EXPORT DEVELOPMENT CANADA REPORT

PUNCTUATED EQUILIBRIUM:

Harnessing technology, data and AI in the post-pandemic economy

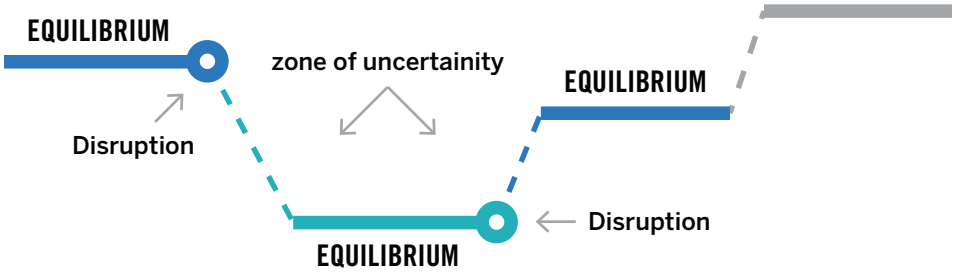
By Vikas Arora
Principal, Advanced technology
Global Trade

Canada

EDC
TAKE ON THE WORLD

In his book, *Punctuated Equilibrium*, Harvard scientist Stephen Jay Gould shared his theory that most species change very gradually over millions of years, but their slow evolution is "punctuated" by a rapid, sudden burst of change, resulting in a new species.

The 2020 pandemic has been a source of major disruption impacting nearly every business, sector and region. These are unprecedented times and this crisis is far from over. We believe this will have far-reaching implications as this crisis metastasizes from health care to disrupting social and economic systems. In this "*zone of uncertainty*" when forces of social, economic and technology collide—we tend to see something like a punctuated equilibrium, meaning a state of long-term stability disrupted radically before settling into a new equilibrium.



Even before we were impacted by COVID-19, there were disruptions in several industries, including the relatively stable auto industry, which is being challenged by the synchronous arrival of electric vehicles, shared mobility and autonomous vehicles with mobile broadband connectivity. When this cycle of disruption ends, the industry will settle into a new equilibrium.

At the end of 2018, Canada had 1.2 million** businesses. Of these:

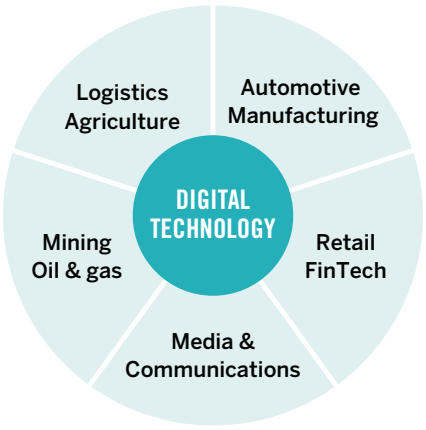
- 1.18 million businesses employ less than 100 people;
- around 22,266 employ between 100 and 500 people; and
- the remaining 3,010 are categorized as large businesses.

Small- to medium-sized enterprises (SMEs) form the backbone of the Canadian economy and account for nearly 50% of the gross domestic product (GDP) and 60% of the jobs. This pandemic will have a far-reaching impact and will fundamentally change the business landscape.

As the economy takes a negative turn, businesses will have to deal with stress, structure and technology. For example, businesses will have an increased stress on cash flow and liquidity, which will force them to re-evaluate their business model and operational structure. Many businesses won't survive this economic dislocation and for those that do, their future will have to be "digital."

