

# Farmer feedback in innovation: seeking redress for a 'big data divide' in North American agriculture

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# Map of talk:

- Define so-called smart farming and the innovations currently in use across N. American farms
- Summarize survey literature on digital agricultural adoption
- Discuss my qualitative research which reveals uneven engagements with smart farming is not something that begins on the farm, with farmer decision-making; rather, policy and industry are implicated
- Make concrete suggestions for policy-makers



# A "SMART EQUIPMENT FOR SUSTAINABLE AGRICULTURE ... PRODUCING MORE WITH LESS"



Adoption of digital agricultural innovations has been uneven.

Digital Farming engagements have mostly been studied through quantitative surveys of commodity growers:

"intensive" management and size	+ adoption (Kutter et al., 2011)
Costs of technologies	- Adoption (Lambert et al., 2014)
Farmer education and digital skill	+ adoption (Robertson et al., 2011)
Farmer age	- Adoption (Yeonh Sheng & Brindal, 2012)
Access to experts (dealers)	+ adoption (Busse et al., 2014)



# 17<sup>th</sup> PRECISION AG SURVEY

**CropLife**

• Purdue Center for Food and Agricultural Business •  
• Purdue Department of Agronomy •

**PURDUE**  
UNIVERSITY

*Play a part in agricultural history! Please fill out and return this brief survey in the enclosed pre-addressed, postage-paid envelope, and send to:*

**CropLife**, 37733 Euclid Ave., Willoughby, OH 44094; Fax: 440-942-0662.

**PLEASE RETURN BY FEBRUARY 20, 2015.**

1. Your primary responsibility: *[check one]*
  - Owner/general manager/location manager
  - Precision manager
  - Technical consultant/agronomist
  - Other: \_\_\_\_\_ (Please specify)
  - Departmental manager
  - Application manager
  - Sales/sales management
2. Are you a: *[check one]*
  - Cooperative
  - Part of a national or regional (multi-state) chain of retail dealerships (not a cooperative)
  - Other: \_\_\_\_\_ (Please specify)
  - Independent dealership
3. What were the **total annual retail sales** (in dollars) of agronomic products and services (fertilizer, chemicals, seed, services) **at this location** in 2012?
  - Under \$1,000,000
  - \$1,000,000 - under \$2,000,000
  - \$2,000,000 - under \$3,000,000
  - \$3,000,000 - under \$5,000,000
  - \$5,000,000 - under 7,000,000
  - \$7,000,000 or more
4. How many total retail outlets does **your company** own or manage? *[check one]*
  - None
  - 1
  - 2-5
  - 6-15
  - 16-25
  - More than 25
5. In a typical year how many total acres do you custom apply **at your location** (fertilizer, chemicals, seeding – total acres including multiple applications)? *[check one]*



# What does qualitative research with a variety of farmers from across Canada reveal?

The bifurcation in the market for smart farming technologies is not simply an adoption issue beginning on the farm; instead, it at least partly results from design decisions which are producing digital farming “haves” and “have-nots.”

The majority of digital agricultural tools favour farms aiming to maximize the output of commodity crops for export markets





