DIGITAL OPPORTUNITY IN AGRICULTURE

Digitizing the western Canadian agriculture industry

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FOOD & AGRICULTURE INDUSTRY

World-wide agriculture:

- contributes 6% of global GDP (World Book 2016, UN-FAO)
- employs 1.3 billion people (UNCTADStat 2016)
- value ag trade exports $1.3 trillion (Agriculture Canada 2015)

- Over 500 food & agriculture tech startups raised USD$4.6 billion in 2015 (AgFunder 2015 Annual Report)
  - "agtech is the new queen of green" (Techcrunch Network, 2015).
  - Before 2013, investment in agtech was flat (CleanTech Group, 2015)
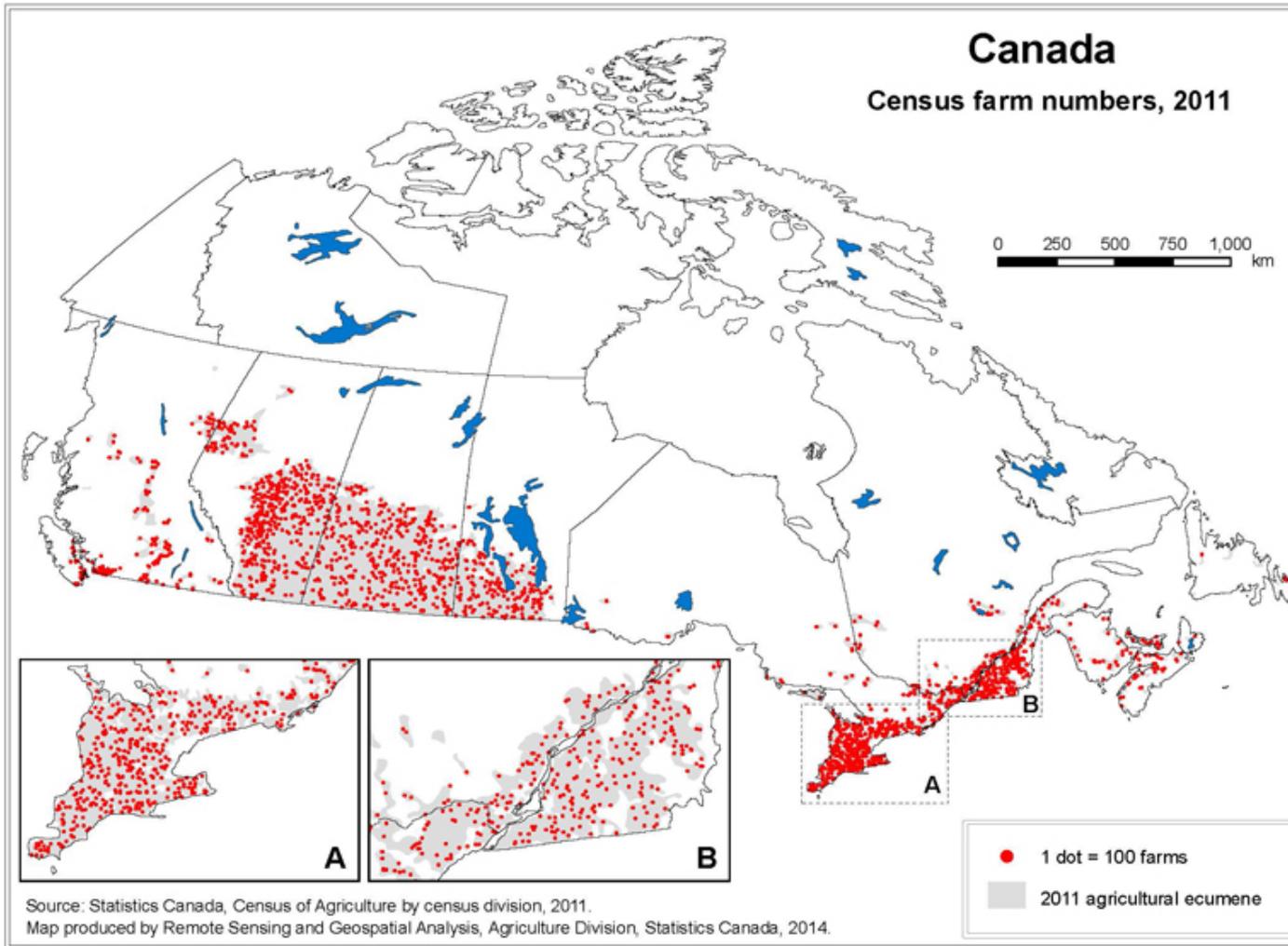   - Why?

