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Farming in the Software Age: Interoperability & Provincial Legislation

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WHAT NOW?

System Update Required

**Farming in the software age:
Interoperability & provincial legislation**

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What is the problem?

In recent years, a small but vital sector of the West's agricultural industry was in significant danger of being lost. The agricultural equipment manufacturing, or shortline, sector is a small but important employer, exporter and community economic foundation on the Canadian prairies. The industry and the jobs, innovation and exports that it engenders had faced an existential threat from the abuse of copyright law by mostly foreign manufacturers of tractors and combines.

That threat was recently mitigated by passage of a private member's bill in Parliament, [Bill C-294, An Act to Amend the Copyright Act \(Interoperability\)](#). But work remains to be done. The federal action to change the *Copyright Act* is a good start, but it is neither complete nor is it sufficient. Equally important, as the act approaches final approval by the Senate and Royal Assent, the provinces and particularly the Prairie provinces need to prepare.



Photo: Greg Huszar

What is shortline manufacturing and what is the threat?

In the shortest definition, shortline equipment refers to the specialized implements or attachments that connect to tractors and combines to plant and harvest crops. Shortline equipment must, of course, be able to inter-operate with the combines and tractors to which they are attached. In today's digital world, that means more than connecting a hose; it means talking to the software that runs those machines. Manufacturers of shortline implements must be able to access software in the larger machines in order to design and build equipment.

Historically, accessing operating software was not an issue. But as combines, tractors and other large equipment have become increasingly digitized, manufacturers have begun to limit access to the software. Recently, the largest maker of combines and tractors, John Deere, blocked access to software on its state-of-the-art combine, the X9. As described by Kyle Weins, co-founder of iFixit and a leading expert in electronic equipment repair, "The X9 uses a new Combine header with a proprietary interface so John Deere can monopolize attachments for combines," Weins said, adding this allows the company to bring all the accessory sales in-house — not unlike Apple's walled garden.¹ In this case, the 'proprietary interface' does not allow non-Deere authorized attachments to talk to the combine. It is a "digital lock" or technical protection measure (TPM). These are combinations of copyright protected software and electronic hardware devices, or, according to the *Copyright Act*, "any effective technology, device or component that, in the ordinary course of its operation, (a) controls access to a work."² Under copyright law, software is considered "a work."

The X9 combine also won an innovation award at the same consumer electronics show where it took a worst-in-show award for its use of TPMs.³ The technological advances are on one hand an immediate boon for most farmers but on the other represent a longer-term threat in terms of locking farmers into a sole source for equipment. The TPMs, which are not necessary for the functioning of the combine, are also an immediate threat to the Canadian shortline manufacturers and Canadian ag innovation eco-system.

These TPMs, or locks, are protected under copyright law in Canada and other jurisdictions. Breaking the locks carries serious penalties even if done for personal or

other uses that do not involve 'stealing' or 'reselling' the technology. In the case of ag equipment, breaking digital locks to manufacture parts that can work with combines and tractors is a benefit for the end-user as it provides choice and makes the equipment more useful. This is not unlike computers that are more useful when the owner has a choice of peripherals to match their specific needs and competition among vendors to reduce cost.

More than allowing limited 'breaking of digital locks,' Bill C-294 is better thought of as breaking the shackles on Canadian innovation that's been imposed by foreign companies.

Government action has been required because despite the benefits of innovation and lack of economic harm from accessing the software, the large U.S.-based multinationals that manufacture combines and tractors have rapidly introduced proprietary and/or encrypted digital interfaces that block access by anyone not authorized by the manufacturer. In 2021, John Deere locked down its new state-of-the-art X9 combine and family of combine headers making it impossible for farmers to fit another brand of harvest header to the new combine. Any attempt to reverse engineer a solution to allow a farmer to choose their own equipment would only work until Deere issued a required update that must be installed to run the combine.

This was a mugs game that the shortline industry could never win.

The importance of shortline manufacturing

According to Statcan data, in 2021 the shortline sector (NAICS code 33311) accounted for \$5.6 billion in total revenue and 17, 113 jobs on the Prairies with a payroll of just over \$1 billion. Canadian exports of agricultural equipment grew at a rate of more than 30 per cent annually between 2015 and 2018. In the Prairie provinces alone, exports of Canadian-made add-on equipment for combines and tractors grew 47 per cent during the same period. There is reason to believe that this trend will only grow into the future unless strangled by the original equipment manufacturers (OEM). An economic impact study of the industry conducted by Western Economic Diversification Canada shows that this activity supports more than 500 companies, mostly small and mid-sized, predominantly in Alberta, Saskatchewan, Manitoba, Ontario and Québec.⁴

