledge of the new technologies to be part of the emerging economy. Part-time and occasional work expands. Income inequality and public unrest is growing. Lower tax revenues force governments to cut and outsource some traditional public service functions. Some citizens are concerned as Canada increasingly contracts out to lower cost foreign firms and even foreign governments to deliver state-of-the-art public services to Canadians. For instance, Google Education has revolutionized education using artificial intelligence and data fusion to develop and certify “micro-skills” training in ten minute video segments funded entirely by advertising. Many Canadians use Google Health for in-home health diagnostics and monitoring. A global underclass has also emerged, as they are both enabled and disabled by open source innovation that has accelerated the rise of free and low-cost digital goods and services.

THE DIGITAL ECONOMY ARRIVES 2025 (INCREMENTAL PROGRESS)

High technology innovation drives a new era of global prosperity and rapid change. Key countries cooperate to promote economic growth, expand equity and ensure global environmental sustainability. As a new technology arrives on the scene, it hybridizes with existing technologies and creates new opportunities in other sectors and professions. Global supply chains become shorter and more digital. Innovations in 3D printing allow nimble investors to quickly customize a growing range of products. Fewer materials are moving around the planet. AI is incorporated in a growing number of smart products, which are sold as services: your running shoes and toilet connect through the internet to monitor your health which lowers your insurance. One third of Canadians are virtual workers for foreign firms, and a similar number of foreigners work virtually for Canadian firms. Global agreements are being negotiated to cover the complex benefits packages for virtual workers who work transiently in many different countries. Government departments have become service-oriented problem-solving networks using the latest tools to engage citizens in innovative policy and program development processes. Data aggregated from many sources helps identify emerging issues and offers a system-level analysis. Many government services are delivered automatically by smart software through citizens’ smartphones, surfaces and glasses.

LEAP-FROGGING TO THE CO-CREATION ECONOMY 2025 (TRANSFORMATION)

Over the last decade, two factors created a crisis that changed the way we think about work and the nature of the economy. Rapid technological change produced high and persistent unemployment in many countries. In addition, the growing use of virtual workers led to a gradual rebalancing of global wages and a consequent narrowing of wage rates between developed and developing countries. It was hard for many families. People started to use new technologies to co-create, co-produce and co-consume goods and services with others to make ends meet. In parallel, the global open source movement started to knit these experiments together. By 2025, the infrastructure for a new kind of economy emerged enabling complex chains of people to organize the production and exchange of goods and services without using scarce money. The digital, traditional and emerging co-creation economies all continue to exist and feed global supply chains in different ways. Society is in the midst of a significant value shift. Perceptions of wants and needs are changing. Many people piece together traditional and virtual work in an effort to re-align their work with other family and life goals. The role of government has changed in this historic shift. Government is becoming far more agile and networked. Experiments with digital democracy build a rapid but evolving consensus from very diverse voices.



POLICY CHALLENGES

These changes may significantly challenge existing policies over the next 15 years

What is a policy challenge?

A policy challenge is an issue that current policies and/or institutions may not be ready or able to address. Identifying, analysing, debating and clarifying the challenge helps us to develop more robust strategy and policy to handle it. Foresight helps identify emerging policy challenges.



ARE WE READY FOR THE RISE OF VIRTUAL WORKERS?

A growing number of sites like freelancer.com and eLance.com are facilitating virtual work across national borders for short term contract work – a sign that the “project economy” is growing. On the positive side, virtual work allows Canadians to find work with foreign firms in need of their skills and for Canadian firms to find foreign talent needed to fill gaps in their value chain.

