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**COVID-19: Steering recovery with precision**

Gov 4.0 and the future of public policy
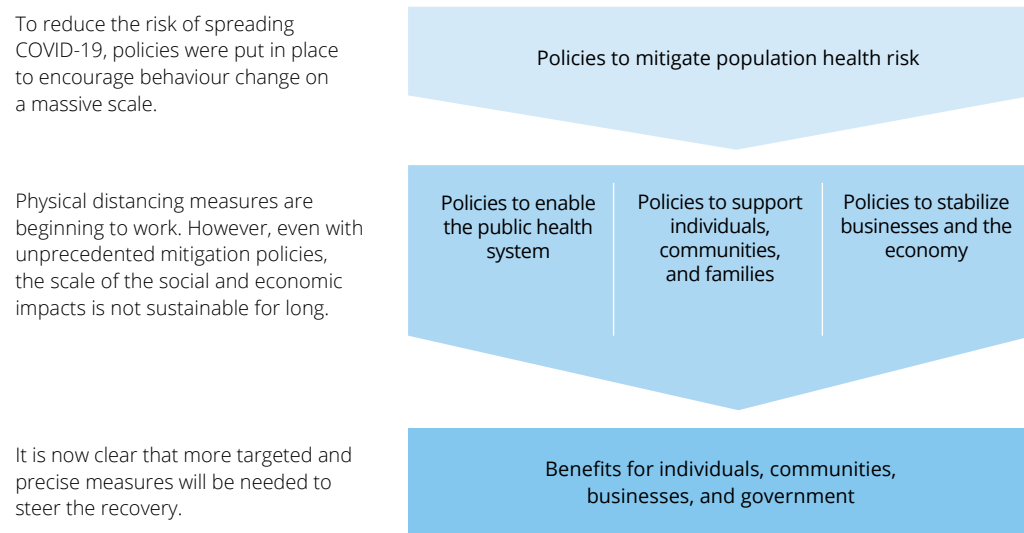
# Contents

While the focus of governments has and must remain on bending the coronavirus infection curve to save lives, attention is turning to planning and preparing for the difficult task of recovery. Indeed, planning the optimal approaches to recovery will help cut off the tail of the curve sooner than may otherwise occur and, at the same time, accelerate the return to work, school, and a functioning society. Governments now face the difficult task of moving from broad-based physical distancing to more targeted and precise policy measures (see Figure 1).

**Figure 1—Policy response to COVID-19**

To reduce the risk of spreading COVID-19, policies were put in place to encourage behaviour change on a massive scale.

Policies to mitigate population health risk

Physical distancing measures are beginning to work. However, even with unprecedented mitigation policies, the scale of the social and economic impacts is not sustainable for long.

Policies to enable the public health system

Policies to support individuals, communities, and families

Policies to stabilize businesses and the economy

It is now clear that more targeted and precise measures will be needed to steer the recovery.

Benefits for individuals, communities, businesses, and government

The blunt policy instruments that governments have needed to deploy to enforce physical distancing have fuelled a false debate: that public health protection and economic recovery cannot be achieved in tandem. The two are inextricably linked. We cannot reboot the economy if people are not safe. People will not be safe unless we meticulously plan and stage how we reopen for business. The goal is to restore economic performance while avoiding, or effectively managing, new disease spikes. To succeed, governments will require far greater data intelligence, digital communication, segmentation, and orchestration than what it took to get us here. This is precision policy, and it will be critical to steering recovery as well as better preparing governments and populations for future waves of infection.

Governments and academics around the world have produced an abundance of potential scenarios for the length and shape of the COVID-19 curve, the probability of a second or third wave of infections (or of COVID-19 becoming a new endemic disease), and the right timing to relax physical distancing measures. It will depend on how well physical distancing works, whether we can develop herd immunity as a population, and when anti-viral treatment options can be developed and made available. The full lifting of restrictions will be contingent on developing widespread and rapid testing for COVID-19 infection and antibodies, the development and deployment of a vaccine, measures for smart quarantine, and focused strategies for the vulnerable. It won't be a short-term effort: one recent study from Harvard University predicted that prolonged or intermittent social distancing may be necessary into 2022 to stay within critical care capacities, with risks of future waves as late as 2024.[2]

**Precision policy** is the micro-targeting of government actions to achieve measurable benefits for individuals, communities, businesses, and society.[1] It is applied when policy outcomes can be improved—and risks mitigated—by tailoring the design and application of government actions to selected individuals, geographic areas, service providers, businesses, or other priorities over time. Precision requires the ability to predict and operate in a real-time, localized manner, to monitor policy signals on the effectiveness of different measures, and to adapt and respond with agility.

Precision policy includes effective execution through partnerships and alliances to deliver benefits directly where they are needed most. Importantly, it can be enabled by government adoption of advanced technologies and methods already prevalent in business and society, such as: cloud computing; advanced data analytics; social media technologies, including SMS text messaging; sensing and Internet of Things; behavioural insights and nudges; and agile methods.