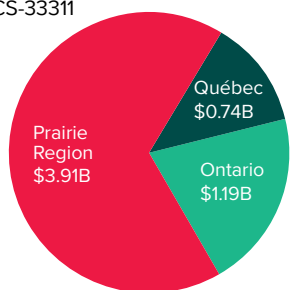
¹ CES 2021 Gadgets: Worst in Privacy and Security Awards, <https://threatpost.com/tractors-pod-ice-cream-lipstick-ces-2021-worst/163117/>

² *Copyright Act* (R.S.C., 1985, c. C-42)

³ <https://www.no-tillfarmer.com/articles/10248-john-deere-receives-ces-innovation-award-for-x-series-combines>

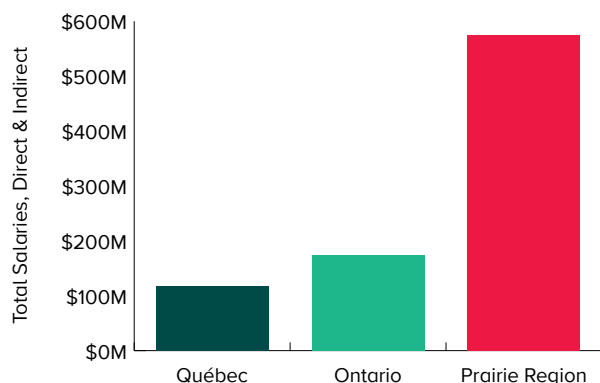
⁴ <https://open.canada.ca/data/en/dataset/6c54a0f9-73d2-4b59-b67b-00b9305081e0>

AGRICULTURE EQUIPMENT MANUFACTURING, 2020 (by region) NAICS-33311



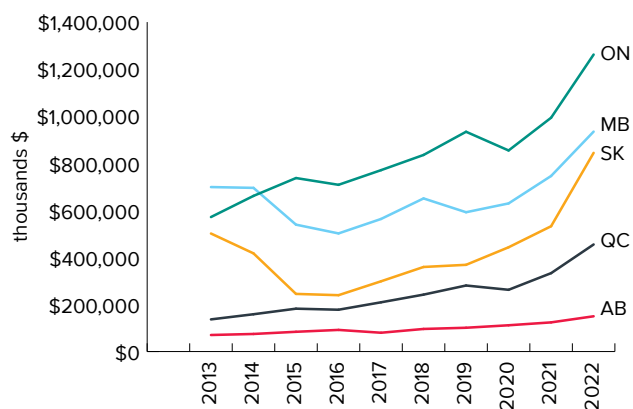
Source: Statistics Canada. Table 16-10-0117-01
NB: Data not available for some provinces and territories

AGRICULTURE EQUIPMENT MANUFACTURING, TOTAL SALARIES, DIRECT & INDIRECT, 2021 (by region) NAICS-33311



Source: Statistics Canada. Table 16-10-0117-01
NB: Data represents the most complete available for provinces in which the shortline sector is significant

CANADIAN SHORTLINE EXPORTS, 2013-22 (by province) NAICS-33311



Source: Trade Data Online

An important aspect of shortline manufacturing is that it is a Canadian ag related export which does not have China as a dominant player.

Another important aspect of shortline manufacturing is that it is a Canadian ag related export that does not have China as one of the dominant export markets. The industry is well diversified in the markets into which it sells. For the shortline sector, diversification is therefore a matter of increasing exports in markets where it is already present, not the more expensive and difficult proposition of trying to find and enter new markets. This is the definition of 'low hanging' fruit in trade diversification, an important policy objective of federal and provincial governments.

SHORTLINE EXPORT MARKETS, 2023 NAICS 33311

	Total \$ Exports	% of Total Canadian Exports
United States	\$ 3,345,760,669	81.67%
Australia	\$ 293,086,187	7.15%
Netherlands	\$ 76,226,193	1.86%
Brazil	\$ 55,063,285	1.34%
Lithuania	\$ 36,474,722	0.89%
Chile	\$ 27,179,707	0.66%
South Africa	\$ 20,684,157	0.50%
Kazakhstan	\$ 20,255,600	0.49%
China	\$ 18,277,294	0.45%
Germany	\$ 16,387,370	0.40%
Others	\$ 187,251,468	4.57%

Source: Trade Data Online (accessed: February 20, 2024)

The importance of shortline manufacturing for the future of agriculture

Interoperability is critical to save not only the jobs of today but also the jobs of the near future that will come with the evolution of sustainable, modern agriculture. Both the Canadian Standards Association and the International Standards Organization have said that data driven ag is the next, essential step in the development of the critical elements, such as data driven precision ag, that are the next evolution of modern farming.⁵ However, for Canada to be able to seize this opportunity, and for it to benefit and not harm the agricultural community, it is critical that Canadian policy makers ‘get inter-operability right.’