CONSIDERATIONS:

- **UNCLEAR NORMS:** Cherry (2010) notes national boundaries are problematic in regulating virtual work, as parties may be unaware of, or ignore, which standards and minimum wage rates apply. There may be a need for new international norms to protect both virtual workers and employers.
- **GLOBAL REBALANCING OF WAGES:** Growing virtual work across national borders will put pressure on wages to move toward a global equilibrium for virtual work. When Canadians are competing with similarly skilled foreign virtual workers there would be pressures to pay similar wages for similar work. Over time, wages for virtual workers in low cost emerging economies could rise, while wages for Canadians could fall. If virtual work becomes a significant proportion of GDP, it will impact non-virtual work wages as well. The best way to ensure higher wages is to have skills or knowledge that allows the worker to add value in unique ways.
- **MORE NON-STANDARD WORK:** Preparing social policy for a period of rapid job turn-over and more non-standard work (i.e. no job benefits or pension) will be important to national well-being.
- **APPLICATION OF CANADIAN BENEFITS:** Currently there are many bilateral agreements among countries facilitating payment of social benefits based on traditional employment in another country. Do they apply for virtual work? To attract the best virtual workers will a Canadian firm have to offer foreigners access to pro-rated Canadian benefits in programs like CPP and health insurance?
- **RE-THINKING IMMIGRATION:** Our concept of immigration may change when there is less need to move workers to Canada and there may be less motivation to emigrate.



