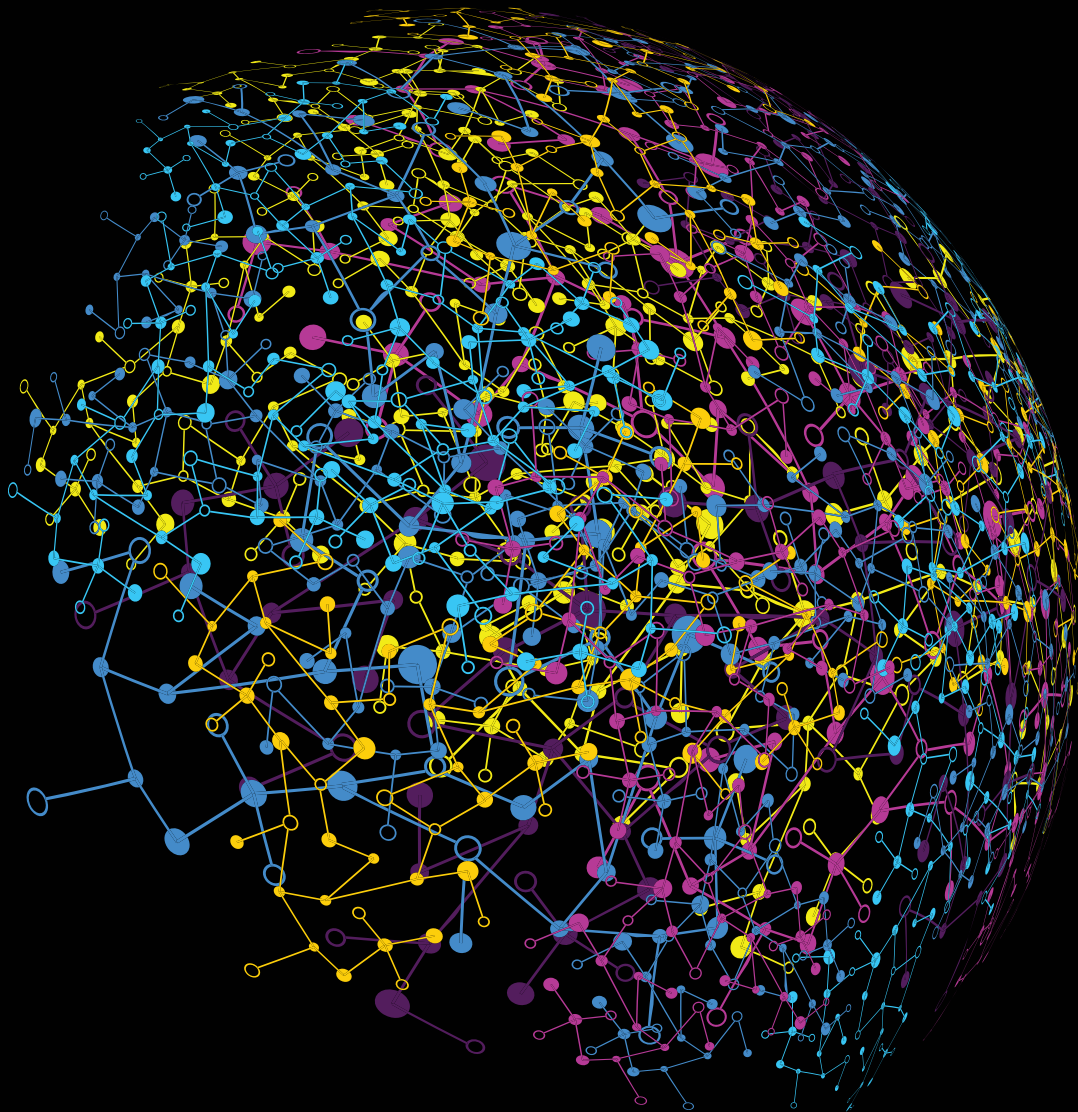


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COVID-19

Smart solutions for recovery

How health care and life sciences organizations can scale analytics and artificial intelligence solutions

