Overcoming barriers to digitalise agricultural systems in the developing world

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CGIAR
Platform for Big Data in Agriculture

bigdata.cgiar.org

#BigDataInAg

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FUTURE FARMS
small and smart

SURVEY DRONES

Aerial drones survey the fields, mapping weeds, yield and soil variation. This enables precise application of inputs, mapping spread of pernicious weed blackgrass could increasing Wheat yields by 2-5%.

FLEET OF AGRIBOTS

A herd of specialised agribots tend to crops, weeding, fertilising and harvesting. Robots capable of microdot application of fertiliser reduce fertiliser cost by 99.9%.

FARMING DATA

The farm generates vast quantities of rich and varied data. This is stored in the cloud. Data can be used as digital evidence reducing time spent completing grant applications or carrying out farm inspections saving on average £5,500 per farm per year.

TEXTING COWS

Sensors attached to livestock allowing monitoring of animal health and wellbeing. They can send texts to alert farmers when a cow goes into labour or develops infection increasing herd survival and increasing milk yields by 10%.

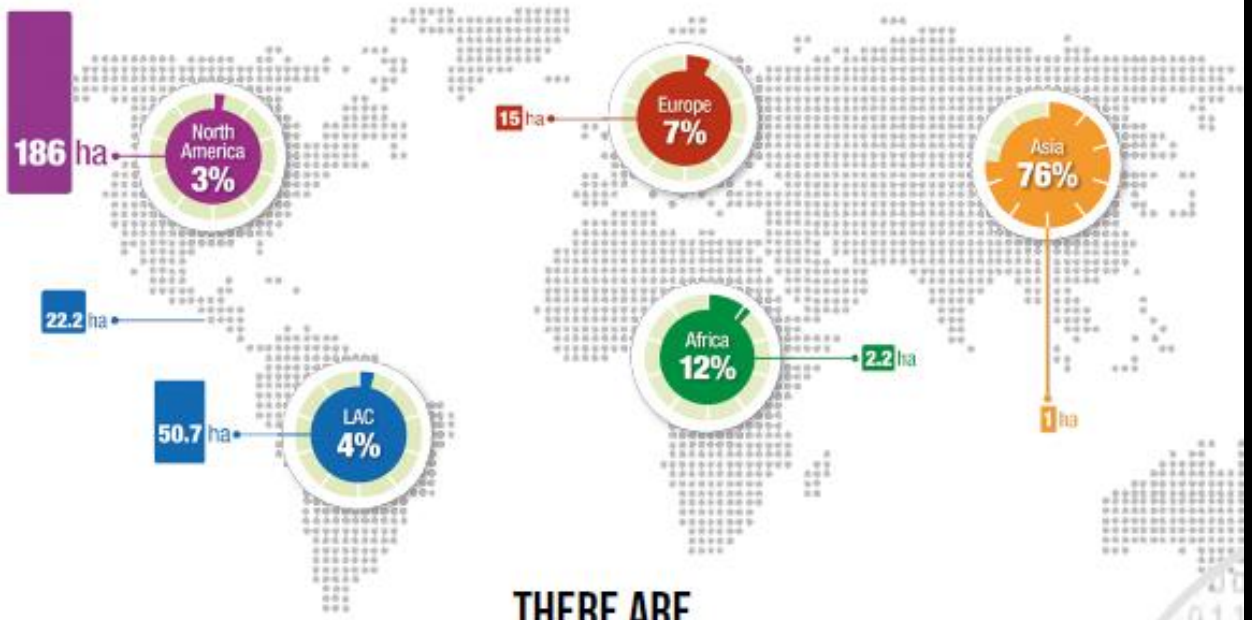
SMART TRACTORS

GPS controlled steering and optimised route planning reduces soil erosion, saving fuel costs by 10%.