Freelancer.com
elance.com

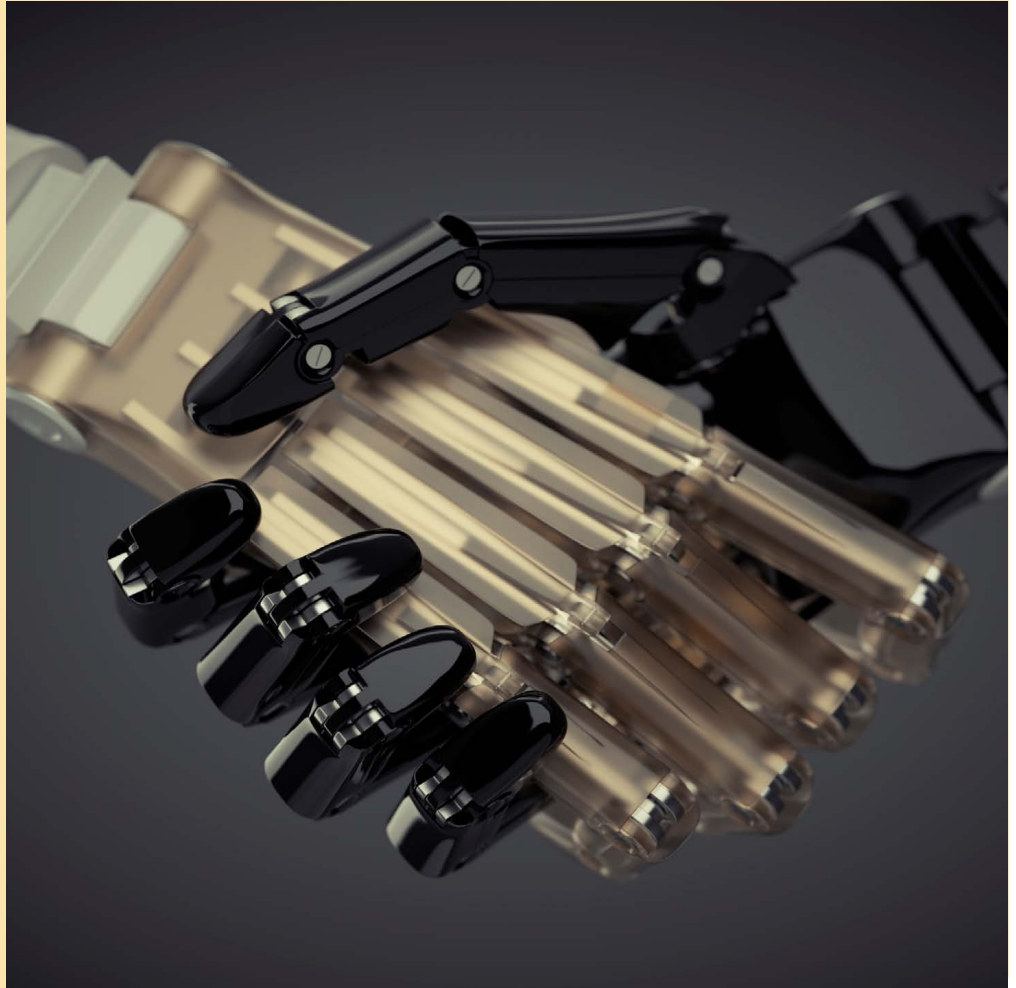


2 ARE WE READY FOR GROWING TECHNOLOGY-DRIVEN UNEMPLOYMENT?

We live in a period of unprecedented technological change. The next generation of technologies (virtual telepresence, sensors, data analytics, 3D printing, artificial intelligence and robots) is taking off. These technologies give software the capacity to understand speech, recognize patterns and feel textures: in short, to perform functions that once only humans could do. The comparative advantage of human labour over smart machines is shifting. Many experts anticipate a period of significant job displacement and job loss.

CONSIDERATIONS:

- **SPEED OF CHANGE:** The key uncertainty is the rate at which these technologies will re-shape the economy. Many are moving faster than most people expect. Underestimating the speed of change will lead to missed opportunities and increased unemployment.
- **JOB CREATION:** How can Canadians prepare themselves to compete in an environment where the growth industries have high productivity but few jobs? “The key to winning the race is not to compete against machines but to compete with machines.” (Erik Brynjolfsson and Andrew P. McAfee. *The Race against the Machine*. Digital Frontier, eBook, 2011). However, the ability to use the latest technology often requires high tech and design skills, which are in short supply.



3

ARE WE READY FOR GROWING INCOME INEQUALITY?

Digital technologies will increase productivity - often with fewer workers. A portion of the Canadian population will thrive in the emerging economy. An unknown but growing number of high and low skilled workers in Canada will lose steady jobs, to be replaced by part-time, intermittent and seasonal work as technology-driven unemployment and digitization proceed through the economy. Income inequality will likely rise.

CONSIDERATIONS:

- **LESS STABLE INCOME:** Individuals or families without a full-time job or with low incomes will have a diminished capacity to invest in their futures (i.e. house ownership, education, retirement). The stresses could also undermine family stability and health. How best might government or others help address income variability?
- **DIGITAL INEQUALITY:** Digital skills, in combination with other skills, will be increasingly essential to land high-value jobs. Populations at risk of losing employment opportunities face a double whammy if they lack both the skills to help with market transitions and the digital skills to help them land the next job. What programs can Canada put in place to ensure a digitally resilient population across the age spectrum and regions?
- **MORE COLLABORATIVE PRODUCTION AND CONSUMPTION:** More individuals may use digital technologies to lever personal skills in creating, sharing, trading and renting goods and services to offset part-time work and boom and bust cycles. This may occur at the family, firm or national level. What set of policies would assist people in helping themselves in reducing costs and sharing consumption?

4

ARE WE READY FOR CHANGES IN MANUFACTURING?

3D printing is evolving rapidly. There are currently over 26 different materials used in 3D printing. Over the next decade, more and more consumers will have a say in product design and the production of increasingly complex products will decentralize. Early in the coming decade, 3D printing will enable forward-looking entrepreneurs to integrate it in existing processes; later in the decade, it will be in many homes and dramatically shorten value chains for a growing range of consumer goods.

CHALLENGES:

- **MORE COMPETITION:** Most manufacturing by Canadian small and medium enterprises (SMEs) is focused on customization for niche markets. This technology makes global markets more accessible for Canadian SMEs but also increases the competition for customization here.
- **MORE JOB OPPORTUNITIES:** With this technology, the whole value chain becomes digital, except for the final production in or near your home. This makes the value chain shorter, less complex and more accessible. This allows people everywhere to be entrepreneurs or compete for high value work (design, marketing, etc.). Do we have the digital design, management and other skills to compete?
- **GROWING DEMAND FOR “SMART” RAW MATERIALS:** An important opportunity for a country that exports natural resources is the development of “smart materials” for these printers.
- **NEW SAFETY AND REGULATORY CHALLENGES:** If almost everyone can create or modify a digital file and print a new product, will this present new challenges for current safety and other regulatory regimes?