FOOD & AGRICULTURE INDUSTRY

Canadian agriculture industry:

- single largest employer and contributor to Canada's GDP
- $107 billion (6.7%) GDP in 2013 (Agriculture Canada 2015)
- 1 in 8 Canadians employed ag & service sector
- leading exporter several commodities
  - 3.5% total world exports
- primary production agtech customers on prairies
  - 133,840 customers Alberta, Manitoba, Saskatchewan

WESTERN CANADA PRODUCTION

Canada
Census farm numbers, 2011

Source: Statistics Canada, Census of Agriculture by census division, 2011.
Map produced by Remote Sensing and Geospatial Analysis, Agriculture Division, Statistics Canada, 2014.

1 dot = 100 farms
2011 agricultural ecumene

Statistics Canada   Statistique Canada

Canada

Map:
1 dot =
100 farms

AB, SK, MB
Combined =
96,063 farms

Agtech customers 133,840 farm operators (45% Canadian market)

130.1 million-acres farmland

METHODOLOGY

Assumption: Trade Shows, field days are central nodes in global knowledge economy or global information networks (Bathelt & Gibson; Golfetto, & Rinallo)

Context: exhibitors, visitors, agtech buyers (international buyers, regional producers), innovation competitions, sales strategy,

- Canada Farm Progress Show 42,000 visitors, Regina, 2015 Innovations Showcase, International Business Center - $C 163.8 M, 146 international buyers, 15 countries,

- Agribition: 130,200 visitors, competitors, buyers C$5 M livestock sales, 70 countries

- w.Canada Crop Production Show (prov.trade shows)

Peer recognition for excellence innovation

FRAMEWORK

| Organization of Innovation	Interoperability	
	Closed	Open
Top-down (hierarchical)	Type I: Corporate model	Type II: Strategic networks
Bottom-up (producer driven)	Type IV: Primordial systems	Type III: Perfect competition

Interoperability defined (generally) as openness and fluidity of membership. Phillips, 2007.

Organization of innovation captures finance, marketing, skills & the technology

TYPE I: TOP-DOWN DRIVEN, CLOSED INTEROPERABILITY
Case *Type I: John Deere, the corporate play for control*

