



Bridging the disconnect between agricultural research and extension through digital development in low- and middle-income countries

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Ulrich Kuhlmann & Luca Heeb

KNOWLEDGE FOR LIFE



CABI

- **not-for-profit** intergovernmental organisation, established by a United Nations-level agreement
- owned by **48 member countries** (G20: Australia, Canada, China, India, South Africa, UK), which have an equal role in the organisation's governance, policies and strategic direction
- **over 500 staff worldwide** in 12 centres
- addresses issues of global concern such as **food security** and **food safety**, through research and international development cooperation
- major publisher of scientific information – books, ebooks, full text electronic resources, compendia and online information resources



The value of extension

- **Extension services play a key role** in technology and information transfer to lift people out of poverty
 - *Some of the most relevant and appropriate information isn't high tech or innovative, but that doesn't mean the farmer knows about it - the role of extension in informing farmers is therefore crucial*
- Direct evidence linking extension and productivity increases is thin, but existing studies show positive returns

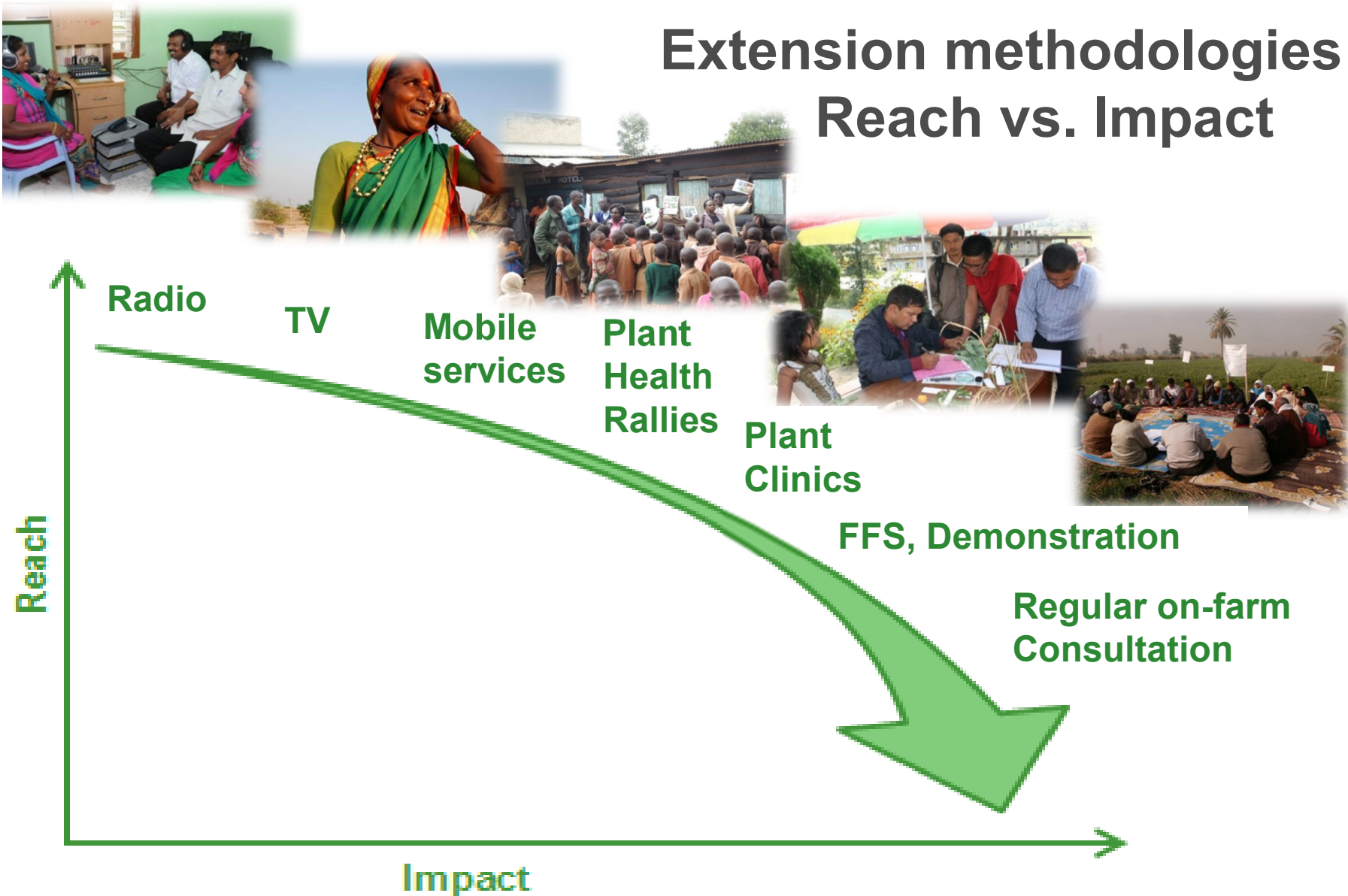
The value of extension

USA	China	Uganda	Ethiopia
<i>Extension alone accounted for 7.3% of annual productivity growth from 1949-2002 and high estimated rates of return (with high variability) of 7-110%¹</i>	<i>Chinese extension, combined with R&D and new technology packages led to >96% adoption of improved varieties of key staple crops by the 1990s, which contributed to 30-40% increase in overall production²</i>	<i>Direct impact from Uganda's National Agricultural Advisory Services Program is estimated to be a 37-95% increase in per capita ag gross revenue from 2004-2007³</i>	<i>Extension participation increased farm productivity by 6% in Ethiopia, but could be as high as 20% if selection bias was not present⁴</i>

1. Wang, S.L., Heisey, P., Schimmelpfennig, D., Ball, E. (2015). Agricultural productivity growth in the United States: measurement, trends, and drivers. United States Department of Agriculture, *Economic Research Report*, 189. https://www.ers.usda.gov/webdocs/publications/45387/53417_err189.pdf?v=42212