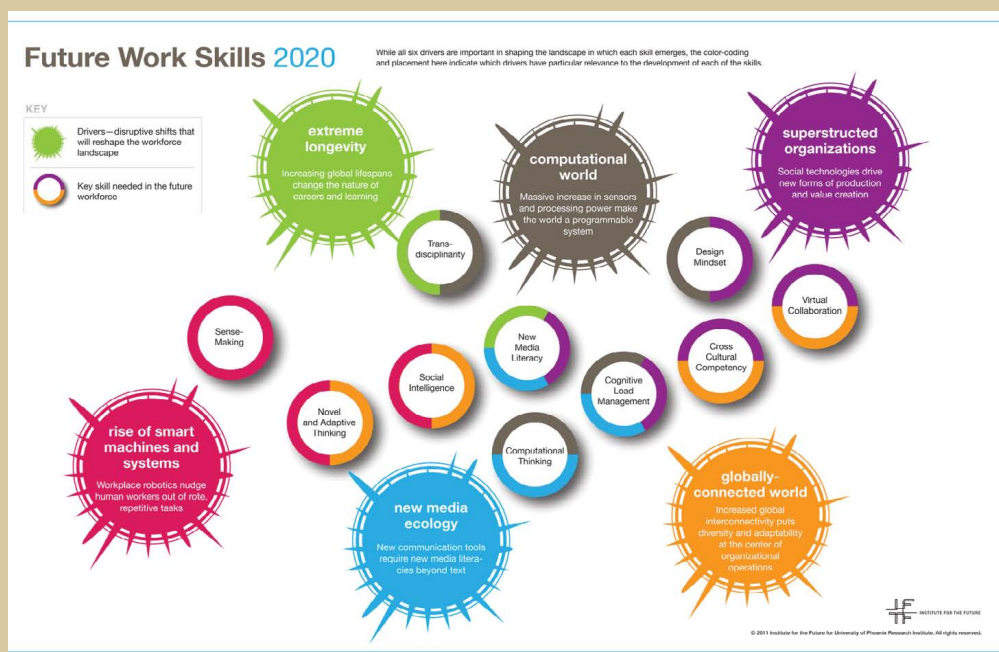
5

ARE WE READY FOR THE RETOOLING OF EDUCATION?

Over the next decade, many workers and students will need to develop skills for jobs that do not yet exist. Those in existing jobs will have to perform new functions for which they have no training. In a world where human capital is central to our prosperity, we need to re-think how we support rapid learning and certification.

CHALLENGES:

- **JUST-IN-TIME SKILLS:** Training needs will evolve faster than traditional educational arrangements can address. Currently, there are two million online courses. But will university credit courses meet future needs — especially of working adults? Could YouTube and direct online testing better support just-in-time “micro-skills” development? Online reputation systems on sites like ebay.com track the trustworthiness of buyers and sellers and enable transactions. Such sites might offer relevant lessons for rapid certification of skills or competencies in some areas.
- **REFINING LABOUR MARKET INFORMATION:** Students and others looking for jobs may make better educational choices if they have a better sense of emerging skills sets, even if we cannot yet describe the new jobs or emerging occupations.
- **RE-THINKING BASIC SKILLS:** What are the basic skills young people need to survive and prosper in the early 21st century? Recent proposals include: sense-making, adopting a design mindset, trans-disciplinary skills, cross-cultural sensitivity, and universal programming skills. What is needed to ensure we have the most basic elements of national resilience in place?



[Khan Academy](#)
[iTunes U](#)
[edX](#)
[Academic Earth](#)

[Future Work Skills](#)



ARE WE READY FOR FREE DIGITAL GOODS AND SERVICES?

Digital goods can be produced at almost no incremental cost, but also suffer from expectations that these goods will be free or almost free. More domains will go through the tangible to digital transition over the next 15 years, from education in the near term, to health care and manufacturing over the longer term.