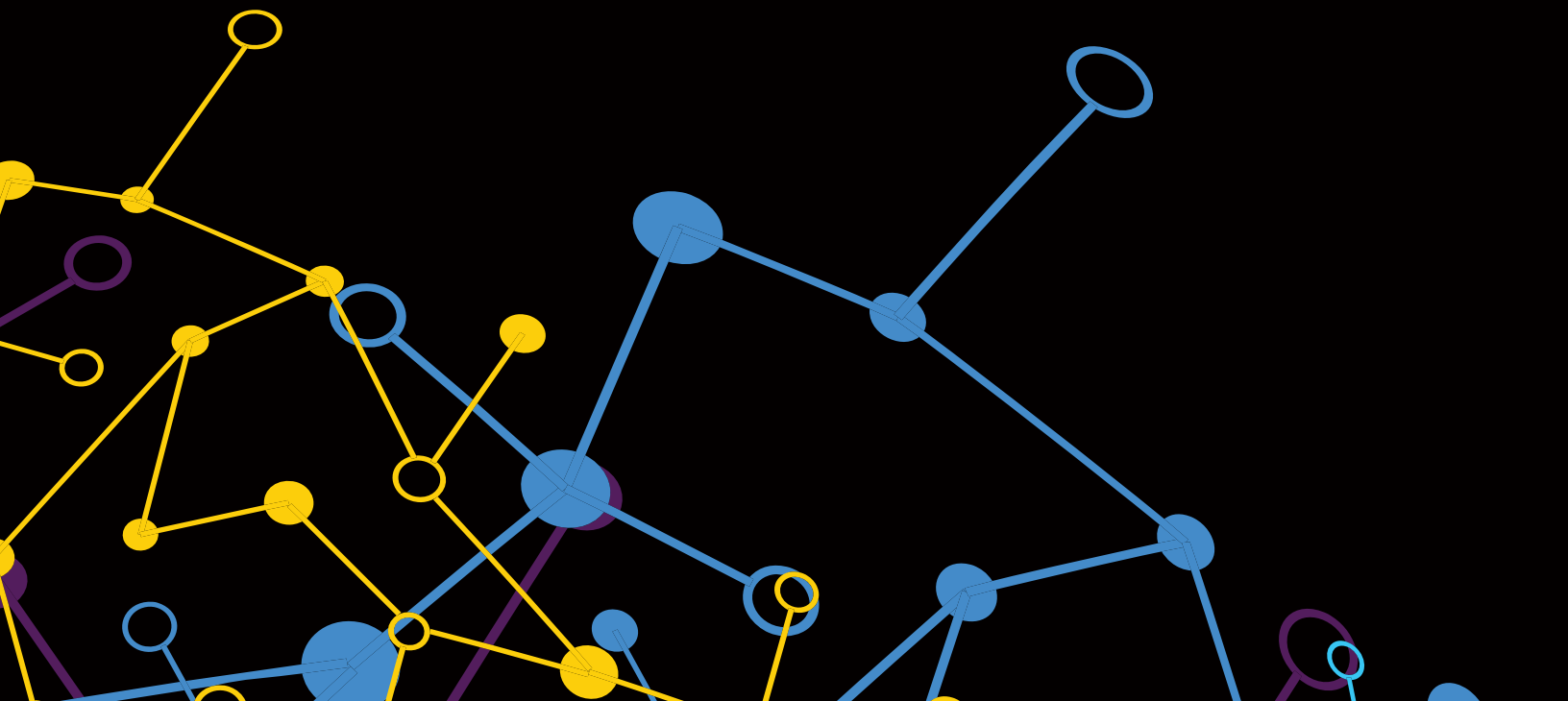
The current wave of COVID-19 is subsiding, and the health sector is shifting to a new focus: recovery

The global COVID-19 health crisis has set health care systems on a path to rapidly flatten the curve

Health care and life sciences organizations around the world are confronting the crisis presented by COVID-19, working diligently to confront the pandemic by containing the spread of the novel coronavirus, protecting the health of citizens, and continuing to supply the health care ecosystem with the critical resources needed to combat the threat.

Countries around the world have made great strides in flattening the rate of infection, and the pandemic has precipitated many public-private collaborations to accelerate the response to the crisis. To date, we have seen automakers Ford and General Motors come together to manufacture respiratory ventilators, breweries transform their supply chains to mass-produce hand sanitizers, and local task forces, such as New Brunswick's Dalhousie University, 3D-print plastic face shields for front-line health care workers. These are but a few examples of the innovation economy, which in Canada is being propelled by the federal government's pandemic-related investment of \$275 million.