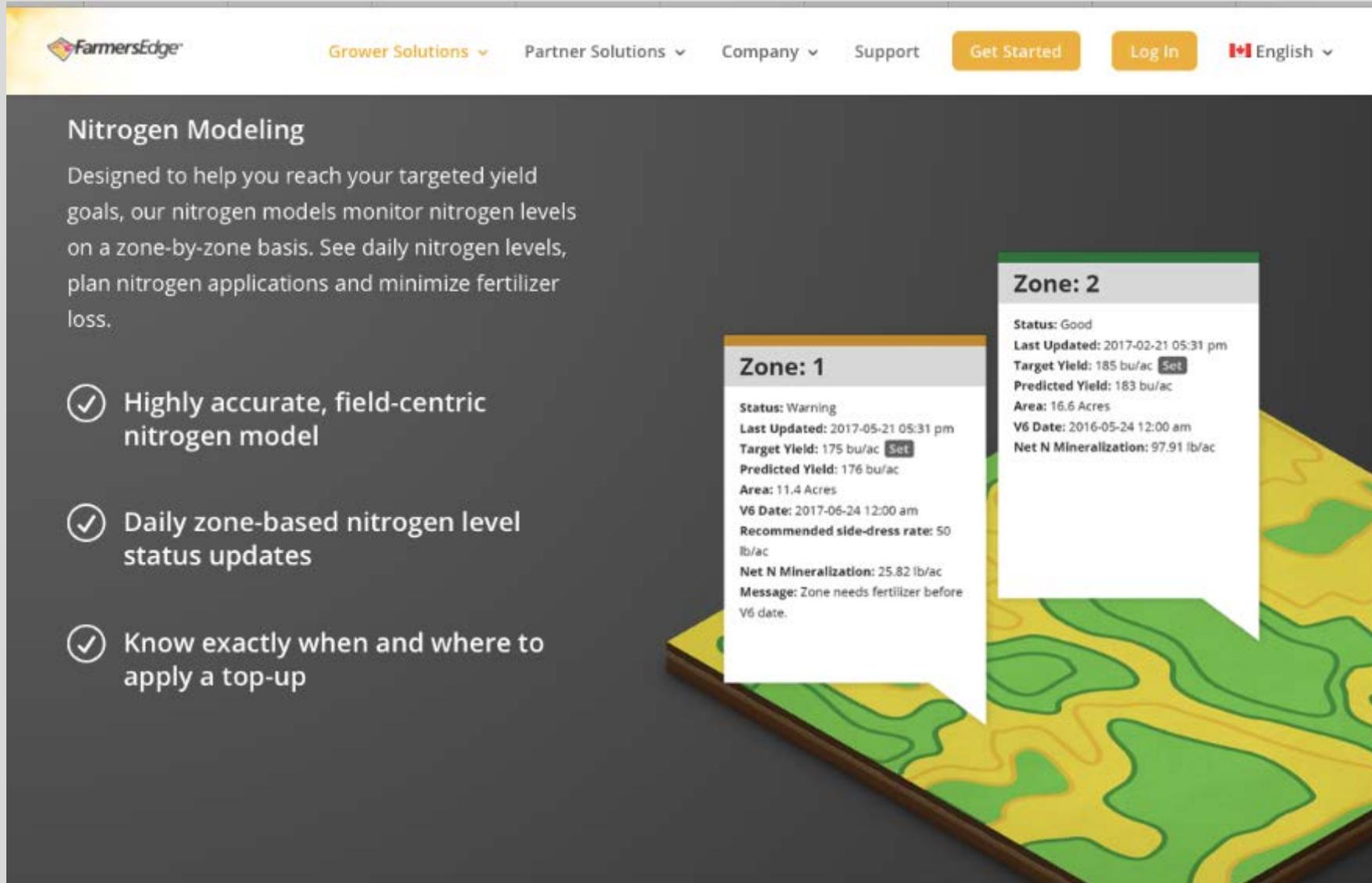
- Track equipment in real time
- View historical paths
- Monitor equipment health
- Review overall performance
- Set tailored equipment alerts

### Performance Manager

Combine 2

Type: Harvester  
Status: ● Active  
Actual Engine Percent Torque (%): 6.00  
Engine Coolant Temperature (C): 43.00  
Engine Fuel Temperature (C): 16.00  
Engine Oil Pressure (kPa): 404.00  
Engine RPM: 1199.75  
Fuel Delivery Pressure (kPa): 212.00  
Fuel Level (%): 49.60  
Grain Moisture (%): 14.90  
Instantaneous Liquid Fuel Usage (L/hr): 9.40  
Percent Load at Current RPM: 19.00  
Wheel Based Speed (km/hr): 0.48  
autosteerDisplay [T]: John Deere GS3 2630  
autosteerSystem [T]: John Deere Autotrac SF2  
header1Feet [T]: 45.00





**FarmersEdge** Grower Solutions Partner Solutions Company Support Get Started Log In English

## Nitrogen Modeling

Designed to help you reach your targeted yield goals, our nitrogen models monitor nitrogen levels on a zone-by-zone basis. See daily nitrogen levels, plan nitrogen applications and minimize fertilizer loss.