Inter-operability is the ability for distinct systems or devices to exchange and make mutual use of data and information. It’s what allows Google Chrome to work on an Apple device and allows much of modern agricultural equipment and systems to work together.

Modern agricultural equipment and the software that runs it are modular devices, not unlike a KitchenAid stand mixer that allows peripherals and add-ons to be plugged in to perform various functions. But as opposed to a bakery paddle mixer, ag equipment collects and produces data in relation to a whole host of things, including equipment diagnostics, soil characteristics, weather, geolocation, and so on. Data driven agriculture requires these components to be able to talk to one another through the mutual exchange and use of data.

This data-dependency in agriculture, sometimes referred to as “precision agriculture,” has been identified by the Canadian Standards Association and the International Standards Organization as the next evolution and frontier for farming.

It has the potential to unlock enormous gains in efficiency and food production by measuring and responding in real time with diagnoses, predictions and decision-making for both crop and livestock production. Data is therefore quickly becoming a tool for more innovation and opportunities in the industry.

But just as data-driven agriculture promises benefits, it may also pose risks to Canadian innovators, manufacturers and the resiliency of remote and rural communities. Without regulatory intervention, there is no guarantee that agricultural technologies will be developed and distributed to promote interoperability. And in recent years we have seen a lack of harmonization among manufacturers and technology firms in this sector. Whether for anti-competitive reasons or a simple lack of incentive, the proliferation of non-interoperable agricultural technologies poses serious risks for Canadian food security, innovation and the export-driven Canadian economy.

As Canadian policymakers embark on an ambitious path to overhaul the *Competition Act* in response to digital markets, interoperability for agricultural technologies must be a core focus. Data dependency is a double-edged sword. Just as it offers enormous advantages and opportunities for innovation, it can equally be used as a fulcrum by powerful technology companies to lock Canadian producers and innovators out of the market. Realizing the promises of data-driven agriculture requires responsive regulation that promotes interoperability and the exchange of data.



⁵ Smart farming: the transformative potential of data-driven agriculture.

ISO, <https://www.iso.org/cms/render/live/en/sites/isoorg/contents/news/insights/smart-farming-data-driven.evergreen.html>

The federal response

Without the ability to offer interoperable solutions, Canadian manufacturers will struggle to continue providing thousands of jobs and billions of exports. Bill C-294 proposes to amend the *Copyright Act* to allow a person, in certain circumstances, to circumvent a technological protection measure to “make a computer program or a device in which it is embedded interoperable with any other computer program, device or component.” Bill C-294 includes two important caveats. The first is that the software in question must be “lawfully obtained,” a term not defined anywhere in the *Copyright Act*. And second, the activities involved in making the devices or software interoperable must not “contravene any act of Parliament or the provinces.” Taken together, these caveats place the spotlight on provincial legislators and call for action.

Federally, there are promising legislative developments on the horizon. For example, the Competition Bureau’s 2022 consultation examining the *Competition Act* pointed strongly to the need for more effective digital market regulation. In retrofitting competition policy for a 21st century economy, policymakers in Ottawa would be wise to look beyond household tech giant names like Amazon and Google and ensure that the agricultural technology industry and others are part of their impetus for action.

The role for provincial legislators

The idea that software must be “lawfully obtained” to fall within Bill C-294’s new exception creates ambiguities. When one buys a piece of agricultural equipment it is not always clear that ownership of the physical asset includes ownership of the lawfully obtained software that is part of, and essential for, its operation. If this sounds confusing, it is. It is not always apparent if the purchaser has legal ownership of both the hardware and software. This creates an opportunity for provincial governments to clarify how computer programs that form an integral part of digital devices and products should be treated under provincial law. A commonsense approach would be to clarify that when a person buys a digital device with onboard software, they have, by this purchase, also lawfully obtained the software. But this needs more explicit recognition in provincial laws.

Without the ability to offer interoperable solutions, Canadian manufacturers will struggle to continue providing thousands of jobs and billions of exports.

For computerized devices outside of the agricultural context, provinces should consider clarification on “lawfully obtained” computer programs in devices by looking to Consumer Protection and Sale of Goods legislation. One approach may be to include with the sale of computerised devices or products with embedded software an implied licence to use or “obtain” the computer programs.