** international.gc.ca/gac-amc/publications/economist-economiste/state_of_trade-commerce_international-2019.aspx?lang=eng#-Section2.0

** ic.gc.ca/eic/site/061.nsf/eng/h_03114.html



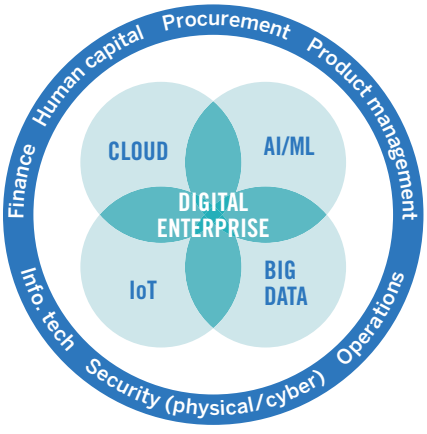
DIGITAL TECHNOLOGY LANDSCAPE

In context of the current global economic disruption and our line-of-sight on the global business landscape (direct and via our partners), businesses which were online and digitally enabled were:

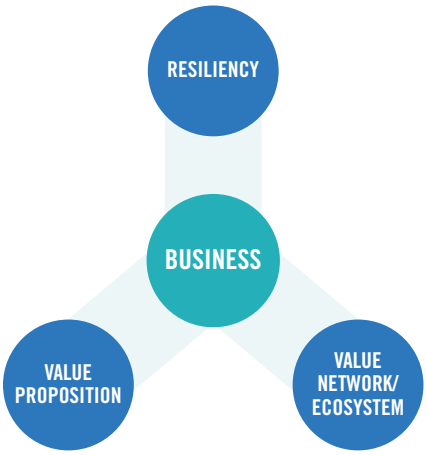
- the first ones to see business recovery as transactions went online;
- able to quickly re-evaluate supply chain alternatives and business models to mitigate impact; and
- had empowered their workforce working remotely with the right tools and technologies while maintaining safety and security.

We believe digital technologies will play a critical role in enabling operational efficiencies, speed, agility and innovation, and drive global competitiveness, economic growth and national security. Key long-term trends driven by digital transformation are apparent across many sectors presenting both risk and opportunities. They include:

- **Retail:** Power of brick-and-mortar retailing is being structurally challenged as an increasing portion is shifting online, disrupting almost all segments, presenting major challenges in terms of logistics, inventory/assortment, space requirements, online presence, customer interaction and pricing.
- **FinTech:** Disintermediation of value chain, data proliferation, new digital products and customer experience personalization are putting pressure on financial institutions customer growth, revenues and value proposition.
- **Media:** Personalized experience, content consumption, advertising patterns and monetization are transforming dramatically.
- **Consumer products:** Changing tastes, preferences and buyer recommendations are driving retailer pricing and positioning.
- **Telecoms/communications:** Changing usage patterns, regulation and investment needs are having a direct impact on location agnostic, fixed/mobile, high-speed broadband access.
- **Auto:** Electrification, shared mobility, connectivity and autonomous driving are challenging the status quo.
- **Manufacturing:** Predictive maintenance, situational awareness, asset tracking, and material consumption are becoming critical for operational efficiency.
- **Oil & gas and mining:** Remote operations, worker safety and environmental impact are becoming focus areas for cost reduction and automation.
- **Agriculture:** Real-time data analytics of soil quality and weather are key to improving food safety, crop protection and yield.



Accelerated adoption of rapidly developing technologies such as high-speed fixed and mobile connectivity (5G/fiber), cloud computing, artificial intelligence (AI)/machine learning (ML), natural language processing (NLP), robotics, internet of things (IoT), big data/data analytics should enable businesses to be more agile, competitive and resilient.



A RISING TIDE DOESN'T LIFT ALL BOATS

Businesses across sectors need to realize that adopting digital technologies and real-time data analytics is no longer a requirement for competitive advantage. It's existential. We fundamentally believe that this pandemic will accelerate digital adoption and force businesses to rethink across their end-to-end processes with respect to agility, scalability and automation, focused on:

1. **Value proposition:** The value offered to customer(s) across different business channels, e.g., B2B, B2C, B2B2C;
2. **Value network/ecosystem:** People, partners, suppliers, assets which enable value creation and product/service delivery; and
3. **Resilience:** Rich data access, tools and technologies integrated into the business fabric for near real-time visibility of your and your network's value chain, to handle disruption (market, geo-political, natural disaster, pandemic).