09 10 11 12 13 14

BLUE RIVER
TECHNOLOGY

#fact



THERE ARE

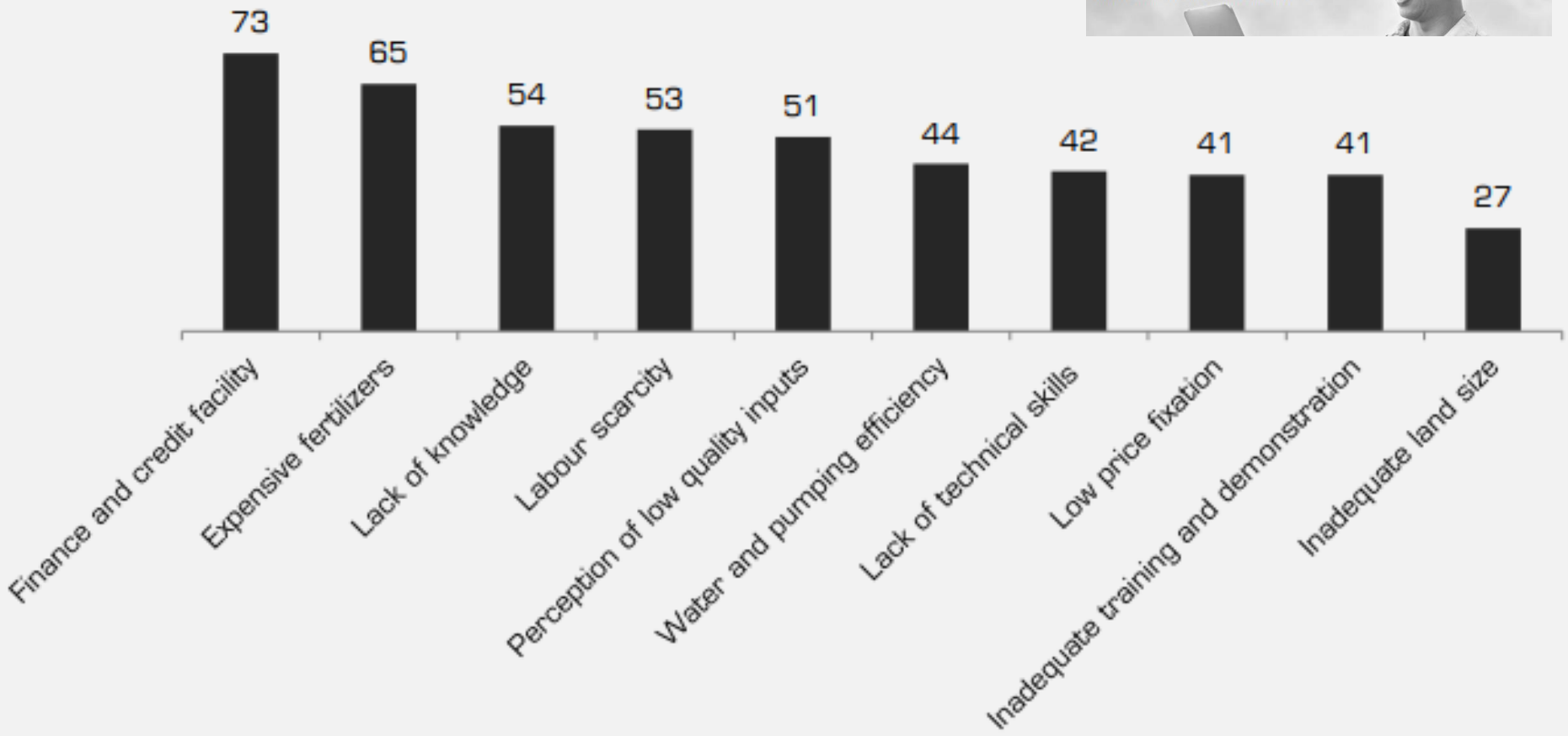
570 MILLION FARMS

IN THE WORLD

72% ARE SMALLER THAN 1 HECTARE

Constraints in Adoption of Precision Farming

Mean Garrett's Score



#UntappedPotential

AGRICULTURE IS #23 OUT OF 23 SECTORS IN TERMS OF DIGITALIZATION IN THE USA

4 major changes

6 BILLION PEOPLE HAVE

MOBILE PHONES,

MORE THAN PEOPLE

HAVING ACCESS TO A TOILET

=

GAME CHANGER

FOR DATA COLLECTION AND

INFORMATION DISSEMINATION

#fact

GODDARD SPACE FLIGHT CENTER
LISTS

2,271

SATELLITES

CURRENTLY
IN ORBIT

Compare detailed crop inventories and crop health for inaccessible areas like Syria across years