2. Key staples include rice, wheat, corn, sorghum, cassava, potato. Xinrong Yu, Vice Minister of Agriculture, official announcement in 2014 (<http://www.chinanews.com/gn/2014/05-20/6189812.shtml>); and interview with Dr. Xuebiao Zhang, Chinese Academy of Agricultural Sciences.
3. Benin, S. et al. (2011). Returns to spending on agricultural extension: the case of the National Agricultural Advisory Services (NAADS) program of Uganda. *Agricultural Economics*, 42, 249-267.
4. Elias, A., Nohmi, M., Yasunobu, K., Ishida, A. (2013). Effect of agricultural extension program on smallholders' farm productivity: Evidence from three peasant association in the highlands of Ethiopia. *Journal of Agricultural Sciences*, 5(8), 163-181.

Source: Transforming Rural Advisory Services in a Digital World, Agriculture Development Programme, Bill & Melinda Gates Foundation, 2017

Extension methodologies: Reach vs. Impact



Source: Heeb L, Jenner W, Romney D, (2016). Promising innovative extension approaches for climate smart agriculture. In 'Supporting agricultural extension towards Climate-Smart Agriculture, An overview of existing tools' www.fao.org/3/a-bl361e.pdf



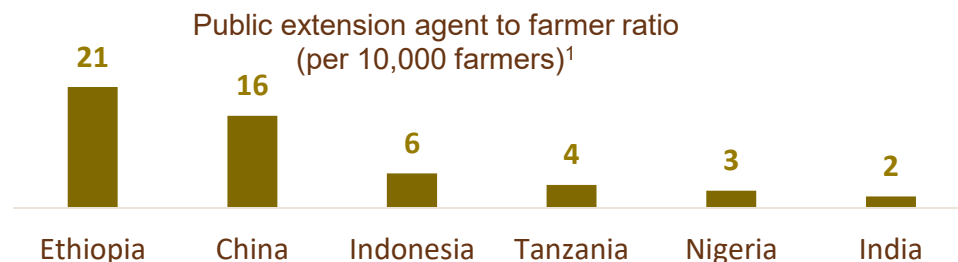
Disconnect between research and extension

- **The disconnect between agricultural research and ground-realities** has led to both underutilisation of proven technologies and lack of development of farmer-friendly solutions
- A **key role** in putting information, skills and tools into farmers' hands is played by **national extension systems** (public and private)
- However, these extension systems often **suffer from chronic understaffing**, lack of institutional capacity, limited operational funds, and weak linkages to other players such as research
- Weak extension systems **leads to limited reach and scalability for full inclusion, adoption and impact** and as well as **inability to respond quickly to new agricultural threats** (e.g. invasive pests, climate change)

Farmer access to extension



Vast majority of smallholders have little access to public extension agents...



...or any source of information overall

Only **38%** of smallholders have access to any information²

And women have even less access...