Since April 2020, we saw several examples of growing pains from fragmented implementation of digitalization:

- Retail grocery chains[1] (Metro, Loblaws, Walmart Canada) had implemented online ordering systems, but were unable to handle the pandemic/lockout-driven demand surge.
- Sectors, like mining, oil & gas, and forestry, faced a lack of technology and process integration for remote worker safety and remote asset operations.
- Automakers limited supply chain and logistics visibility led to factory shutdowns due to parts availability issues and border and flight closures. This brought to the surface a lack of process integration covering suppliers of Tier1 and beyond and a very limited real-time logistics visibility.

What this shows is the importance or rather difference between designing a new digital business versus implementing incremental digitalization of sub-processes.

To be prepared for the upturn towards the new equilibrium, businesses should rapidly use this opportunity to build their "tech-intensity." For example:

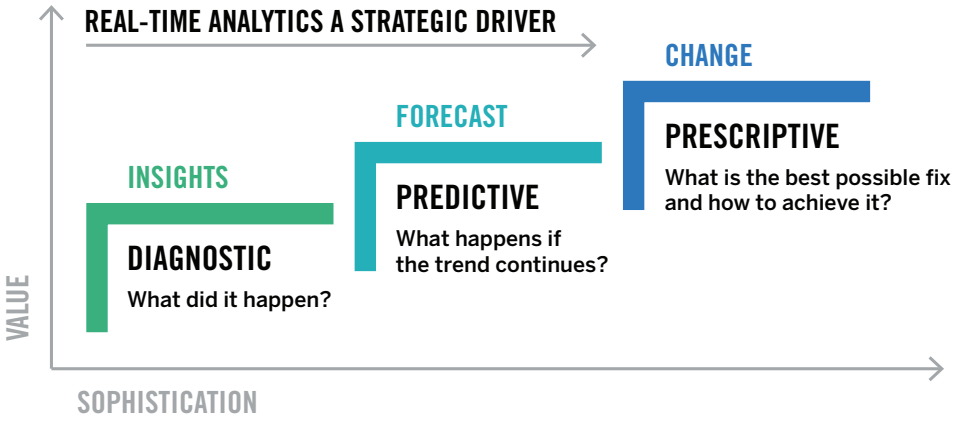
1. Reinforce their operational excellence with fast adoption of technology;
2. Integration of proprietary expertise; and
3. Access to real-time quality data by:
   - Leveraging technologies, like cloud computing, AI, machine learning, natural language processing, IoT/robotic process automation, high-speed connectivity, operational and business support systems (OSS/BSS) and big data analytics;
   - Integrating process automation with built-in redundancies and modularity; and
   - Understanding the risks, like cybersecurity vulnerabilities and talent.

[1] theglobeandmail.com/business/article-online-grocery-deliveries-struggle-with-surging-demand/

DATA AND AI RENAISSANCE

We've all heard it numerous times that data is the new oil—some say, gold—of the 21st century. The fact is that data and information are the capital assets of the current age. We fundamentally believe that to augment human decision-making, access to reliable, quality data in real-time is key to the core foundation of any business.

Good quality data enables an evidence-based decision-making framework. It forces the stakeholders to confront uncertainty, consider divergent hypotheses, surface unknown connections, reason about complex patterns and derive actionable insights to achieve business objectives.



This dependency mapping with quality data can help businesses plan for disruptions down to the component/customer level and potentially help pivot to new business models during a crisis.