# It's time to plan recovery

How are governments approaching this? In the United States, for example, there are four major proposals for reopening the economy. Each sets slightly different threshold requirements, though all feature some combination of a sustained reduction in cases, hospital capacity, the ability to test for infection or antibodies, and the ability to actively monitor contacts.[3] The World Health Organization has also released guidance for national COVID-19 response strategies, including conditions for transition to a steady state of low or no transmission.[4]

The path to reopening is fundamentally uncertain and decisions around when, how, and under what conditions are incredibly complex. Government leaders are beginning to speak publicly about what a gradual reopening of their economy could look like, including public health indicators for lifting certain restrictions and criteria about which sectors or industries may reopen first and under what conditions.[5] However, the approach varies by jurisdiction, largely based on pre-existing policy priorities, measures already in place, and experience with the virus. Timelines beyond an initial loosening of restrictions are not yet clear. Further, even as reopening occurs, people may not feel safe or motivated to return to pre-COVID-19 norms—such as eating at restaurants, shopping at malls—without clear and actionable information.

Indeed, the world could look very different depending on how circumstances play out, as shown in scenarios developed by Salesforce and Deloitte earlier this spring in an exercise to imagine what the next five years might be like once the health crisis has passed.

The scenarios reflect the critical uncertainties concerning the course of the global spread of the virus and the level of collaboration within and between countries. There are vastly different potential implications for how social cohesion, technological advances, economic recovery, environmental resilience, and global politics might be affected in the medium to long term.[6]

It is the role of government, engaged with business and non-profit partners and members of the public, to manage this uncertainty, and they need access to the best available tools to do so. In addition to overwhelming global health and public services systems, the COVID-19 tsunami has exposed the vulnerabilities of government services and capabilities, at least when measured against practices and behaviours that are common throughout other parts of society and the economy.

**We have reached a nexus where the need for a targeted approach to reverse near-total population behaviour change intersects with the advent of Industry 4.0 capabilities for use by the public sector. This is Government (Gov) 4.0.**

In this paper, we present a broad view of policy areas where precision and orchestration are needed. We then explore select cases to illustrate how interventions might be delivered, and the potential benefits and tradeoffs inherent in Gov 4.0-enabled policy design and execution.

# Precision policy in practice

Precision can be applied across an array of policy domains, driven by strategic leadership and enabled by Gov 4.0 capabilities (see Figure 2).

Industry 4.0 solutions are prevalent across vast segments of the economy and can be adopted by governments to hasten a safer recovery. These Gov 4.0 solutions have the added benefit of accelerating efficiencies for governments facing fiscal pressures, through digitization, the agile deployment of people and resources, and evidence-driven decision-making. The strategies for recovery will be more important than ever as government leaders look to kick-start the economy and take a long view on the virtualization of public services and digitization of society.

Furthermore, precision policy can be applied within and across domains to shape and advance the recovery.

The technology exists to activate these use cases; governments should target investment and orient policy to mobilize and accelerate adoption. For examples of where some of the more critical use cases can be delivered, see Figure 3.
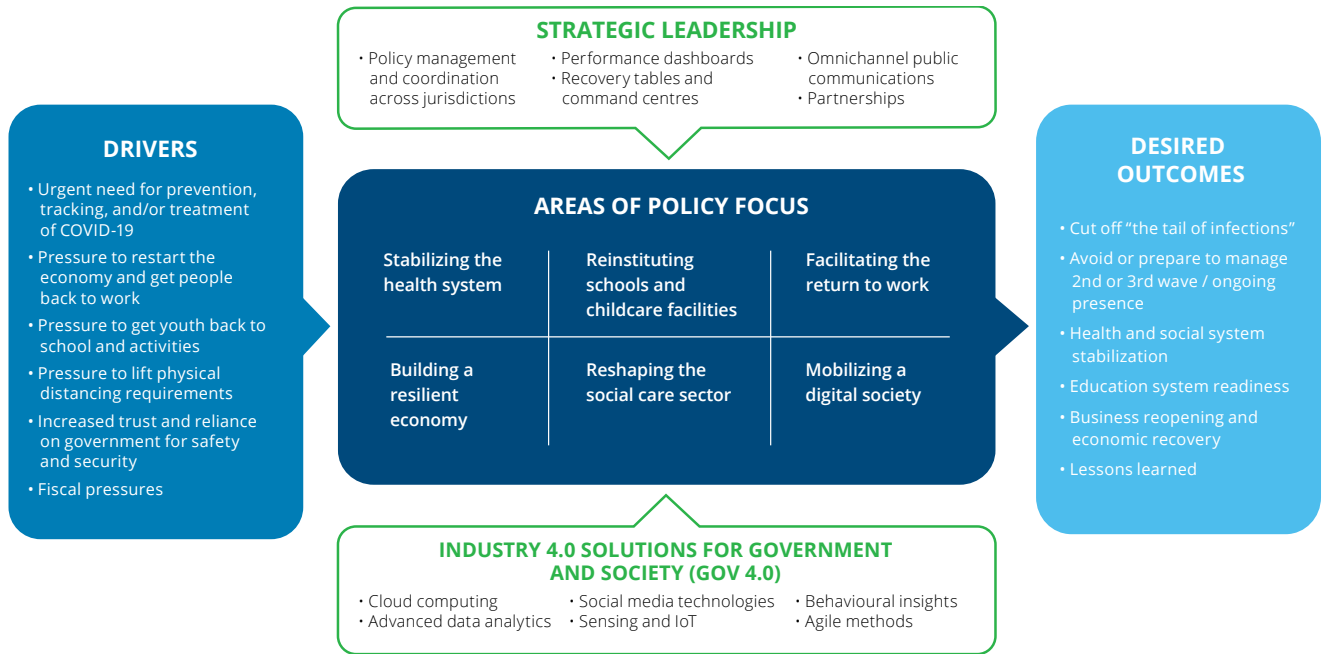
For a closer look, let's take tracking and tracing. Almost half of COVID-19 transmissions occur in the very early phase of infection, before symptoms appear.[7] Traditional public health contract-tracing methods are too slow and burdensome to keep up with this virus. Further, the shift to self-testing and point-of-care testing reinforces the need for user-oriented technology solutions to deliver results rapidly and at scale. Data may be used to notify people quickly of close contact with someone who has tested positive for COVID-19, or to inform policy direction and allow responsiveness to localized needs.