CONSIDERATIONS:

- **EASY ENTRY; RAPID TURNOVER:** Systemic barriers to new entrants in many digital creative domains are low. An ecosystem emerges that runs from open source production, to producers that seek micropayments for their designs, to full-scale industries seeking subscribers or sales. Firms new to a market can find that their business model is only competitive for a few years. As this becomes the norm for new virtual services and industries, will Canadians be prepared for the skills updates required of short-lived firms? Will our income and industrial support programs be ready to help with rapid turnover?
- **BEYOND IP:** Strong intellectual property rights (IP) help secure access to producers' rents, but encourage piracy. Without a global, broadly supported standard for IP, innovation may move to where it is most able to thrive. The challenge is in establishing fair pricing and rapid access to digital goods to undercut piracy and encourage consumption to remain in the legitimate economy.
- **EXPANSION OF OPEN SOURCE MOVEMENT:** Similar to the open source movement in software, there is an [Open Source Hardware Movement](#) that is creating free digital files that consumers can use, customize or improve to produce new products and services. The movement may make it hard for traditional businesses and small entrepreneurs to compete with goods and services that are "free".

[Newspaper Ad Revenues Fall to 60-Yr. Low in 2011](#)



7

ARE WE READY TO COLLABORATE?

The demand for a say in decision making is likely to grow as stakeholders use social media in innovative ways. New digital collaboration tools, artificial intelligence and data analytics offer the potential of a new kind of policy process and the co-creation and co-production of public goods with other societal actors. Many governments and private sector organizations are experimenting now with tools such as innovation labs, crowd-sourcing and on-line dialogue. The benefits include better coordination among levels of government, better analysis, and better policy that meets citizens' diverse aspirations. It could also include the possibility of devolving responsibilities and reducing costs as other actors play larger roles.

CHALLENGES:

- **EFFECTIVE COLLABORATION:** Other actors bring expertise, human and financial resources to solve the problem. Are we ready for other actors playing a larger role in policy making? How do we ensure that vocal special interests do not dominate? What does a legitimate and effective policy co-creation process look like?
- **POLICY CUSTOMIZATION:** New technologies offer new ways to customize policy to suit different geographic circumstances or even the needs of groups of individuals, such as new partnerships to deliver health care in remote areas or to people with particular problems. Could this lead to policy fragmentation and social inequity or should we see this as targeted strengthening of resilience?
- **COMPETING FOR ATTENTION:** As the amount of information people receive increases, the ability to capture and maintain their attention will become an important limiting factor in a world of expanding opportunities for co-creation. New approaches to engagement will likely involve smart phones, social media and gaming. How can these tools support democratic participation? How will our institutions evolve in light of the changing relationship between citizen and state?
- **REVITALIZING DEMOCRACY:** What skills, tools and authorities will the public service need in order to use collaboration tools to build a culture of informed dialogue for a smart forward-looking democracy?
- **DEFINING THE PUBLIC INTEREST:** Social media and online reputation systems will increasingly allow non-state actors to build trust with large segments of the population and gain influence in defining the public interest and shaping public goods. The government and other political parties may use new technologies to engage directly with the public. What role will the public service play?

Future Melbourne

The City of Melbourne is collaborating with citizens to create a vision of the future for their city

Attention Economy
(Article)





ARE WE READY FOR NETWORKED GOVERNMENT?

There are internal and external pressures for greater horizontal collaboration within the Public Service. However, authority and accountability are vertically aligned. Departmental “silos” present challenges for information and resource sharing, planning, decision making, financial and accountability structures. Governments and public services in many jurisdictions are re-defining structures and processes for the 21st century.

CHALLENGES:

- **ORGANIZATIONAL ALTERNATIVES:** Greater collaboration challenges current accountability mechanisms and institutional culture. Workplace and work style expectations of employees, especially younger generations, are challenging traditional hierarchy and control. Experimentation with new ways of working will be required to find models that work. What skills, knowledge and technologies will public servants require in the next decade? Will the relationship between the elected government, the public service and the public change as a new culture and way of working emerges? How will virtual telepresence and artificial intelligence change the way public servants interact with one another and the public?



David Halpern discusses legislation and ordering
(article, the Guardian)

GOV.UK
Behavioural Insights Team



ARE WE READY FOR VIRTUAL SERVICE DELIVERY?