Canada has shown considerable focus in responding to the onset of the pandemic, specifically in flattening the curve to prevent burden on health systems. Priorities have emphasized the expansion of health system capacity, enforcing stringent physical distancing mandates, and mass-producing of critical resources such as ventilators and personal protective equipment (PPE). While some of these priorities will continue to hold, the focus is now turning to recovery, and how we can scale and maintain the technology advances we have made.



Analytics and AI are critical in guiding your path to recovery from COVID-19

As the Canadian economy restarts, life sciences and health care organizations need to carefully plan their recovery

Canada has shown indications of flattening the curve, and on April 28, the federal government released a joint statement with provincial and territorial premiers on plans to restart the economy. As these recovery plans begin to be activated, life sciences and health care organizations need to think critically and plan carefully for their sector's recovery. How will they adjust capacity quickly in anticipation of recurrent outbreaks? How will supply chains be affected when businesses reopen? These are but a few of the essential questions that need to be considered.

Just as health systems turned to innovative solutions to flatten the curve, organizations will need to do the same to support their recovery planning. This is where tools like analytics and artificial intelligence (AI)—applications that enhance our ability to identify patterns, predict, communicate, and inform decisions—can deliver considerable value.

How analytics and AI can guide your path to recovery

Analytics and AI have been integral to Canada's response to COVID-19. We have seen this with provincial governments investing heavily in supply chain analytics, and with the federal government's partnership with BlueDot, a Toronto-based AI startup, to monitor disease surveillance. Organizations that have excelled in data capture, modelled the environment, and actively incorporated predictive models into their decision-making have demonstrated strong maturity in responding to the COVID-19 crisis. With analytics and AI being integral in responding to disease onset, the use of these tools will be just as critical in planning for recovery. Continued modelling of the environment will ensure safe execution of your initiatives, diligent monitoring of new outbreaks while preserving privacy, and determining the next best action in light of high-risk events.

How can organizations capitalize on the analytics and AI opportunity to boost recovery planning?

The proliferation of the use of analytics and AI in health care can make it challenging to understand where to begin. One way organizations in the sector can address recovery is to start small and employ an approach based on use cases and enabled by data, analytics, and AI. Use cases are modular, nimble business applications, powered by analytics and AI, that deliver business insights to end-users. Examples can be found in all areas of the health care ecosystem: a scheduling optimization tool that recommends the best allocation of personal support workers (PSW) in long-term care homes; a supply chain analytics tool that

recommends optimal quantities for PPE based on disease patterns; an application that alerts clinicians of an ICU patient whose vital stats data predicts a rapidly deteriorating health condition. The modular nature of use cases has allowed life sciences and health care organizations to develop business insights quickly during the onset of the coronavirus pandemic, and with minimal investment risk. For recovery planning, the selection of a prioritized list of use cases will enable leaders to quickly obtain business insights about the effectiveness of recovery initiatives; again, without having to invest in a large-scale analytics program. The additional benefit of use cases is that as they're developed, they build on an organization's analytics and AI foundation to help meet long-term priorities. Starting small now will enable organizations to not only recover faster, but also build resiliency for future waves of COVID-19.

This paper will show leaders in the life sciences and health care leaders like you how to build an effective recovery plan with the support of use cases. Specifically, it will walk you through three key steps:

Step 1:

Articulate your priorities. Identify and articulate critical business priorities as you plan your organization's recovery from the pandemic.

Step 2:

Select relevant use cases. Understand how you can meet your recovery priorities with analytics and AI solutions.

Step 3:

Implement the selected use cases. Rapidly execute your use cases for your current needs, and scale them to meet long-term business objectives.

Developing an effective recovery plan

Step 1: Articulate your priorities

Creating an effective recovery plan begins with identifying the critical business challenges and priorities your organization faces.

This allows you to focus your recovery plan on addressing the right priorities. While the health care ecosystem is collectively working toward alleviating the COVID-19 crisis, the priorities of each health system stakeholder are different, as the sets of examples below demonstrate. As you review them, consider: What questions are most pressing for you to answer right now? What questions do you anticipate will arise as the economy restarts?

Examples of critical priorities:

For government organizations:

- Plan to reopen the economy as safely as possible, minimizing the risk to the public of another wave of infections.
- Effectively collect and monitor disease epidemiology to inform continuous planning and mitigate risks of new outbreaks.
- Effectively track, trace, and test at-risk individuals as physical distancing measures are relaxed.
- Ensure appropriate support structures are available for vulnerable and at-risk populations.