When it comes to agricultural equipment more specifically, the provinces should consider these types of clarifications to their *Farm Implements Acts* or similar regulations addressing farm implements. Regulations of this sort exist in every province and territory and in some cases have been in force for over a century. They are more detailed and prescriptive versions of Sale of Goods and Consumer Protection legislation tailored specifically for agricultural technologies. They often stipulate safety, standards and environmental protection, but they also address the sale and distribution of farm implements to ensure fair market practices. Though each province’s *Farm Implements Act* varies slightly from the next, these frameworks could jointly support a unified approach to clarifying when and whether computer programs are “lawfully obtained” in agricultural equipment.

Without such clarification, we run the risk that Canadian innovators will suffer the chilling effects of not knowing whether cutting-edge research and development falls within the ambit of Bill C-294’s interoperability exception. This in turn could harm Canadian exports, reduce choice for Canadian agricultural producers, and concentrate market power among a small group of original equipment manufacturers. While clarification at the federal level of these issues would be a more straightforward approach in an ideal world, federal policymakers have made clear throughout Bill C-294’s legislative process that the ball is being passed to the provinces on this question. Now is their time to act.



Conclusion

Agriculture is a significant contributor to the export-oriented economies of the Canadian prairies. The ag equipment sector, built on innovation and market diversification, has been part of the larger agriculture export success story. As such, it has received unique legal and regulatory protections including farm equipment acts in each prairie province dating to the turn of the last century. The significant increase

in computerization and precision agriculture has increased productivity but has also brought market competition barriers that have required new policy interventions. With recent changes to copyright's digital locks rules as a critical first step, it is now time for the provinces to act. For copyright reforms to bring home their intended benefits, provinces now need to fill in the gaps and provide certainty for Canada's shortline sector.

BILL C-294: <https://www.parl.ca/legisinfo/en/bill/44-1/c-294>

1st Session, 44th Parliament,
70-71 Elizabeth II – 1 Charles III, 2021-2022-2023
HOUSE OF COMMONS OF CANADA

BILL C-294

An Act to amend the *Copyright Act* (interoperability)

His Majesty, by and with the advice and consent of the Senate and House of Commons of Canada, enacts as follows:

R.S., c. C-42

Copyright Act

1 (1) Subsection 41.12(1) of the *Copyright Act* is replaced by the following:

Interoperability

41.12 (1) Paragraph 41.1(1)(a) does not apply to a person who circumvents a technological protection measure that protects a lawfully obtained computer program for the purpose of

(a) obtaining information that would allow the person to make the program or a device in which it is embedded interoperable with any other computer program, device or component; or

(b) making the program or a device in which it is embedded interoperable with any other computer program, device or component.

(2) Subsections 41.12(4) to (7) of the Act are replaced by the following:

Sharing of information

(4) A person referred to in paragraph (1)(a) may communicate the information obtained under that paragraph to another person for the purposes of allowing that person to make the computer program or a device in which it is embedded interoperable with any other computer program, device or component.

Limitation — technology

(5) A person to whom the technology, device or component referred to in subsection (3) is provided may use it only for the purpose of making the computer program and any other computer program interoperable.

Limitation — information

(6) A person to whom the information referred to in subsection (4) is communicated may use it only for the purpose of making the computer program or a device in which it is embedded interoperable with any other computer program, device or component.

Non-application

(7) A person is not entitled to benefit from the exceptions under subsection (1) or (6) if, for the purposes of making the computer program or a device in which it is embedded interoperable with any other computer program, device or component, the person does an act that constitutes an infringement of copyright.

Non-application

(8) A person is not entitled to benefit from the exceptions under subsection (2), (3) or (5) if, for the purposes of making the computer program and any other computer program interoperable, the person does an act that constitutes an infringement of copyright.

Non-application

(9) A person is not entitled to benefit from the exception under subsection (4) if, for the purposes of making the computer program or a device in which it is embedded interoperable with any other computer program, device or component, the person does an act that constitutes an infringement of copyright or an act that contravenes any Act of Parliament or any Act of the legislature of a province.

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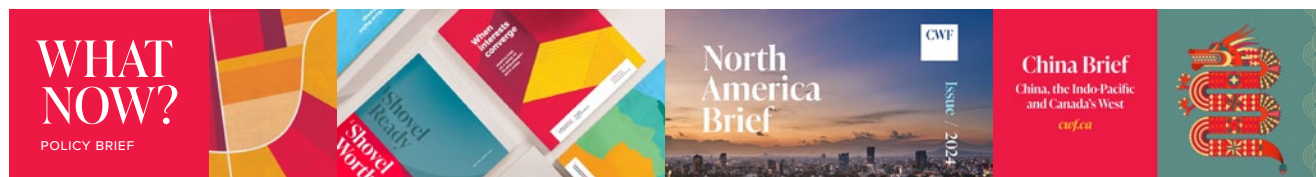
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