Smart, cheap sensors, Internet of Things


Analytical capacity

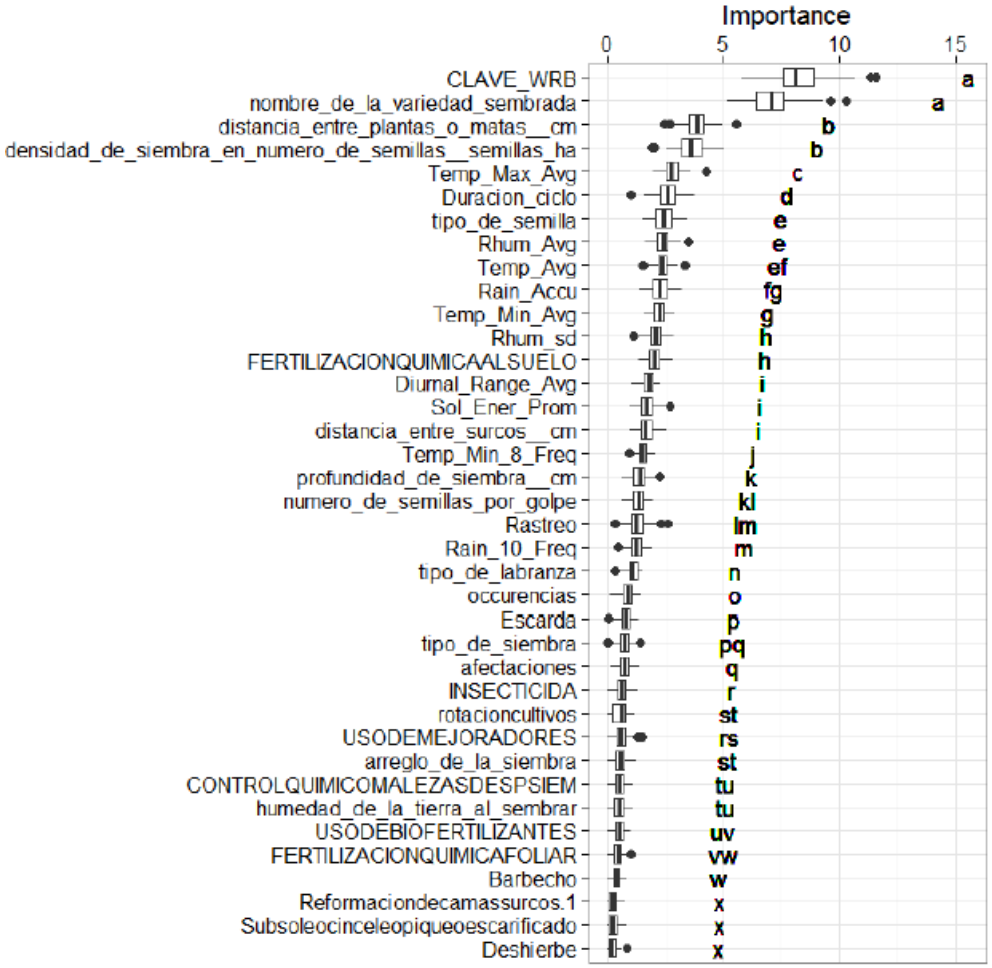
Rainfed maize

N=496

Model: Random Forest

n=2000, mtry=p/3, 100 runs

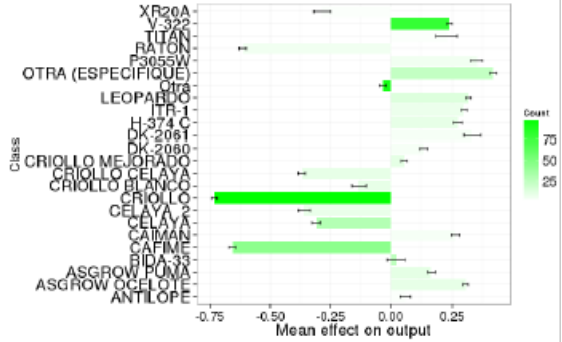
mean R^2=65.2%



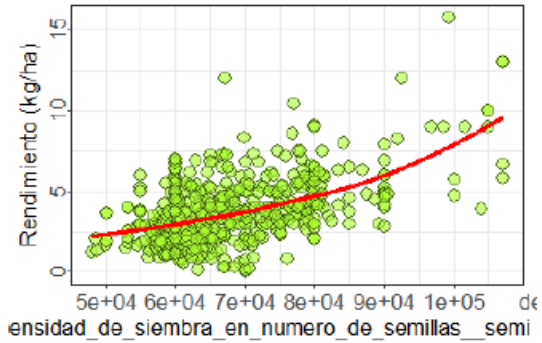
Most relevant variables

Soil class: … but… proxy variable with many categories. Need further characterization with functional variables to enable a clustering

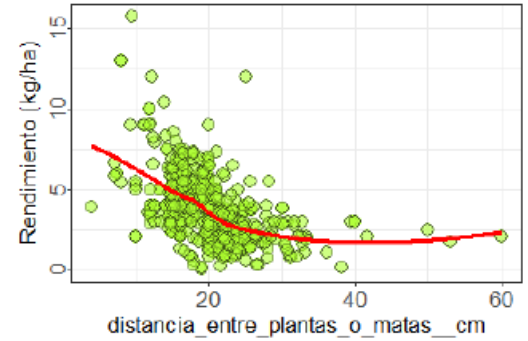
Cultivar: many categories, might need a classification