Data is the lifeblood of businesses today, and so it should be for governments. When online retailers, for example, run marketing campaigns, schedule deliveries, provide status notifications, forecast sales, and report on results, they rely on data that are acquired, analyzed, and acted upon at a transaction level, often in real time. Apart from the intellectual property that resides deep inside the algorithms developed by the most sophisticated players, the building blocks of these capabilities are commercially available, and often open-source, making them accessible and affordable for government.
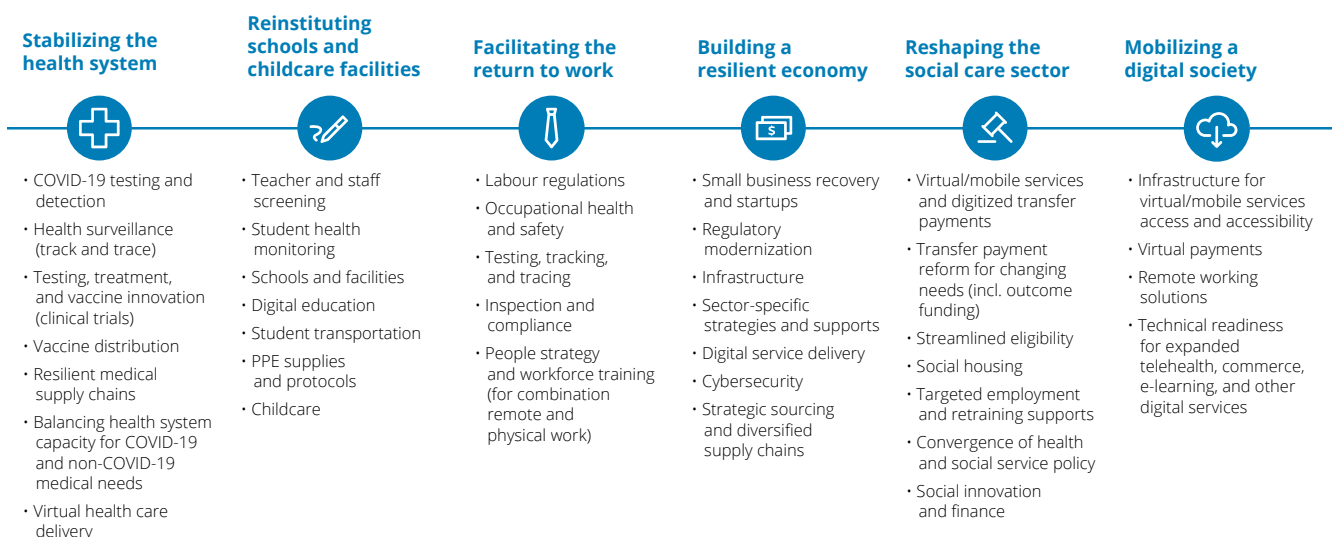
## Figure 2—Precision policy for COVID-19 recovery

Precise policies will be required in a number of key areas and will be enabled by strategic leadership and operational capabilities
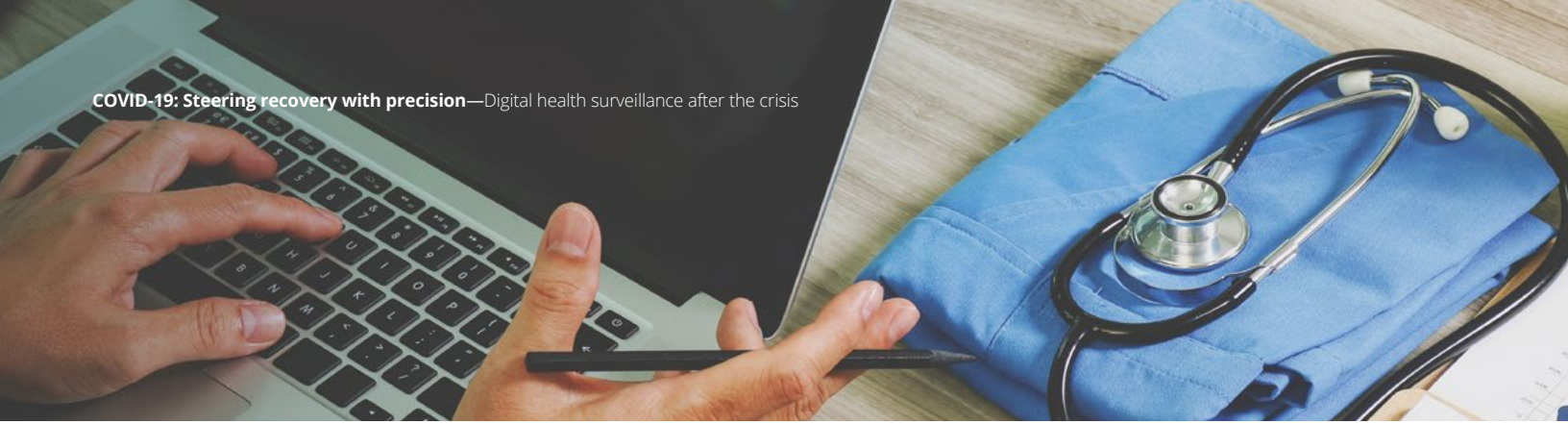
**STRATEGIC LEADERSHIP**