For health care providers and academic health organizations:

- Expand capacity to support all patient care, including COVID-19 and non-COVID-19 patients.
- Effectively screen and test patients for COVID-19 without infecting other patients and health care providers.
- Plan to resume hospital services that COVID-19 priorities have delayed, such as elective surgeries.
- Create capacity for potential surges from relaxed physical distancing measures by better allocating resources (e.g., beds, clinical teams).

For insurers and employers:

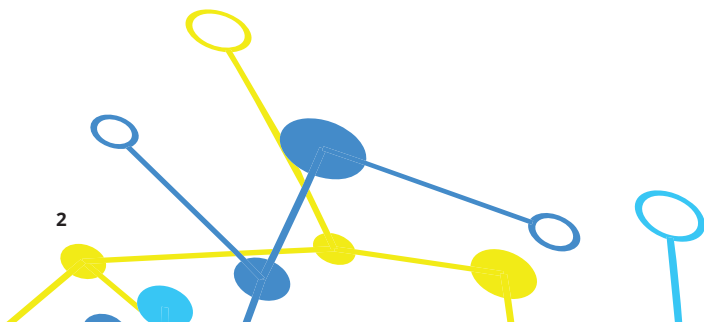
- Support and monitor workplace protocols to keep employees safe as they return to work.
- Tailor health and benefit offerings to support the mental health of employees in prolonged self-isolation and distress, and mitigate increases in disability claims.
- Identify vulnerable employees and policyholders returning to the workplace, and tailor support models for them.

For retail pharmacies:

- Monitor outbreaks in the workplace to support essential workers in pharmacies and retail locations, given anticipated increases in store traffic.
- Ensure appropriate levels of pharmaceuticals, medical equipment, and personal protection equipment (PPE) are available to meet consumer demand, which may be heightened in anticipation of further outbreaks.
- Forecast community needs to ensure sufficient supply of drugs, while adhering to the national 30-day drug supply limit to reduce stockpiling.

For pharmaceuticals:

- Ensure sufficient amount of product, given decreased production and limited export from global producers.
- Support the medical and commercial field force in continuing to effectively access and interact with health care practitioners (HCP).
- Accelerate the production of targeted vaccines and test for efficacy.



Developing an effective recovery plan

Step 2: Select relevant use cases

Now that your critical business priorities for recovery are clear, your next step is to select the use cases with which to address them. Use cases can deliver insights about high-risk populations, optimal resource allocation, patient-specific information on disease progression, and high-risk individuals in a workplace, among other possibilities. Given the widespread application of use cases in a pandemic such as COVID-19, selecting the ones that match your business priorities will better solicit executive buy-in, help you achieve your goals quicker, and accelerate your return on investment.

To help you in your selection, the five categories of use cases presented on the next page are those most commonly related to the priorities of health system stakeholders for planning recovery. Within each pillar, you'll find example use cases that can align to your specific business priorities. This list can apply to the interests of multiple stakeholder groups. While not exhaustive, it's intended to provide you with key opportunities, depending on your area(s) of focus.

Key definition: What is a use case?

Use cases are small-scale business applications enabled by analytics and AI. These applications are tailored to a set of processes and insights and delivered to end-users, such as business operations managers, clinicians, and executive leaders. Capabilities developed through use cases are modular and can be reused across various areas of an organization to scale both new and existing capabilities.

A use case...

- Is scoped to address a need for a target user
- Delivers an actionable insight to the target user (such as a recommendation or a risk score) that can be used to address the user's needs
- Can be continually refined over time to deliver more accurate insights, with ongoing measurement and additional data

Five categories of use cases for business recovery

1. Containing outbreaks and building resiliency in population health

These use cases allow you to track disease prevalence and effectively support at-risk groups/regions through public health surveillance

- Identification of transmission hotspots and prediction of risk of new outbreaks
- Identification of at-risk sub-populations
- Disease surveillance and monitoring
- Scenario modelling for lifting physical distancing measures

2. Personalizing care interventions

These use cases help you improve individual patient health outcomes by delivering the right treatment to the right patient at the right time

- AI-enabled remote health monitoring for at-risk patients
- Return-to-work self-assessments and scenario planning
- Identification of at-risk patients for tailored clinical engagement

3. Optimizing operations and costs

These use cases drive efficiency in your organization, increasing value for money, ensuring scalability of operations, and reducing overall costs