- ✓ Highly accurate, field-centric nitrogen model
- ✓ Daily zone-based nitrogen level status updates
- ✓ Know exactly when and where to apply a top-up

**Zone: 1**  
Status: Warning  
Last Updated: 2017-05-21 05:31 pm  
Target Yield: 175 bu/ac   
Predicted Yield: 176 bu/ac  
Area: 11.4 Acres  
V6 Date: 2017-06-24 12:00 am  
Recommended side-dress rate: 50 lb/ac  
Net N Mineralization: 25.82 lb/ac  
Message: Zone needs fertilizer before V6 date.

**Zone: 2**  
Status: Good  
Last Updated: 2017-02-21 05:31 pm  
Target Yield: 185 bu/ac   
Predicted Yield: 183 bu/ac  
Area: 16.6 Acres  
V6 Date: 2016-05-24 12:00 am  
Net N Mineralization: 97.91 lb/ac





"Auto-steering for seeding using GPS is a no-brainer. ... But the thing about field-mapping is, well it requires some very expensive technology to do a variable fertilizer application. Data helps you determine which areas of the field are the least productive. And then as you go through your soil testing you can soil test those quadrants and then you can see if they require different applications of fertilizer. But in order to do that you have to have application equipment which is quite expensive, which is variable rate technology."

- 'Jon,' Saskatchewan grain farmer





Farmers Edge and other corporations developing data systems are currently making little attempt to overcome historic patterns of variation in 'foodways'



“Of course industry is interested [to design technologies for] large farmers, they are the ones with money to pay.”