Sowing density



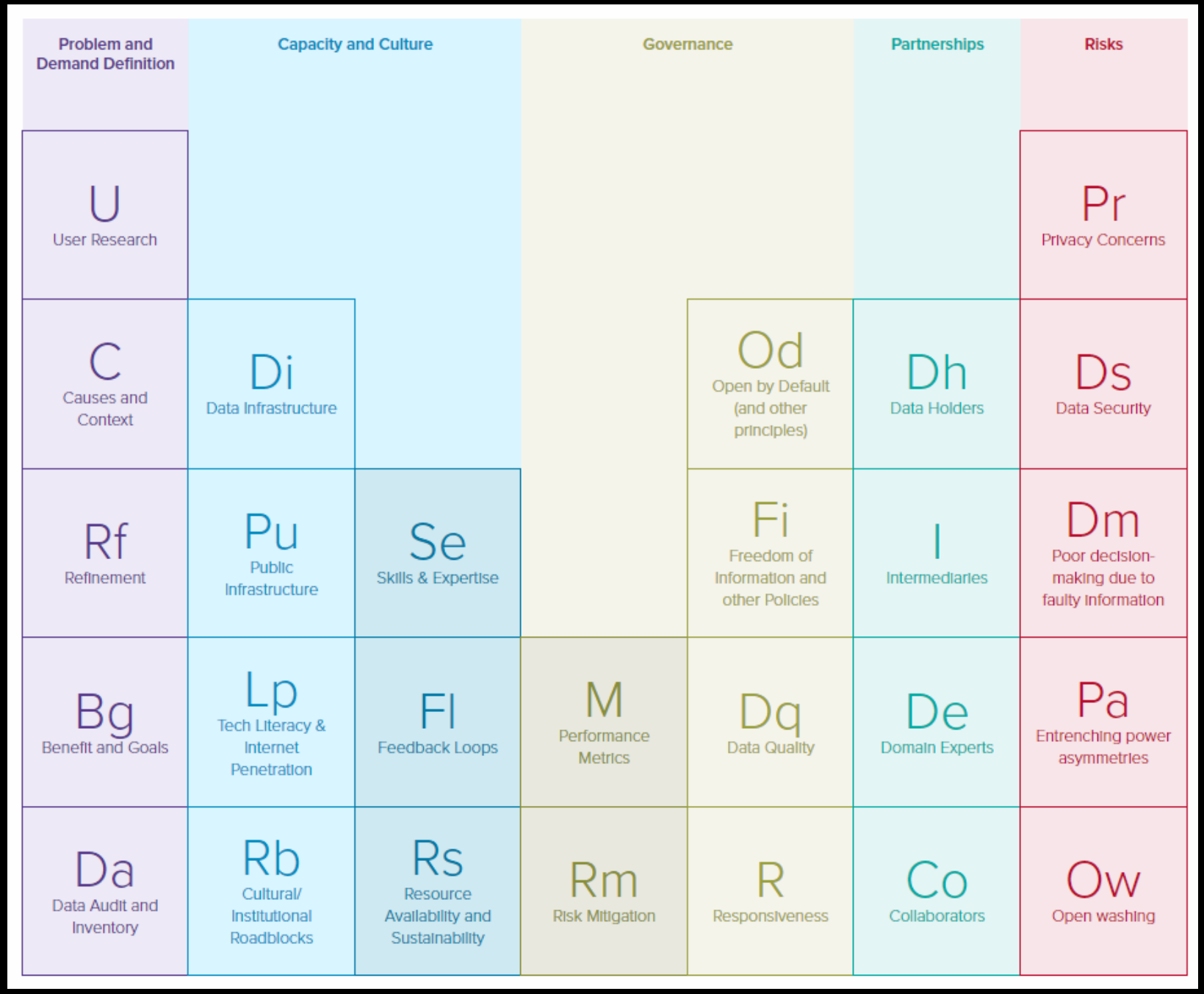
Distance between plants on a row



So what is holding it back?

#fact

EVERY YEAR, CGIAR SURVEYS 180,000 SMALLHOLDER FARMERS



http://odimpact.org/

Take out your cellphone

You have 60 seconds….

Tell me something that might help me make a decision in the next 24 hours

PERSONALIZATION

This is Imelda – she is a coffee farmer and lives in Pescador, Cauca. Tell her something useful….

Getting sustained, personalized information services to farmers: Public Extension