- Policy management and coordination across jurisdictions
- Performance dashboards
- Recovery tables and command centres
- Omnichannel public communications
- Partnerships

**DRIVERS**

- Urgent need for prevention, tracking, and/or treatment of COVID-19
- Pressure to restart the economy and get people back to work
- Pressure to get youth back to school and activities
- Pressure to lift physical distancing requirements
- Increased trust and reliance on government for safety and security
- Fiscal pressures

**AREAS OF POLICY FOCUS**

| Stabilizing the health system | Reinstituting schools and childcare facilities | Facilitating the return to work |
| Building a resilient economy | Reshaping the social care sector | Mobilizing a digital society |

**DESIRED OUTCOMES**

- Cut off "the tail of infections"
- Avoid or prepare to manage 2nd or 3rd wave / ongoing presence
- Health and social system stabilization
- Education system readiness
- Business reopening and economic recovery
- Lessons learned

**INDUSTRY 4.0 SOLUTIONS FOR GOVERNMENT AND SOCIETY (GOV 4.0)**

- Cloud computing
- Advanced data analytics
- Social media technologies
- Sensing and IoT
- Behavioural insights
- Agile methods

## Figure 3—Use cases for policy precision

Sample use cases for the application of precision policy solutions to advance recovery

**Stabilizing the health system**

- COVID-19 testing and detection
- Health surveillance (track and trace)
- Testing, treatment, and vaccine innovation (clinical trials)
- Vaccine distribution
- Resilient medical supply chains
- Balancing health system capacity for COVID-19 and non-COVID-19 medical needs
- Virtual health care delivery

**Reinstituting schools and childcare facilities**

- Teacher and staff screening
- Student health monitoring
- Schools and facilities
- Digital education
- Student transportation
- PPE supplies and protocols
- Childcare

**Facilitating the return to work**

- Labour regulations
- Occupational health and safety
- Testing, tracking, and tracing
- Inspection and compliance
- People strategy and workforce training (for combination remote and physical work)

**Building a resilient economy**

- Small business recovery and startups
- Regulatory modernization
- Infrastructure
- Sector-specific strategies and supports
- Digital service delivery
- Cybersecurity
- Strategic sourcing and diversified supply chains

**Reshaping the social care sector**

- Virtual/mobile services and digitized transfer payments
- Transfer payment reform for changing needs (incl. outcome funding)
- Streamlined eligibility
- Social housing
- Targeted employment and retraining supports
- Convergence of health and social service policy
- Social innovation and finance

**Mobilizing a digital society**

- Infrastructure for virtual/mobile services access and accessibility
- Virtual payments
- Remote working solutions
- Technical readiness for expanded telehealth, commerce, e-learning, and other digital services

**Enabled by the adoption of Industry 4.0 solutions for public services (Gov 4.0)**

# Digital health surveillance after the crisis

To safeguard the health of the public through the recovery, regions will need to rapidly adopt data-driven surveillance tools for applications such as self-assessments, contact tracing, and screening and prevention. The gap may not be as large as it appears. For example, many governments operate screening and prevention systems for various cancer conditions, designed to automatically send notifications at pre-set times (such as annually or biannually, starting at a certain age). For testing, reporting and monitoring, some aspects of COVID-19 recovery plans will require similar functionality. However, these and other functions could benefit from operating as they would in an online retail environment. In many situations, front-line workers in health care, education, border security, and other areas will need to identify, manage, and report on the health status of individuals—with precision—prior to the individuals' return to work and once schools and borders have been reopened.

Public policy has the central role in balancing the trade-offs between personal freedoms and social benefits. We have known for some time that big tech and the platforms it enables are fueled by tracking, surveillance, and other digital capabilities. Now, governments are faced with the need to deploy these tools to control and fend off future spikes of the disease, in ways that ensure data is secured with privacy protections and citizen consent.

