Digital Transformation of Canadian Agri-Food

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Abstract.

Agriculture in Canada is on the cusp of a dramatic revolution as a result of the digital transformation of the industry driven by the emergence of tools such as Precision Agri-Food Technologies and the Internet of Things (IoT, a network of interconnected physical devices capable of connecting to the internet). With the expected exponential growth of data from the application of innovative technologies such as IoT by the Canadian Agri-Food industry, Canada has the potential to gain valuable insights through leveraging this data using powerful tools such as data analytics. These tools can provide producers and industry stakeholders with intelligent decision support tools that will enable actionable outcomes, moving beyond current system monitoring and alerts. Ultimately, it is through data, analytics and emerging technologies that Canadian Agri-Food will be able to address current and future challenges; to identify best management practices to reduce nutrient use or antimicrobials in livestock farming or the challenges of food security and safety. Data, analytics and technology will provide insights into overall trends, insights into the overall landscape of the Canadian Agri-Food industry, allowing

for governments to implement smart policies based on authentic and real-time data and support/showcase sustainable Canadian farming practices to consumers; provincially, nationally and globally.

INTRODUCTION

Digital Transformation is a characterization of the ongoing evolution of organizations through the increasingly interconnected nature of our society, business and technology. It is delivering profound (and potentially disruptive) impacts by enabling innovative business opportunities (products, distribution, supply chains and ecosystems) and innovative solutions to societal challenges related to our environment, health, productivity and resource allocation.

Digital Transformation affects all sectors, public and private. In February 2017 the McKinsey Quarterly reported on a study investigating the implications of digital reinvention on business revenues, profits and opportunities. McKinsey found that on average, industries are less than 40 percent digitized. Among those surveyed, winning companies respond to digitization by significantly changing their corporate strategies. Leading companies were found more often to align corporate and digital strategies, exercise high levels of strategic response to digital changes in products, distribution, ecosystems, processes and supply chains (Bughin et al, 2017). In short, embracing Digital Transformation is a winning strategy.

Canadian Agri-Food has begun to experience the digitization of agriculture, in part due to the emergence of Precision Agri-Food technologies and the Internet of Things (IoT, a network of interconnected physical devices capable of connecting to the internet).

CHALLENGES

The adoption of data driven Agri-Food management strategies is currently limited to innovative farmers, or early adopters; the bottlenecks preventing more widespread adoption are the lack of ease of use, difficulties regarding integration, and affordability. Overall, Agri-Food is facing a significant challenge of underutilized data. Data is not mined to its full potential as most Agri-Food data exists within isolated repositories as evidenced by the consistent message from stakeholders across all agri-food commodities:

"*We need answers, we are drowning in data but starving for information*".

Producers are challenged with on-farm technology systems that do not communicate with each other; as a result, we lack decision support systems that are easy to use, result in actionable outcomes and guide producers towards evidence-based decision relevant to their operations. As more leading-edge technologies are adopted for use on farm, the data they generate should be integrated into one central system as having producers access data across a variety of different systems, is ineffectual, error prone, and labour intensive. On-farm data is not being used to its full potential, producers need access to their data as useable information, complete with context and guidelines on how to interpret the data.

The Canadian Agri-Food community needs access to informative real-time reports. Industry awareness of trends with respect to disease prevalence, production, or market demands could help the industry make informative decisions. For example, effective management of disease and outbreaks requires awareness of the precise locations of affected plants and animals as well as total number at risk. Livestock processors and producers could realize significant value from a feedback system of communication. Data capture, management, and flow needs to be efficient. Integration of industry data and on-farm technologies could provide an industry wide system for regulatory purposes, greatly reducing redundant data capture, cost and labour. Canadian

researchers posses the knowledge to understand complex plant, animal and ecosystem models and have the ability to solve complex problems using advanced analytics (e.g., artificial intelligence) and technologies (e.g., blockchain) which requires access to relevant real-time, standardized, consistent, and integrated data.

Canadian agri-food is also challenged with data issues concerning ownership and access; with special concern for data aggregated to repositories outside Canada. In addition, there is a lack of coordination between farmers, industry, government and academia which inhibits large-scale data-integration. Data from farms are disconnected in a series of isolated storage locations and difficult to access behind the doors of competing data collectors. Easy and secure connections and access to data are key for innovation and knowledge.

MOVING FORWARD

The ability of the Canadian Agri-Food sector to commit to the establishment of a comprehensive digital transformation strategy will determine our future as either leaders or followers in the global marketplace. This strategy could enable leadership by leveraging data assets to support evolving issue-related social innovation models (such as the anticipated shift in the re-distribution of business costs, benefits and risks), new business models, and for protection of Canada's global reputation as producers of trusted, high quality food products. Canadian farmers are operating in an ever more complex, global reality and the race for access and control of on-farm data is escalating. Farmers are often conflicted – wanting to sign up for ag data services yet hesitant when it comes to sharing their data. Canada requires a unified governance framework to address issues of data ownership.

Identifying, extracting, refining, distributing and monetizing data assets are key components of a robust digital transformation strategy. It is delivering profound (and potentially disruptive) impacts by enabling innovative business solutions (products, distribution, supply chains and ecosystems) and innovative solutions to societal challenges related to our environment, health, productivity and resource allocation; both in the public and private sector.

Insights achieved through the use of data have the potential to provide Canadian Agri-Food producers and industry with a wealth of new capabilities, to:

- Engage more effectively with consumers;
- Create operation efficiencies – intelligent decision support systems for proactive management;
- Enable the rapid adoption of new practices – to reduce the use of inputs (e.g., nutrient or antimicrobials; and
- Enable the rapid introduction of new food products to the global marketplace.

The path forward is clear. Canada requires a comprehensive digital strategy and a flexible data environment built through collaborative, trusted and confident partnerships. It requires participation from all stakeholders: producers/farmers/growers, suppliers, service providers, researchers, business, government, Canadian tech providers and innovators.

REFERENCES

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