Hardware
Software
Sensors
Satellite/Cellular
Remote access & control
Aggregation
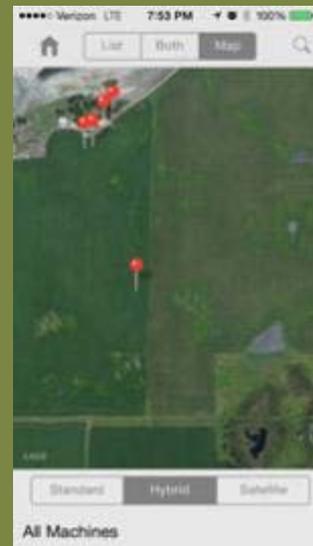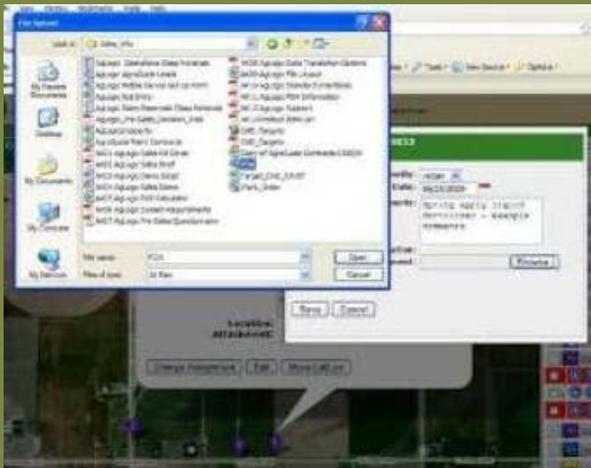
TYPE I: TOP-DOWN DRIVEN, CLOSED INTEROPERABILITY
## Case *Type I: John Deere, the corporate play for control*
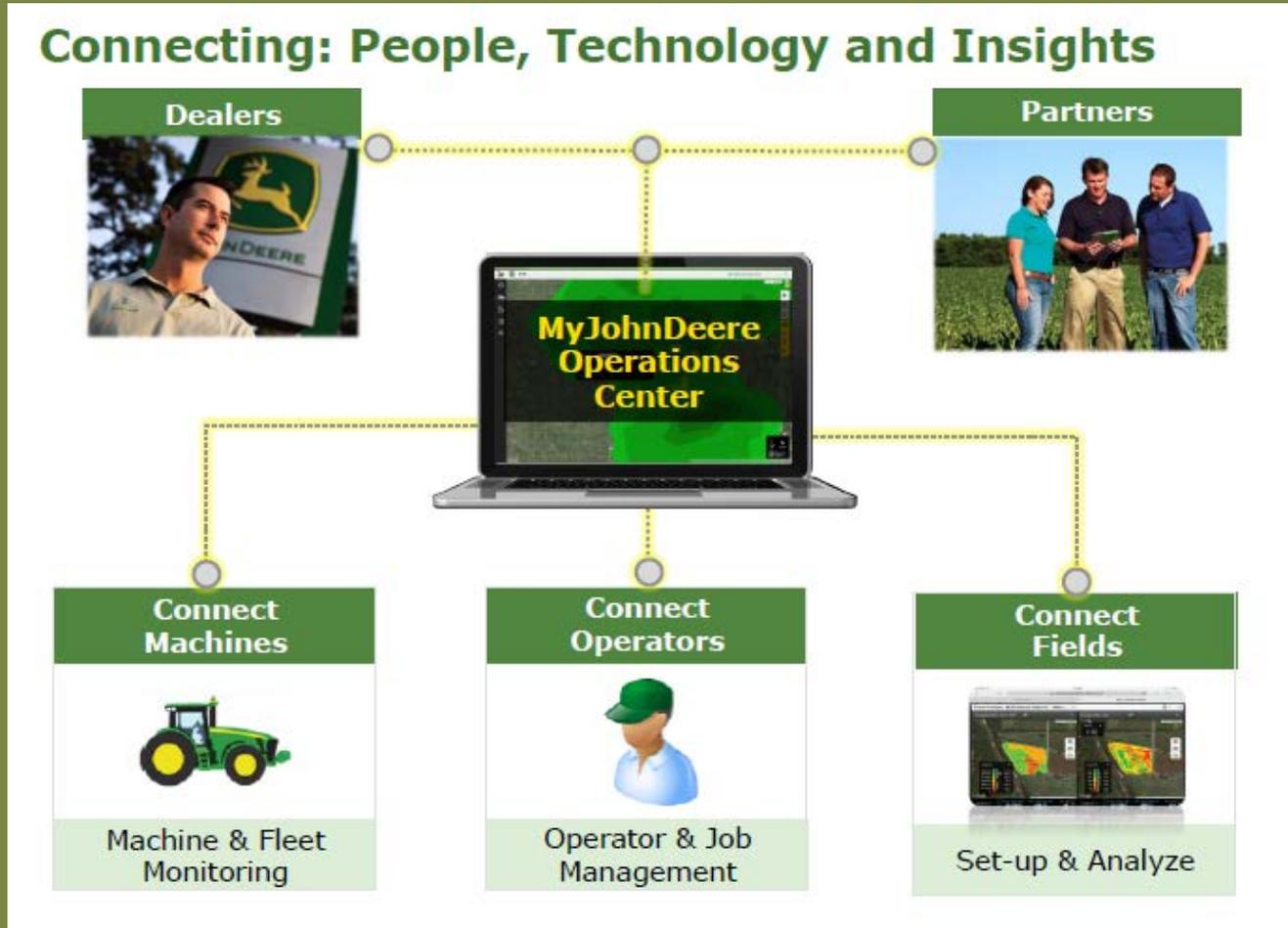
Data integration for farm operation, staff, agtech providers (ATPs) advisors

Source: Pinkston 2015. VP Information Solutions, Intelligent Solutions Group John Deere