Companies like Google are setting the standard and shaping public expectations for individualized service delivery. Advances in data analytics could help governments identify the interests, information and program needs of citizens before they voice them. Benefits of virtual service delivery could include: customizing services to each individual’s needs; greater uptake of services and programs; increased user input in designing services and programs; and growing trust in government.

CHALLENGES:

- **WHO DOES IT?:** Will governments or other actors be best positioned to deliver virtual public services? If others, what will government need to do to ensure the public interest is served?
- **COOPERATE WITH OTHER GOVERNMENTS:** Should governments cooperate with other governments and providers of services to share costs to develop smart online services (like online health monitoring and diagnostics using simple in-home sensors)? Is there a trade-off between serving individual needs and the collective public interest? How would accountability be shared?
- **PRIVACY AND SECURITY:** Notions of privacy may be changing in society, but issues around sharing personal data and protecting its misuse are likely to remain important for public trust. Likewise, increased reliance on digital technologies as the interface between government and the public will likely require increased investments in protection from cyber threats.



CONCLUSION AND CREDIBLE ASSUMPTIONS

How do we use assumptions?

We look at two kinds of assumptions. At the start of a process, we try to identify the “current assumptions” that are buried in current policy and dialogue. At the end of the process, we test the current assumptions against the findings in the study to identify “credible assumptions” that appear to be robust across a range of futures. The assumptions that survive this testing are useful in shaping forward-looking research, policy and program development and decision-making.

Conclusions and credible assumptions

Resilience is defined as having strategies and the capacity to cope with threats and surprises. Foresight builds resilience by helping us understand the issue, explore plausible futures, identify potential surprises and challenges, and develop robust strategies to cope with them.

For strategists and policy makers, foresight helps us surface, clarify and test the assumptions that are shaping our thinking. Examining the core assumptions is one of the easiest ways to see alternatives and start seeking opportunities.

At first glance, the set of challenges in this study paints a bleak picture. A close examination of the current assumptions that are buried in media coverage, conversations, public policy documents, and our own thinking will help us test current thinking and see the opportunities.

COMMONLY HELD ASSUMPTIONS 2012

The Canadian economy is going to look a lot like today ... only a little poorer.

Firms are one of the primary drivers of prosperity.

There are many policies and programs to support their development and international success.

Manufacturing, with its steady work and high pay, will continue to decline in Canada.

Service jobs are safe because proximity to the client matters.

Canada will suffer labour market shortages. Immigration will be a large part of the solution.

Current educational institutions will provide the skilled labour we need to prosper.

Government services will continue to be a lot like today, but will be delivered increasingly on-line.

CREDIBLE ASSUMPTIONS LOOKING FORWARD

The Canadian economy could look quite different in 2025.

Digital technologies will bring about dramatic changes in processes and relationships and create new possibilities in business and government.

In addition to firms, uniquely skilled individuals may become an increasingly important driver in any strategy to ensure prosperity and resilience.

In the emerging digital economy, it appears firms will increasingly be virtual, international, project-oriented networks that contract skilled workers as needed. If firms become more ad hoc and virtual, investing in and keeping uniquely skilled individuals will help ensure prosperity.

New digital technologies, especially 3D printing, could help to re-localize manufacturing as well as enhance our competitiveness in global niche markets.

Interestingly, the high value-added jobs in the digital economy will be up and down stream of the actual manufacturing process – so anyone can be a player.

Both low and high end service jobs may be dramatically changed or lost due to low cost AI, sensors, data analytics and robots.

The changes will probably occur faster than people expect and the new service jobs may not be located in Canada.

Canada may not suffer a labour shortage.

High and low skilled virtual workers could fill labour market need. Boomers may delay retirement to work full or part time. New skills and technology, and a better match of just-in-time training with demand could improve the productivity of both low and high skilled workers.

An educational system for the 21st century could look quite different, using digital technology to support just in time learning and certification across the whole life course.