Let's look at the retail sector example:

Retail represents 31% of global GDP[2], generates around 40 Terabytes of data/hour[3] and is the "demand-sensor" for the retail world. This data can be used to reshape retail by performing real-time analysis to:

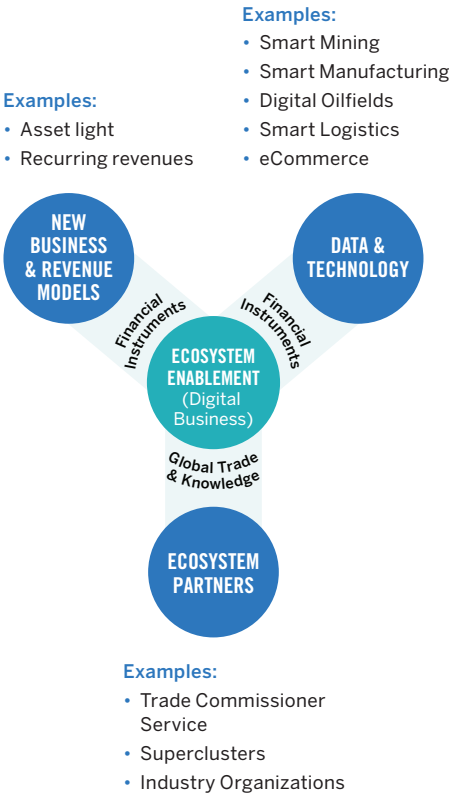
- deliver personalized customer experience and drive loyalty;
- empower employees and drive productivity;
- create an intelligent supply chain and reinvent business models.

The current COVID-19 situation is also a great example of the importance of reliable quality data to keep citizens safe and for governments to craft targeted policies to stem the economic impact.

To build resilience, agility and competitiveness, every business—big or small—has to become data-driven. This data can then be leveraged by artificial intelligence (AI) & machine learning (ML) systems to drive business decisions. AI/ML systems have great applicability in scenarios that involve rapid alterations such as manufacturing operations, logistics, financial risks, environmental considerations, pandemic. If the AI/ML system spots a condition or a deviation, this information can then be used with other data sources to understand specific issues or causes. An important aspect of this system is to learn and adapt with new data. In this way, it enhances performance and augments our capabilities by adjusting to new and evolving circumstances and conditions.

[2] businesswire.com/news/home/20160630005551/en/Global-Retail-Industry-Worth-USD-28-Trillion

[3] Microsoft CEO – NRF Keynote presentation 2020



NEW BUSINESS MODELS & OPPORTUNITIES

We fundamentally believe that technology and innovation are critical ingredients for our businesses to be more productive, innovative and competitive on a global platform.

Export Development Canada (EDC), along with its partners and stakeholders, is playing an active role in enabling the ecosystem and helping Canadian businesses develop and adopt innovative digital technologies and solutions across sectors to improve business agility, capability and resiliency.

As businesses navigate this pandemic by re-evaluating their cost structure, unbundling business process and re-adjusting business investments, go-to-market strategies and a data-driven technology based business transformation, we are there to support[4] new business models, international trade opportunities and help Canadian businesses scale, manage risk and compete on a global platform.

KEY TAKEAWAYS

History teaches us to think in terms of cycles, but not every phenomenon is cyclical in nature. Structural breaks and economic dislocations occur, forcing businesses to delineate, in real-time, between changes that are temporary departures from the familiar to more permanent changes.

As economic threats multiply, resilience, agility-at-scale and efficiency become critical. Resilience helps businesses mitigate impact; agility and efficiency make them highly competitive and innovative. Businesses set themselves apart by leveraging digital technologies, data and artificial intelligence in anticipating external disruptions and inoculate against the sting in their tail!

Acknowledgements

We'd like to thank our colleagues Karen Turner, Greg McElheran, Rob Forbes, Tushar Handiekar, Marc-Andre Sinclair, Tim Peterman and Russ Jackson for their suggestions and contributions.

Punctuated Equilibrium, Steven Jay Gould, Harvard University Press, Cambridge, 2007.

[4] Business as Unusual, edc.ca

ABOUT EXPORT DEVELOPMENT CANADA

Who are we?

Export Development Canada (EDC) is Canada's export credit agency. Our job is to support and develop Canada's export trade by helping Canadian companies respond to international business opportunities. We're a self-financing Crown Corporation that operates at arm's length from the Government of Canada.

Disclaimer

Canada

Export Development Canada EDC