TYPE I: TOP-DOWN DRIVEN, CLOSED INTEROPERABILITY
Case *Type I: John Deere, the corporate play for control*

aggregating platform for John Deere USA,
3rd parties
Climate Corp,
Trimble/AgriTrend
Raven

Wireless Enabled Machines (2009-present)
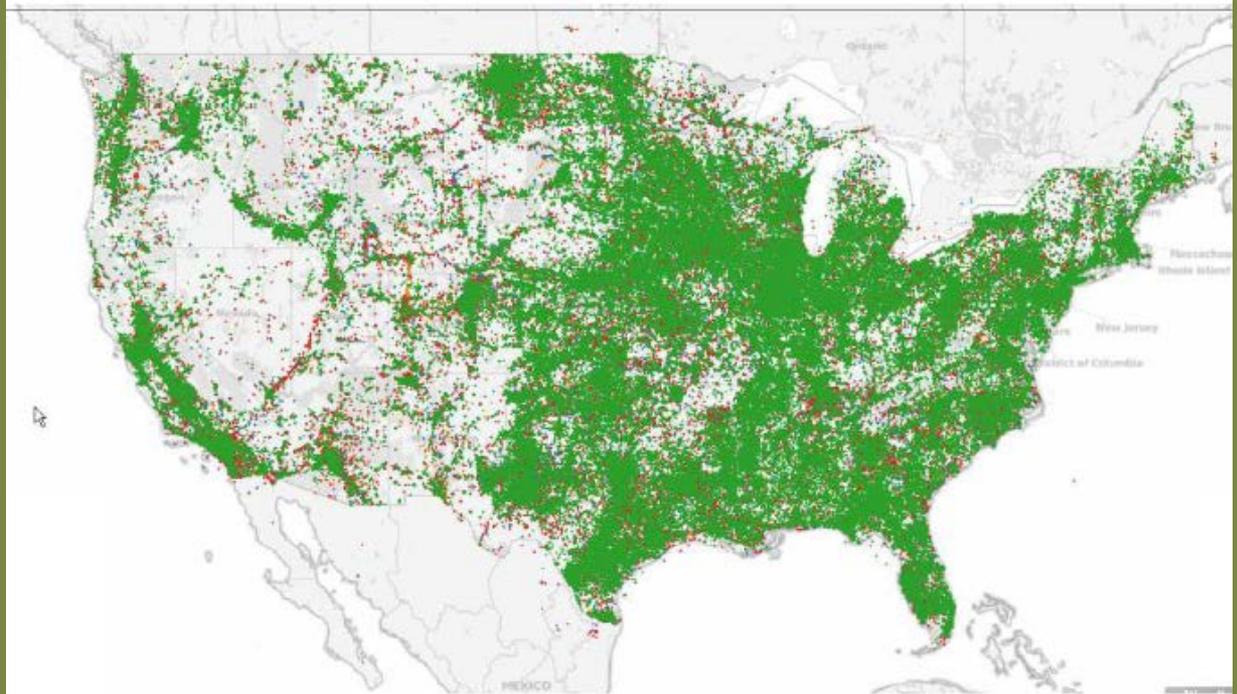
Source: Pinkston 2015. VP Information Solutions, Intelligent Solutions Group John Deere

TYPE II: TOP-DOWN DRIVEN, OPEN INTEROPERABILITY
Case *Type II: Farmobile (USA), strategic networks*

Solving a problem – famers right to own their data & sell it

Skills
- developer/programmer, start-up business, farm history
- consumer digital tech to agtech (Fitbit®, iTunes)

Finance
- start-up self financed, scale up with venture capital

Market
- open interoperability - common communication codes
- $4.00/ac purchase price -$2.00/acre farmer - $2.00 firm

Technology
- processes and hardware patent protection – the system

TYPE II: TOP-DOWN DRIVEN, CPEN INTEROPERABILITY

Case *Type II: Farmobile (USA), strategic networks*

In the box

PUC

Data plan, storage & Simplicity app

$1,250 US/PUC/yr
install the PUC on tractor (15 min)
connect antenna cables to PUC;
data cable to machine, start-er-up, collect data

EFR

TYPE III: BOTTOM-UP DRIVEN, OPEN INTEROPERABILITY
Case *Type III: AgSKY Technologies (Swan River, MB)*
perfectly competitive entrepreneurial start-up