- System-level health resource demand and capacity for high-risk outbreak regions
- PPE-demand forecasting and inventory optimization
- Digital twin of supply chain processes and scenario planning for operations optimization
- Optimization of backlog of elective surgery schedules
- Resource and facility design planning for scaling or reducing services

4. Expanding access to support and services

These use cases allow you to improve the patient experience by expanding access to support and services, and personalizing interactions and offerings for better health

- AI “concierge” for COVID-19 inquiries
- Matching of health care workers with organizations in need
- Matching of health services with infected patients
- Virtualization of health care services

5. Mitigating enterprise risk

These use cases anticipate and alert you to emerging risks to your organization from fraud, cyber, safety, and security perspectives

- Contact tracing to identify at-risk individuals in the workplace
- Cyber-breach monitoring
- Inappropriate physician billing



Developing an effective recovery plan

Step 3: Implement the selected use cases

After choosing use cases that best align to your most pressing business priorities for recovery, start implementing them. This process will need to be all-encompassing,

including people, processes, data, and technology. To minimize investment risk, use your existing infrastructure to deploy rapidly. To help you understand how to implement use cases, read the two case studies outlined that follow: contact tracing, and supply and demand forecasting for personal protective equipment.

Use-case spotlight

Contact tracing to prevent new outbreak surges

Canada is rapidly working to restart its economy, and with this comes the reopening of businesses, relaxed physical distancing measures, and uncertainties about how the public will respond. Flattening the infection curve is merely one component of the nation's response to COVID-19; there is also a need to sustain progress and minimize the risk of recurrent waves.

Maintenance comes with its own questions, including how health systems and employers will develop protocols to limit contact, how outbreak risks can be continually monitored and identified early on, and at what thresholds public health authorities will need to tighten physical distancing measures should public health risks be elevated.

A critical component for answering these questions is contact tracing, a method that, through anonymous Bluetooth or geolocation data, identifies individuals who have come into close contact with infected people, so that public health officials and employers can test potentially infected people and control the spread of the disease. Diligent testing, tracing, quarantine, and control will be essential for mitigating outbreaks after physical distancing measures for the public are lifted.

Analytics and AI work with contact-tracing efforts to aggregate contact data and identify critical transmission hotspots that require intervention, possibly leading to the reactivation of physical distancing mandates or stringent workplace protocols. Categorizing high-risk localities with insights such as a foot traffic index, which identifies regions by their foot traffic patterns, can help jurisdictions and employers better predict the risk of local outbreaks and quickly enforce control measures.



How to build, execute, and scale this use case

1. Define business priorities (trace, monitor, quarantine) and identify your use-case champions

Start by articulating the key questions you want to answer—are you looking to monitor the impact of lifting physical distancing measures and identify regions with high foot traffic? Trace at-risk individuals in the workplace? Monitor sub-populations with stay-at-home directives to understand whether they are adhering to requirements? Focus on your priority questions and identify sponsors for the use case while building alignment across your organization's health, information technology, privacy, and operational services teams.

2. Build an action plan and identify the digital tools and data required to execute the use case.

Create a plan that involves scanning and selecting available digital tools and AI technologies, establish communication and change management protocols, consider privacy and security implications for ensuring the anonymity of citizen/employee data, and design specific analytics wireframes that will provide the required insights. You'll also need to determine what data domains you need by consulting with relevant subject matter experts who can identify challenged geographies and priority populations. Then you'll be ready to establish your data domains—such as Bluetooth data to monitor citizen or employee traffic, social media data to monitor large social gatherings, and public data sets that identify all locations of essential goods and services (e.g., grocery stores, pharmacies)—to understand the drivers of close contacts.

3. Launch a pilot with a subset of users

Execute your action plan by implementing your digital contact-tracing tool and using data sets to build analytics data models to produce the insights identified in your action plan. Example insights could include: identifying at-risk individuals, infection area hotspots, infection network graphs, and regions with high quarantine compliance. As part of your pilot launch, deliver initial communications to your user subset to ensure adoption, and validate that privacy and security measures are in place.

4. Monitor and scale

Test the effectiveness of your pilot by tracking user adoption, and reviewing the data you captured and the insights obtained. Ensure you evaluate your pilot group's experience to identify areas in your business processes that require change. Now, expand to larger sets of users and geographies and augment with new capabilities, such as delivering tailored communications to citizens in high-risk regions through their contact-tracing mobile applications (considering first adoption, governance, privacy, and security). As you act on the insights delivered by your use case, ensure you have defined clear KPIs (such as foot traffic index, confirmed case counts, total contacts traced, app adoption rates) and efficacy indicators to monitor change in these KPIs as well as the overall success of your contact-tracing efforts.