Preliminary data shows that successful ICT-enabled RAS could drive…

>50%

greater adoption rates

30-40%

increase in yields

20-25%

increase in farmer income

30-45x

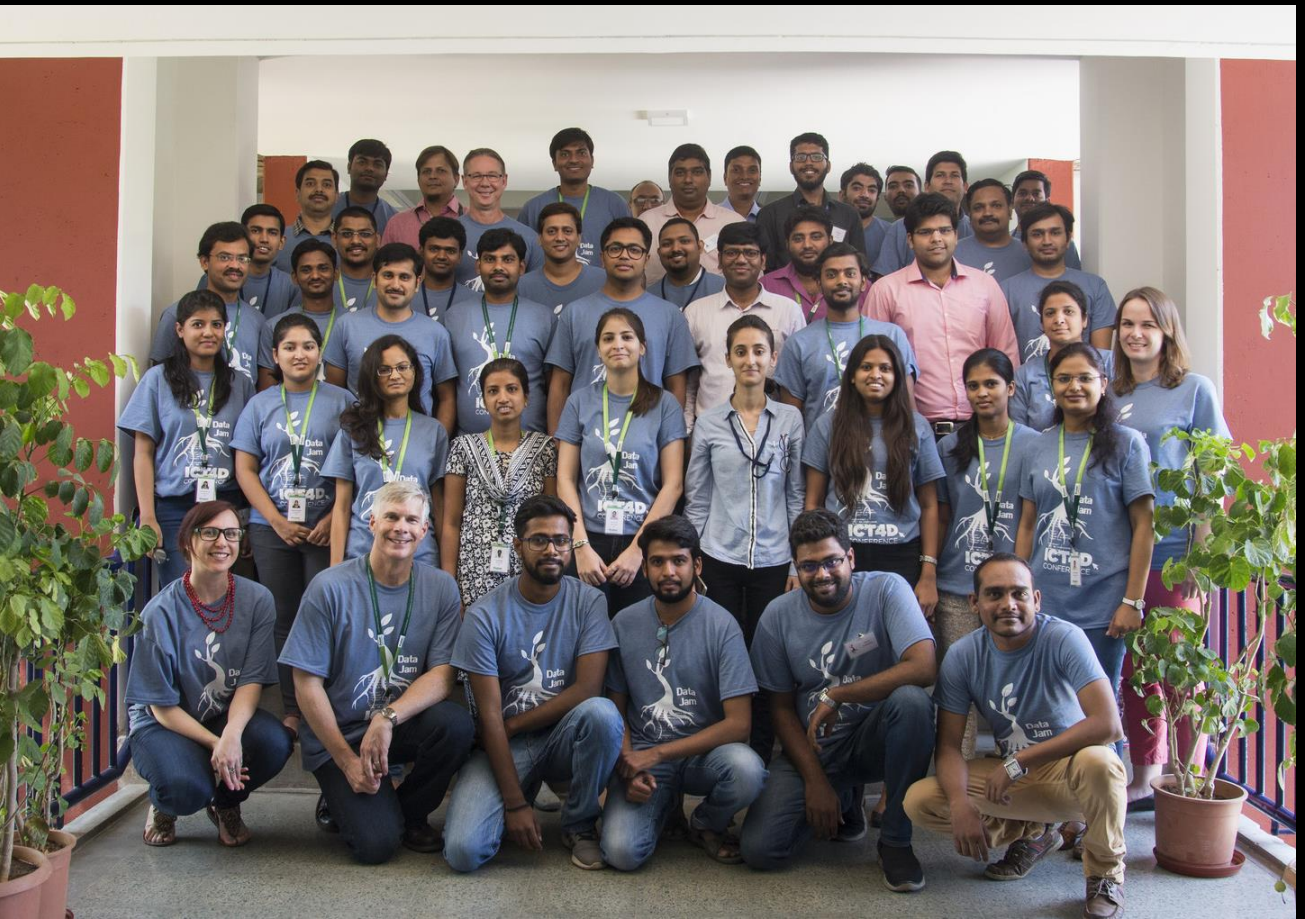
return in farmer income / dollar invested

10x

cost savings for public systems

SOURCE: Yield, income, ROI and cost targets are aspirational targets estimated for RAS investments based on evidence from existing models and dimensions of BMGF proposed investment. Dalberg study provides detailed data and methodology on impact and cost-effectiveness of RAS models.

+ supporting private sector services to establish



Needs new partnerships, new capacity


CGIAR
Platform for
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in Agriculture

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to solve agricultural development problems faster, better and at greater scale

Platform by name,
Innovation Hub by nature

ORGANIZE

CONVENE

INSPIRE

Inspire Challenges 2017

- We identified 4 topics which are ripe for disruption
- US$100k innovation prizes
- 12 month grants
- Risky ideas a plus
- Novel partnerships promoted

Take our challenges now!

- Revealing Food Systems
- Monitoring Pests and Diseases
- Disrupting Impact Assessment
- Empowering Data-Driven Farming

In summary....

- Huge promise, but only handful of success stories in smallholder systems. Plenty to learn! Fail forwards.
- Need for appropriate technology for smallholder systems: new business models
- Some of the challenges include:
  - Kickstarting a sustainable data ecosystem (requires institutional change)
  - Capacity building a new generation of agricultural scientists and field agronomists
  - Providing the enabling environment for services to be successful
  - Generating robust evidence on value for money, impact on gender/youth
- Enormously exciting!

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