Solving a problem – famers don't have enough time to process drone images for quick decision-making

Skills
- farm know-who & know-how, developer/programmer, business

Finance
- start-up Bank of Dad, acquisition by GreenAero Technology
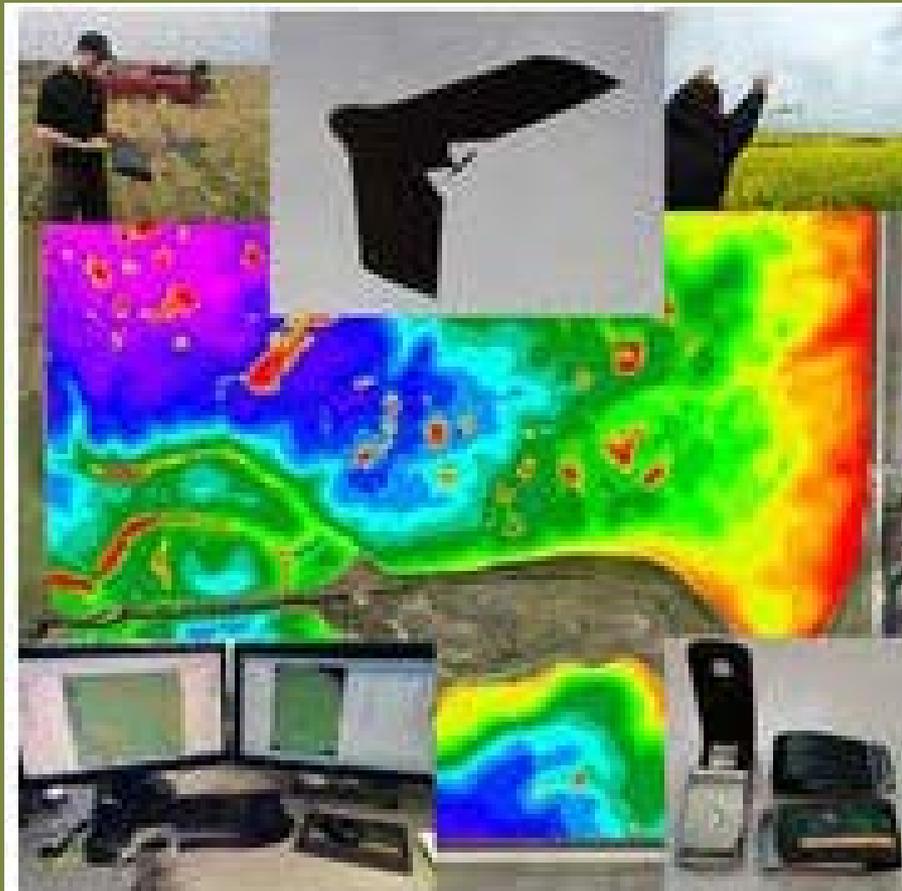
Market
- open access

Technology
- processes: mobile, mainframe storage, USB/e transfer

TYPE III: BOTTOM-UP DRIVEN, OPEN INTEROPERABILITY

Case *Type III: AgSKY Technologies (Swan River, MB)*

perfectly competitive entrepreneurial start-up
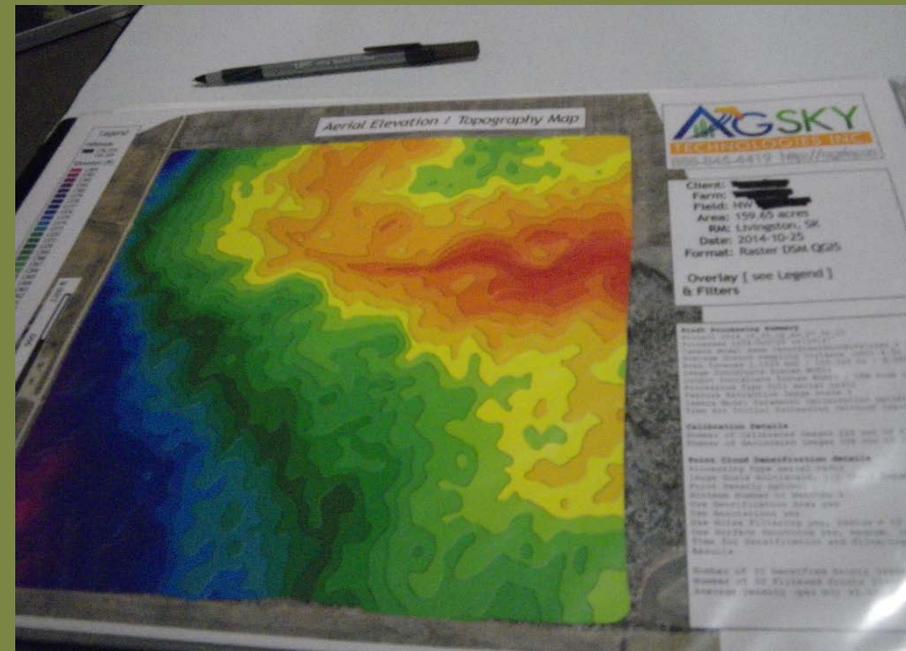
Drone flight, images
Mosaic-ing
Actionable report