With the growing pressure for new skill development and the new possibilities offered by online learning, collaboration and certification, there is an opportunity to assess and rethink how we prepare citizens for the emerging economy.

Profound change is possible in the way government works and in who delivers the service.

Data analytics, new behavioural levers, new public / private partnerships and new business models such as social enterprises are some of the tools in the emerging tool kit. Given fiscal constraints, there will be pressure to innovate across all governments.

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Appendix A:

OUR PROCESS

ASSUMPTIONS

- Interviews and reading to frame and understand the problem
- Track core assumptions to test

SCANNING

- Identify insights / weak signals that change is occurring
- Assess relevant trends
- Elaboration of commonly-held assumptions

SYSTEM MAPPING

- Identify key elements in the system
- Describe key relationships

CHANGE DRIVERS

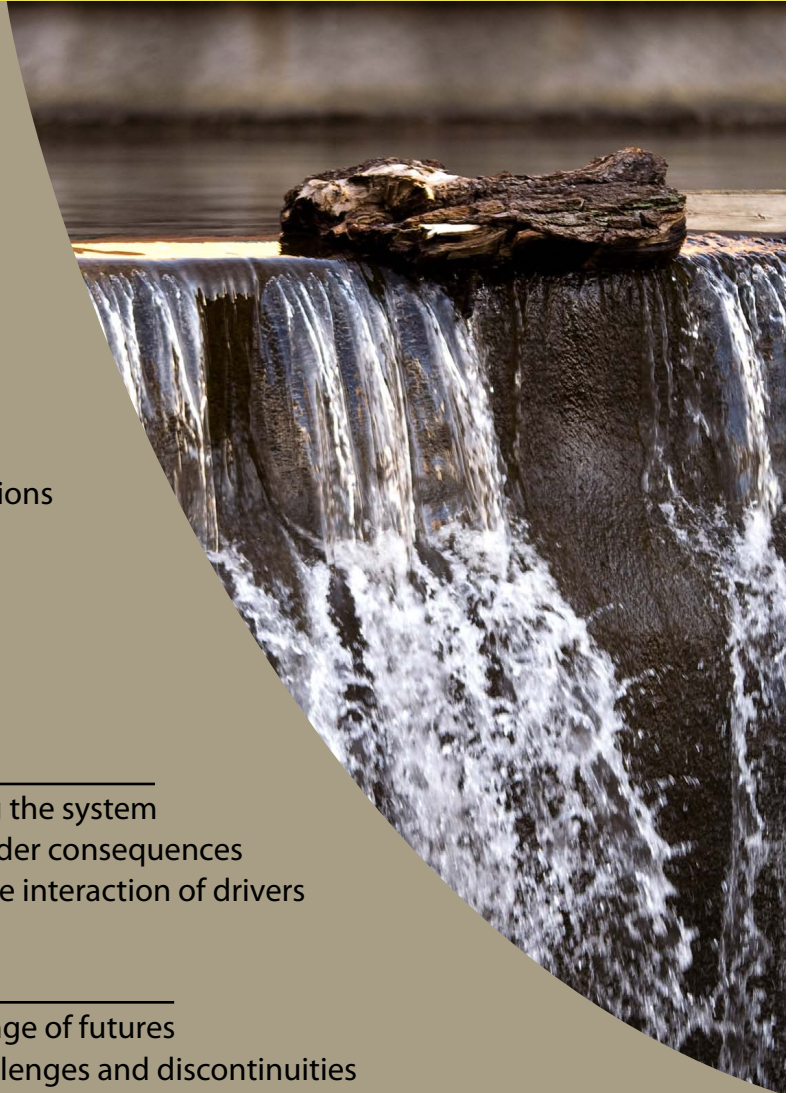
- Describe change drivers shaping the system
- Influence maps of 2nd & 3rd order consequences
- Preliminary examination of the interaction of drivers

SCENARIOS

- Scenarios to explore range of futures
- Identify potential challenges and discontinuities
- Testing for robust assumptions and strategies

PRODUCTS

- Credible assumptions and key uncertainties
- Policy challenges
- Emerging issues
- Data needs





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