Use-case spotlight

Supply and demand forecasting for PPE

As the first wave of COVID-19 subsides, organizations in the health sector will need to consider the likelihood of demand fluctuations for critical medical supplies, equipment, and pharmaceuticals as the economy reopens and people start going back to their workplaces. Some equipment, such as ventilators, may present less demand, but they will nonetheless require optimal distribution across regions in anticipation of new surges in infections. Other equipment, such as N95 masks, may spike in demand following lifts in physical-distancing measures as people seek to increase their personal protection. Competing demands between jurisdictions for limited supplies will

also create the impetus for organizations—such as regional health authorities, retail pharmacies, and pharmaceutical companies—to collaborate to determine the optimal and equitable distribution of supplies and equipment in areas of highest demand.

Analytics and AI are key enablers in understanding priority institutions that require PPE, including health care services (long-term care, emergency services, general medicine) and non-health care-related essential services (police, fire, public transit, grocery stores). Continual monitoring of the use of PPE across institutions during the economic recovery can help predict future demand so that supply chains can be optimized.

How to build, execute, and scale this use case

1. Define business priorities and identify your use-case champion

Define the scope of your PPE supply and demand objectives—are you looking to optimize supplies of critical equipment across the hospital network in a defined geography? Are you looking to increase the distribution of particular equipment, such as N95 masks, across health and non-health essential services to meet potential increases in demand as physical distancing measures are relaxed? Focusing on critical PPE first will allow for quicker execution of your use case, followed by scaling the use case with additional PPE categories. Meanwhile, identify your use-case champion, such as the lead of your organization's COVID-19 task force or the CEO of a regional health authority, to sponsor your use case while building alignment across critical functions such as supply chain, information technology, and operations.

2. Build an action plan and identify data domains required to execute your use case

Create an action plan to build your use case, including the development of appropriate communication and change management protocols, defining the scope of critical PPE to be included in your pilot launch, and designing the specific analytics wireframes that will provide the required insights. In addition, determine what data domains you need according to your defined scope.

This includes identifying data sets that hold:

- Supply order information (order IDs, requested quantities, requested delivery dates)

- Product data sets for equipment and pharmaceuticals (SKUs, supplier IDs, inventory totals, product location)
- Demand channels (core health, broader health, essential services) and their main drivers (staff sizes, daily operations, number of facilities, supply self-sufficiency)
- Types of PPE usage protocols applicable to different kinds of environments and situations
- Overall population data (age, demographics, disease prevalence), to be able to identify areas and populations predicted to be at risk during another outbreak

3. Operationalize your use case for critical PPE

Execute your action plan, sourcing internal and external analytics talent, integrating data sets using your existing data and technology infrastructure, and developing analytical models to create a network view of your supply chain. As part of your use-case build, you may choose to assign prioritizations across institutions to ensure the delivery of supplies to critical services first. Ultimately, implementing your use-case plan entails delivering required supplies to the high-demand geographies or institutions identified through your use-case insights. Ensure you have the means to continuously track order and fulfillment data to minimize product shortages and satisfy equipment needs.

4. Monitor and scale

Test the effectiveness of your initiatives by tracking KPIs such as inventory totals by SKU, time to delivery by SKU, and average order demand by institution. Having implemented your pilot, you may choose to scale this one to include additional PPE, additional geographies, or additional health care or non-health care institutions.

Conclusion

As health care and life sciences organizations seek to safely recover from the disruptions caused by COVID-19, effective data use will be critical for monitoring the success of their efforts. Tools such as analytics and AI are important in recovery planning, and by employing a use case-based approach, they can be implemented in a manner that is rapid, pragmatic, and with reduced risk.

Despite the challenges created by the COVID-19 pandemic, the silver lining is that the crisis has prompted the industry to embrace innovation and, through novel approaches, health system stakeholders are already effecting positive change through better collaboration and more optimal care delivery. As Canada proceeds to restart its economy after a weeks-long lockdown, life sciences and health care organizations focus on using analytics and AI to help guide their path to recovery and to meet future COVID-19 waves with resiliency.

Taking advantage of this opportunity now will not only help them recover faster, but also ensure the longevity of their analytics and AI capabilities in the world that emerges after COVID-19.



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