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TYPE IV: BOTTOM-UP DRIVEN, CLOSED INTEROPERABILITY

Case *TYPE IV: FarmLead, (Foam Lake, SK) primordial system generator*

Solving a problem - removal single desk marketing of grains

Skills
- farm know-who & know-how, economics, commodity trader

Finance
- own networks, competitions, AB venture capital investors

Market
- open access, mobile platform for trading grain
- anonymized buyer/seller (voluntary attribution) rating system for transaction behavior

Technology
- processes: mobile, cloud, financial (insurance)
- on-line bid system

TYPE IV: BOTTOM-UP DRIVEN, CLOSED INTEROPERABILITY
Case *TYPE IV: FarmLead, (Foam Lake, SK) primordial system generator*

OBSERVATIONS

A. agtech leveraging DT other sectors & countries

B. farm know-how, know-who, trust & legitimacy

- programmer/developer, OR business skill sets off-farm,

- mentorship critical to start-up & next-phase success

C. data ownership, lock-in technology (warranty)

D. culture of trust relationships producer to seller in ag different than other sectors of DT customers, privacy of identity paramount

E. trade shows, farmer field days (epistemic community),self-organizing & hacker networks key to understanding agtech innovations and the actors

CONCLUSIONS 1

What is the current position of Canadian ICT firms in the innovation and production networks?

CONCLUSIONS 1

1. Type I model not being developed in Canada – USA driven
    - brand-loyalty, inter-generational transition in ag
        - Canadian software innovations acquisitions or third-party licensing
2. Type II networked activity - little evidence $ value of data
    - models emerging in animal (cattle) sector
3. Type III and IV (bottom-up) models - significant activity
    - local investment, developer **or** financial skills
    - local market - adaptation & adoption influenced by **trust** relationships, global potential cross-commodities
    - gaps in coordination agtech ideas with business, financial support & mentorship to reach next-level of success producer-driven global innovation networks

CONCLUSIONS 2

What policy initiatives might be needed to ensure that Canadian industry remains at forefront of ICT adoption and diffusion?

POLICY RECOMMENDATIONS

"keep going"

1. talent & mentorship programs such as Futurpreneur (competitions)
2. kick the tires events - trade shows with innovation awards & farmer field days: showcase agtech innovations & talent, **build epistemic community/strategic networks of agtech & applied innovation**
3. relationships with Transport Canada co-operative & collaborative

"we really need more"

4. support beyond start-up (incubator) phase

    venture capital tax credits, business planning, strategic plans (next strategic moves), copyright, patent USA-Canada

"we need clarity – policy action – guidance principles harmonization"

5. legal basis in flux in Canada

    ownership, privacy, and security of data & innovation: **who owns the tractor? who owns the data?** third party access to information/data

FOOD & AGRICULTURE INDUSTRY
Three Futures for Creating Digital Opportunities

Digitization of entire R&D, production, distribution, supply, & marketing system

1. Virtual world - seed, microbe, animal modeling
2. Reimagining the business system
3. Creating new value propositions

Disruptive digital technologies - metamorphosis of agriculture

VIEW OF WOLSELEY WHEAT MARKET.

FEB. 12, 1902.

Circa 1st decade 20th century

Circa 2nd decade 21th century

Robot tractor handles heat of harvest

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