This pandemic is fundamentally reshaping the ethical debate. Governments are rebalancing how they use social media, AI, machine learning, and other advanced technologies that are commonly used in other parts of society to protect people. Democratic jurisdictions, like South Korea and countries across the European Union, have crossed the threshold of using digital technologies as tools to implement health and social policy objectives. Apple and Google have announced a joint initiative to enable Bluetooth-powered contact tracing, initially to build the functionality into official public health apps and then, eventually, to use in iOS and Android operating systems.[8]

The United Kingdom's National Health Service will be working with leading technology companies to develop its own app, while the governor of New Mexico has accepted an invitation from the United States federal government to be part of a pilot for surveillance and research on automated contact tracing.[9] In these and many other jurisdictions, public and private entities are cooperating to harness data and improve public health outcomes as quickly as they can. While using Bluetooth technology may mitigate risk for the users—the users and their location are more difficult to identify compared to GPS—any surveillance techniques still raise public concerns about who owns and controls their information. Those currently in favour of giving up some personal information may re-evaluate their position once the immediate crisis has subsided.

Finding the balance in digital health surveillance policy for pandemic prevention and containment will accelerate the widespread adoption of virtual health services. As members of the public, we will need to come to terms quickly with whether now is the time to reset the balance between public safety and civil liberties. Does our trust in public institutions and the rule of law, our everyday acceptance of the commercial and social terms of data-sharing, and our concern over the devastating impacts of the pandemic allow governments to accelerate the adoption of precision policy? What safeguards would need to be in place to allow this culture shift?

# Return to work (physical distancing 2.0)

Establishing and enforcing the policy guidelines for towns, cities, and industry sectors to return to work has implications far beyond the realm of chief medical officers. Occupational health and safety, restaurant and food handling, and near countless other regulated sectors will all need to play a role. Employers across industries will be seeking new physical distancing protocols for public and private workspaces as they make critical decisions to get people back to work.

Critical choices about reopening, when outcomes are deeply interdependent, create significant complexity (see Figure 4). Effectively navigating these choices will require large integrated sets of data, the right mix of stakeholders, scenario modelling to guide thinking, and surveillance systems to monitor progress in real time and course-correct as necessary. While crisis response had an almost universal and consistent approach across many jurisdictions, reopening will follow different patterns and prioritization based on the spread and impacts of the virus, local economies, demographics and other concerns. Transition will be a phased progression, with differentiation by sector and prioritization by geography.

Precision policy can guide the gradual transition to a risk-based reopening strategy, combining a relaxation of restrictions with continued public health measures. Sequencing should be evidence-based and grounded in the risk of COVID-19 transmission and the relevance of each sector, both to the economy and to the recovery effort itself. Following the lead of other countries further along the curve of reopening may suggest the right approach. Many nations are starting by opening public schools and childcare to allow parents to return to work, while others have focused on manufacturing and small businesses to kick-start the economy.

Governments will need to track and understand the spread of the virus at a localized level to inform their decisions on the sequence and scale of reopening, varying by community or sector as necessary. The current regulatory regime for occupational health and safety will have to evolve rapidly to help businesses comply with new requirements. The regime should also accommodate changing ways of working, as measures taken during the pandemic have accelerated the blurring of the line between work and home life, and has made virtual modes of working

**Figure 4—Critical choices and the complex path to reopening**



*(illustrative choices)*
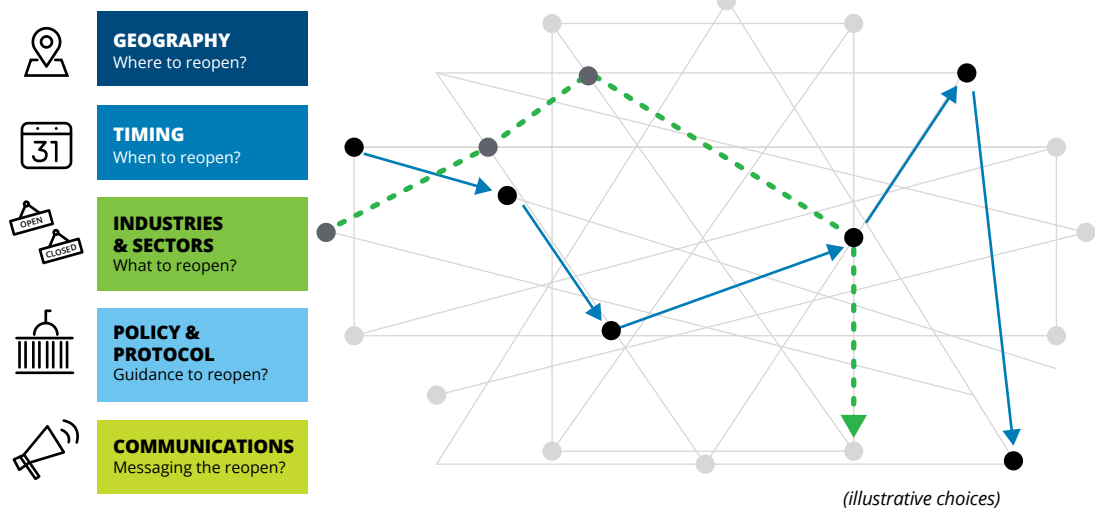
viable. Regions will need to coordinate both nationally and internationally to understand the evolving effects on supply chains, travel restrictions, and public health safeguards as areas reopen unevenly. There is also the likelihood of future spikes in infection rates, which may drive changes in the reopening strategy.