- ‘Phil,’ public sector agronomist

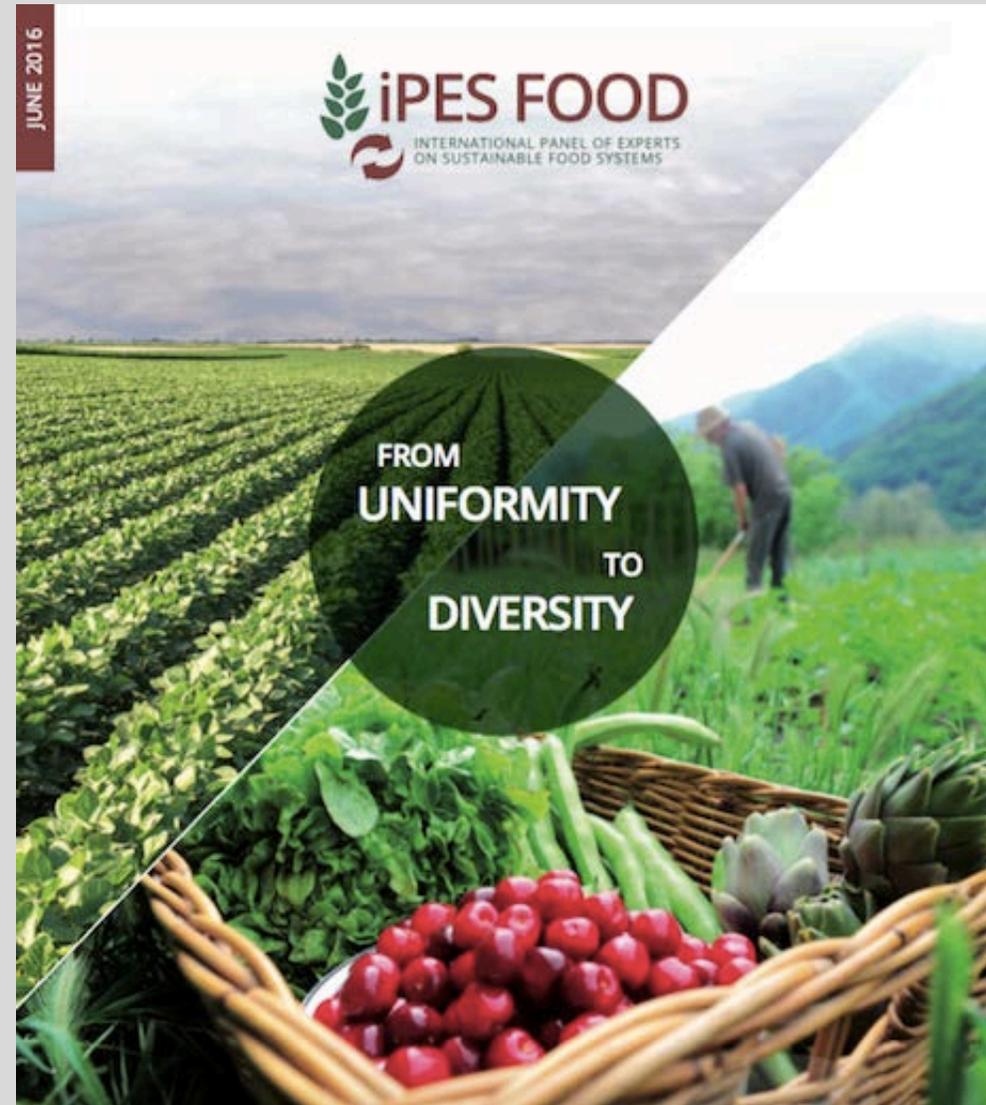


"There is [sic] sensors on satellites that are run by various space agencies within the governments: American, Canadian, Japanese, oh you know European, umm... We have access through open data policies to a lot of these instruments so we download, acquire, and download tools to process these data and we get a lot of the data for free. Now some of the data you have to pay for and with Government we don't have a lot of money to do these things, umm so we have to be opportunistic in the sense that we use the data that's free, open ..."

- 'Andy,' public sector data scientist



There is evidence that fostering diversity of farm strategies and sizes, among other kinds of diversity, is key to meeting food system and environmental crises.



1) Be attuned to and support “small” digital innovations alongside the “big” ones (e.g. AI, robotics, Internet of Things)



## Autoconstruction

À la CAPÉ, on ne se prive pas pour amener de nouvelles idées et pour construire en gang! On part d'un besoin concret sur la ferme, on réunit une équipe de patenteux et on programme les ateliers d'autoconstruction. C'est pas plus compliqué! Pour rejoindre cette joyeuse tribu, il faut juste être membre de la CAPÉ!

Pour commander du matériel (achat collectif) ou pour vous inscrire aux ateliers de montage, il n'y a qu'un seul formulaire mais vous pouvez commander du matériel sans participer aux ateliers.

[Formulaire de commande et d'inscription pour l'autoconstruction](#)

Participer à un atelier collectif de fabrication d'outils avec la CAPÉ permet certainement d'économiser beaucoup d'argent en pièces et métaux car achetés en gros mais surtout, de profiter d'un super espace de travail et de l'expertise de tout un groupe, en plus de fabriquer des outils qui n'existent pas sur le marché et permettent d'avoir de meilleures pratiques culturelles.