Government guidance to businesses, schools and universities, transportation agencies, and many other sectors of society will need to be available to the public in near real time. People returning to work will need localized information at their fingertips to know how to behave and what to do outside the home. Reopening the economy requires precise information flows, which are enabled by Gov 4.0 capabilities. Similarly, precision policy can better predict and prepare people, businesses, and communities for new

restrictions should they be required, avoiding some of the more severe economic and social consequences seen in the current shutdown.

Digitization gives governments an unprecedented ability to deploy data and advanced technologies at the micro level to drive targeted behaviours from individuals and facilitate business rejuvenation in the midst of ongoing public health measures. How might roadmaps differ across regions, and will governments have the Gov 4.0 capabilities ready to make them work?

**Figure 5—Navigating recovery with precision**

## Reopening the economy
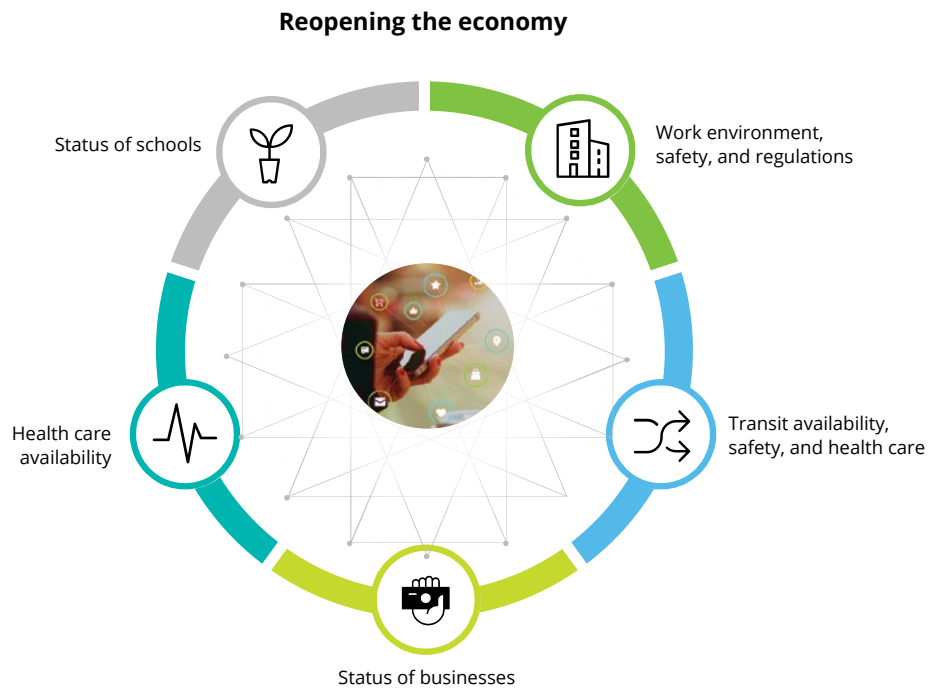


**Powered by:** Cloud computing, social media technologies, sensing and IoT, alliances and partnerships, behavioural insights and nudges, advanced data and analytics

**Micro-targeted • Real-time and localized • Predictive**

# A new vaccination process

Government leaders and public health officials around the world are clear that vaccination, immunity, or anti-viral treatment are the prerequisites for a total reopening of society. The challenges experienced to date with mass testing can be avoided when researchers discover and develop a vaccine. Governments can prepare now. Industry-leading supply change management is already in use by some governments and can be scaled for mass action. Supply chain integration and digital enablement have been shown to improve evidence-based clinical decision-making, yield impressive returns on investment, and enhance system performance across leading health-care organizations.[10] Failure by relevant organizations to transform supply chain practices adequately by the time a vaccine has been approved could add weeks or months to a full recovery from the pandemic.

The distribution of vaccines in a way that maximizes public health and economic recovery will require the careful prioritization and orchestration of various distribution networks and resources. If limited vaccination becomes available, sequencing may target a partial return-to-work approach in which the priority is given to essential and strategic services that will support further treatment and prevention (e.g., health-care workers, teachers, childcare providers, and first responders) as well as the most vulnerable populations. The sooner these prioritization protocols are established and communicated, the more ready the systems will be for deployment. Those systems might be public (e.g., schools and libraries), based on public-private partnerships to expand capacity along the supply chain and even rely on military resources to reach remote locations.
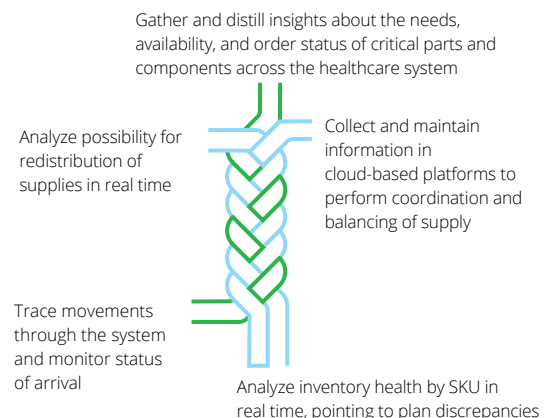
Implementing a control tower would help manage supply chain complexity during crises and enhance visibility. A control tower is a system management capability that enables organizations to identify and resolve exceptions from everyday business-as-usual issues by combining:

- A decision support platform that monitors transactional data from internal and external sources and delivers prescriptive insights, alerts, and self-driving execution
- An organization or network of analytical experts who understand supply chain issues and have the analytical capability to generate the insights they need to improve the process
- An insight-driven and exception-based way of working

World-class control towers are enabled by artificial intelligence, machine learning, and advanced analytics, and are embedded throughout business processes. Control towers for vaccine distribution would facilitate system-wide management, including outbreak modelling, critical inventory analysis, visibility into the logistics network (including anticipated backlogs), and the bringing together of demand and supply. It would capitalize on existing systems and use analytics and machine learning to break down the silos evident in testing to deploy resources where and when they are most needed.

Governments cannot afford to lose time—how might they accelerate the adoption of leading supply chain management tools and deploy strategies with the agility of private industry?

**Figure 6—Key elements of the control tower**



Gather and distill insights about the needs, availability, and order status of critical parts and components across the healthcare system

Analyze possibility for redistribution of supplies in real time

Collect and maintain information in cloud-based platforms to perform coordination and balancing of supply

Trace movements through the system and monitor status of arrival

Analyze inventory health by SKU in real time, pointing to plan discrepancies

# Strategic leadership in the transition to recovery

Responding to the crisis has required leaders to take decisive action based on the best data available, even when incomplete, and to be willing to pivot to respond to developments. Transparency and clear communication strategies that focus on people's needs have been critical. Government leaders have faced a difficult challenge steering us along an evidence-based path through the crisis response phase, using the tools available to them. Now, they must champion the introduction of Gov 4.0 tools so that precision policy based on localized data, analytical insights, and user-centred service design— can shape the recovery and lay the foundation for digital-based societies to thrive.

As they shift to a recovery mindset and design the return to "normal" conditions, leaders will need to focus on communicating across boundaries— between government and industry, between layers of government, and between various governmental and non-governmental entities. Public leadership will be critical in communicating the right information to the right people at the right time, and maintaining public confidence and trust in reopening measures even as different regions in the world experience different rates of recovery, possible second and third waves of infection, and other setbacks. The ability of government to tailor services for specific users will enable leaders to further break down traditional silos and burdensome coordination channels.

Most jurisdictions established response command centres led by health professionals, who determined the degree of physical distancing required and the strategies to enable the health system to cope. This health-led leadership model will continue to be needed through the complex transition into the recovery phase. In addition, recovery will require the careful orchestration of precision policy across a complex web of interconnected social and economic needs. Coordinated strategies, operating under clear leadership and enabled by the capabilities of Gov 4.0, are required.

Establishing dedicated cross-disciplinary recovery command centres, in priority geographies and across sectors, would allow government to:

- Maintain a 360-degree view on the crisis and what might be coming next
- Break down traditional silos to focus on priorities, with the flexibility to deploy resources based on skillset and need
- Evaluate policy options based on real-time, responsive evidence
- Provide strategic direction that is precise, localized, digitally enabled, and data-driven
- Give and receive information openly and transparently in near real-time through digital platforms
- Accelerate policy, investment, and regulatory processes and decisions

Recovery command centres bring to bear the best insights and capabilities from across sectors while orienting to the beneficiary—the user—of policy decisions.

While the focus of recovery may shift toward reviving the economy and the business of government, data-driven vigilance must continue to ensure that public health measures are up to the task of preventing, or at least predicting, future waves of infection from the virus. A dashboard of both medical and economic indicators, for instance, can help track progress throughout recovery. (One such example is Deloitte's COVID-19 economic recovery dashboard,[11] a publicly available resource that monitors health and social activity as well as financial and economic indicators to signal when the economy is starting to recover.)

Such types of dashboards can provide government leaders with precision in policy design, execution, and evaluation, because they offer:

- AI-powered analysis of real-time insights into public sentiment about COVID-19, collected by scanning social channels and online media. Sentiment trends can show where policy and strategies are working and how government could adjust its approach
- Data from telematics devices on millions of commercial vehicles, which allows the monitoring of transportation activity—and, by proxy, industrial business activity. The same analytic and machine-learning capabilities can be used to optimize performance and improve regulatory compliance
- Traffic indices, which help analyze traffic and congestion levels with global and historic comparators. Points-of-interest data, typically used for commercial insights on store visitors and business listings, are deployed to track foot traffic and the eventual return to "normal" routines

Dashboards aggregate data from a variety of sources at the neighbourhood level to visualize specific and localized insights to provide clean and effective storytelling. Good dashboards are simple and designed for the user, encompassing principles from graphic design, data architecture, design thinking, user experience, communication theory, typography, and data science.

Integrating multiple sets of intelligence through visual analytics can help governments make sense of the chaos and model various scenarios to steer recovery safely and effectively, evaluate policy options, calibrate policy responses, and plan for what will be needed next. Use cases include monitoring and predicting disease spread, modelling physical distancing relaxation measures, prioritizing sectors and industries for opening, managing care measures for vulnerable populations, and risk management.