- **Contact:** Yan Gordon, responsable du comité Autoconstruction à la CAPÉ
- **Courriel:** [autoconstruction@listes.capecoop.org](mailto:autoconstruction@listes.capecoop.org)

## Projets à venir en 2018

- sur-mesure pour optimiser l'espace de transport pour multi-cellules et enjamber une planche (février 2018)
- Atelier autoconstruction d'enrouleuses à bâches et toiles (février 2018)
- Atelier automatisation de serre: construction de boîtiers de relais et de contrôleurs Arduino pour ouverture et chauffage de serres (mars 2018)
- Atelier autoconstruction de laveuses à racines (mars 2018)
- Atelier autoconstruction de chariots de récolte (date à définir)

Recherche...



## ARCHIVES

• décembre 2018

• octobre 2018

• septembre 2018

• juillet 2018

• février 2018

• janvier 2018

• Atelier décembre 2017

• mai 2017

• avril 2017

• novembre 2016

• juin 2016



“The intention behind Farm OS is to be able to have democratized access to environmental data so that anybody has access to high quality, high resolution data at very low cost, and has high participation...”

-Michael Stenta, organizer, FarmOS

farmOS: A web-based farm record keeping application. <http://farmOS.org>

drupal farm agriculture mapping livestock crops equipment soil sensors

3,135 commits 4 branches 21 releases 4 contributors GPL-2.0

Branch: 7.x-1.x New pull request Find file Clone or download

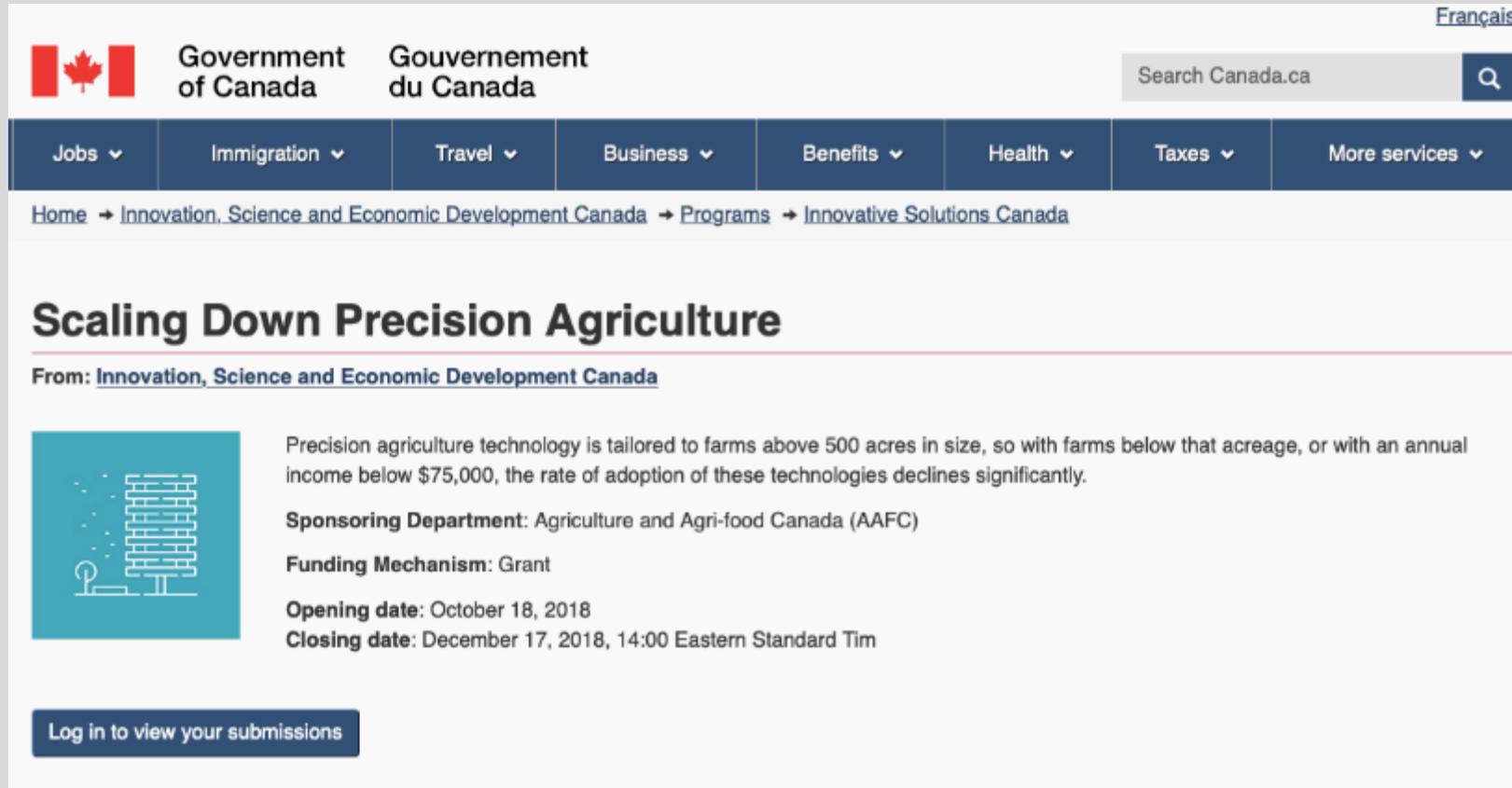
 <b>mstenta</b> Break out area unit conversion to a separate function: farm_area_conv... <small>...</small>	Latest commit 369c0e2 11 days ago
 modules/farm	Break out area unit conversion to a separate function: farm_area_conv... 11 days ago
 themes/farm_theme	Add KML button styles. 2 months ago
 .gitignore	Add to .gitignore: libraries, modules/contrib, modules/dev, themes/bo... a year ago
 Dockerfile	Prepare for release of farmOS 7.x-1.0-beta18. 2 months ago
 LICENSE.txt	add GPLv2 LICENSE.txt 11 months ago
 README.md	Change all links to farmOS.org to https. 2 months ago