Governments do not currently plan, monitor, or evaluate policy interventions at the level of detail presented here. Yet, in the future, they will be able to. Precision policy—the measures government can take to influence indicators for reopening—can be designed to be hyper-localized and micro-adjusted based on granular data sourced and aggregated from a broad ecosystem of partners. Governments should be able to identify and monitor policy signals that indicate, with precision, whether an intervention is working and to adjust course with agility.

# Ready, set, mobilize

It will take governments, businesses, labour, civil society, and the cooperation of every citizen to lead us out of this crisis, from the neighbourhood to the global level.

The COVID-19 pandemic has taught us that communication and coordination is critical to the speed and effectiveness of a response. While we have by necessity taken rapid and significant steps to contain the spread of the virus, treat the ill, and mitigate the social and economic fallout of physical distancing programs, we now need a coordinated plan to steer the recovery. This plan should include action to eliminate future waves of the virus while turning the economy back on.

Leaders got us to where we are with the tools at their disposal, and have saved lives by doing so. To move us beyond, however, they need state-of-the-art tools supported by strategy, leadership, and foresight. Individuals should play a role in their own health and the health of their families and communities, and their ability to do so is enhanced by the quality of the information available to aid their decision-making.

Recovery needs to include further investment in Gov 4.0: virtualized services and interoperability between business, government, and society, supported by privacy-by-design principles. Precision policy will lay the foundations for a digitally enabled society.

**Collectively, we have what we need to mobilize.**

# Contacts

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**Footnotes**

1 Policy throughout this piece refers broadly to government mechanisms and interventions, including investment, regulation, and policy design to inform execution.

2 Kissler, S.M., Tedijanto, C., Goldstein, E., Grad, Y.H., Lipsitch, M., "Projecting the transmission dynamics of SARS-CoV-2 through the post pandemic period," (14 April 2020), Science, https://science.sciencemag.org/content/early/2020/04/14/science.abb5793

3 See the American Enterprise Institute's *National Coronavirus Response: A road map to reopening; the Center for American Progress's A National and State Plan To End the Coronavirus Crisis*; the Rockefeller Foundation; and Harvard University's "COVID-19 Rapid Response Impact Initiative: Why We Must Test Millions a Day." These represent a sample of prominent scenarios. Many other organizations have released similar forecasts and analysis.

4 See the World Health Organization's *COVID-19 Strategy Update* (https://www.who.int/publications-detail/covid-19-strategy-update-13-april-2020)

5 The states of California, Washington, and Oregon have developed six joint criteria that will determine the pace of re-opening: the ability to expand testing to identify and isolate patients; maintain vigilance to protect seniors and high risk people; be able to meet future surges in hospitals with adequate protective gear; continue to collaborate with academia on therapies and treatments; redraw regulations to ensure continued physical distancing at private businesses and schools; and develop new enforcement mechanisms to allow the state to pull back and reinstate stay-at-home orders. Governor Gavin Newsom of California described the first stage of re-opening as one where residents continue to wear facemasks, where waiters wear masks and gloves, where menus are disposable and restaurant capacity is halved. Schools and recreational areas would have restricted capacity and enhanced sanitization practices. For full transcript, see: https://www.rev.com/blog/transcripts/gavin-newsom-california-briefing-transcript-april-14-unveils-plan-to-reopen-state. Countries including China, South Korea, Spain, Italy, Austria, Czech Republic, and Iceland are also beginning to relax restrictions.

6 See Deloitte's *The world remade by COVID-19: Scenarios for resilient leaders, 3–5 Years*, (April 2020, https://www2.deloitte.com/content/dam/Deloitte/global/Documents/About-Deloitte/COVID-19/Thrive-scenarios-for-resilient-leaders.pdf

7 Oxford Big Data Institute. "Oxford University provide evidence for coronavirus mobile app for instant contact tracing". 17 March 2020. https://www.eurekalert.org/pub_releases/2020-03/oubd-oup031720.php

8 "Apple and Google partner on COVID-19 contact tracing technology," (10 April 2020), https://www.apple.com/newsroom/2020/04/apple-and-google-partner-on-covid-19-contact-tracing-technology/

9 Kellon, L., "Coronavirus: UK confirms plan for its own contact tracing app," (12 April 2020), BBC News, https://www.bbc.com/news/technology-52263244; "New Mexico to Join Pilot US Effort on Contact Tracing," (15 April 2020), Associated Press, https://www.usnews.com/news/best-states/new-mexico/articles/2020-04-15/no-end-in-sight-for-new-mexico-emergency-restrictions

10 Three case studies by the World Health Innovation Network (WIN) in 2018 found that supply chain processes, based on global standards, improve safety, quality, and performance in three global health systems. These case studies provided the first empirical evidence of the impact of implementing supply chain transformation in Canada, the United Kingdom, and the United States. See Snowdon, A., "The Impact of Supply Chain Transformation in Health Systems," (Oct. 2018), SCANHealth, 03:17.

11 See https://www2.deloitte.com/ca/en/pages/about-deloitte/articles/covid-dashboard.html

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