2) Attempt to foreground in funding and other decisions the normative aspects and purposes of innovation: Who exactly stands to benefit from this specific research direction? What kinds of historic inequities might be reproduced by this decision?



3) Team up with researchers whose job and capacities allow for in-depth gathering of feedback from farmers and diverse food system actors.



The screenshot shows the Government of Canada website interface. At the top, there is a navigation bar with the Canadian flag, the text 'Government of Canada' and 'Gouvernement du Canada', and a search bar labeled 'Search Canada.ca'. Below this is a menu with categories: Jobs, Immigration, Travel, Business, Benefits, Health, Taxes, and More services. The breadcrumb trail reads: Home → Innovation, Science and Economic Development Canada → Programs → Innovative Solutions Canada. The main heading is 'Scaling Down Precision Agriculture'. Below the heading, it says 'From: Innovation, Science and Economic Development Canada'. To the left of the text is an icon of a stack of books with a lightbulb. The text describes the funding opportunity: 'Precision agriculture technology is tailored to farms above 500 acres in size, so with farms below that acreage, or with an annual income below \$75,000, the rate of adoption of these technologies declines significantly.' It lists the sponsoring department as Agriculture and Agri-food Canada (AAFC), the funding mechanism as a grant, the opening date as October 18, 2018, and the closing date as December 17, 2018, at 14:00 Eastern Standard Time. At the bottom, there is a button that says 'Log in to view your submissions'.

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Home → Innovation, Science and Economic Development Canada → Programs → Innovative Solutions Canada

## Scaling Down Precision Agriculture

From: [Innovation, Science and Economic Development Canada](#)

Precision agriculture technology is tailored to farms above 500 acres in size, so with farms below that acreage, or with an annual income below \$75,000, the rate of adoption of these technologies declines significantly.

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**Funding Mechanism:** Grant

**Opening date:** October 18, 2018

**Closing date:** December 17, 2018, 14:00 Eastern Standard Tim

[Log in to view your submissions](#)



**Thank you**

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