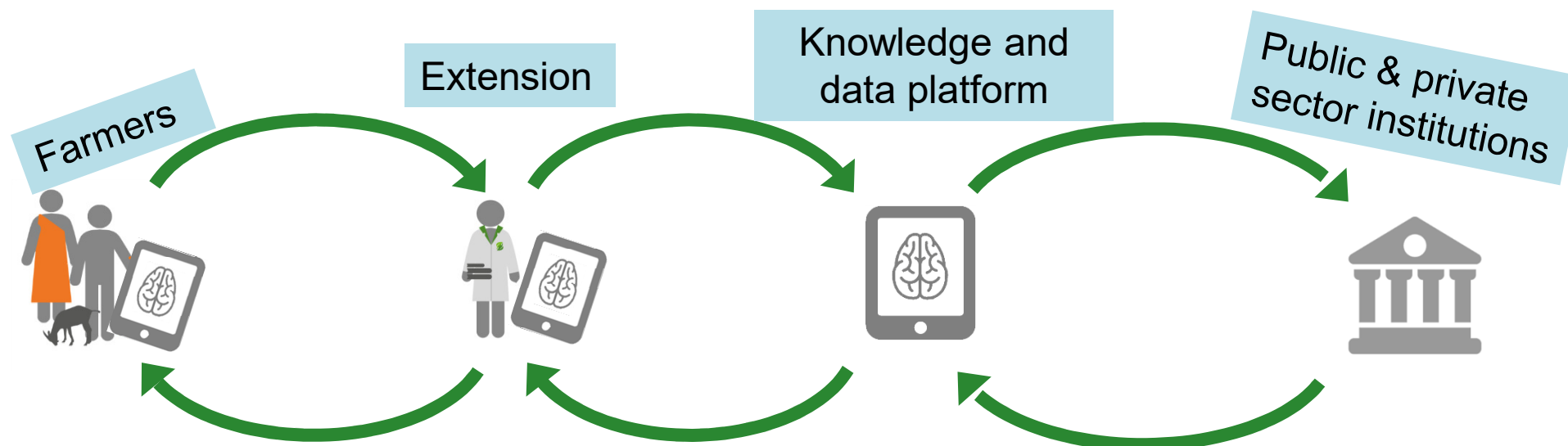
Smallholder access to extension in 1 year (Ethiopia, 2014)³



1. Bachewe, et al. "Agricultural Growth in Ethiopia (2004 – 2014): Evidence & Drivers." Ethiopian Development Research Institute & IFPRI, Working Paper 81, October 2015.
2. Adhiguru, P., BIRTHAL, P.S., Kumar, B.G. (2009). Strengthening Pluralistic Agricultural Information Delivery Systems in India. Agricultural Economics Research Review, 22, 71-79. (Not inclusive of mobile based data.)
3. Michael Mann & Janes Warner, "Ethiopian Wheat Yield and Yield Gap Estimation: A Small Area Integrated Data Approach." IFPRI, March 2015.

Source: Transforming Rural Advisory Services in a Digital World, Agriculture Development Programme, Bill & Melinda Gates Foundation, 2017

Digital-enabled extension system



Digital development helps to overcome constraints in extension delivery:

- Limited availability of national funds for inclusive extension delivery
- Limited interaction and knowledge sharing between players
- Limited capability to provide and develop farmer-friendly, research based solutions
- Limited two-way flow of knowledge and information
- Limited capacity for quality assurance
- Limited interest of youth to undertake a career in extension

Source: Plantwise webpage: www.plantwise.org

Digital tools to improve extension

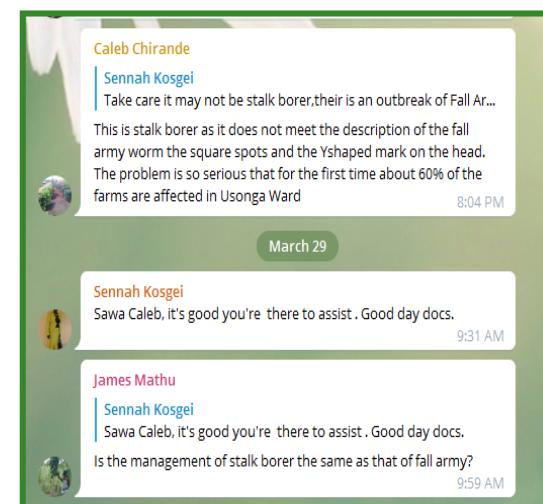
Web portals and applications



Mobile services



Communication apps



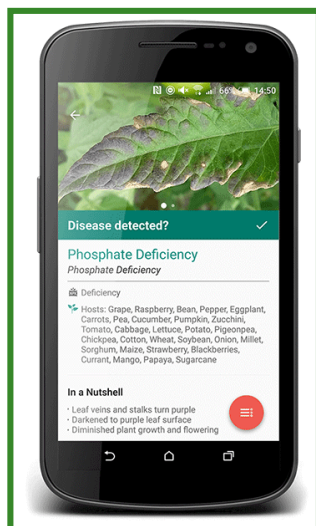
...to enable extension organisations to store, share and access country-specific information and tools

...to provide targeted SMS services across the whole agricultural supply chain

...to exchange knowledge, raise awareness and improve linkages between stakeholders

Digital tools to improve extension

**Image recognition
and crop advisory
apps**



**Educational apps
(serious games)**



Data collection tools



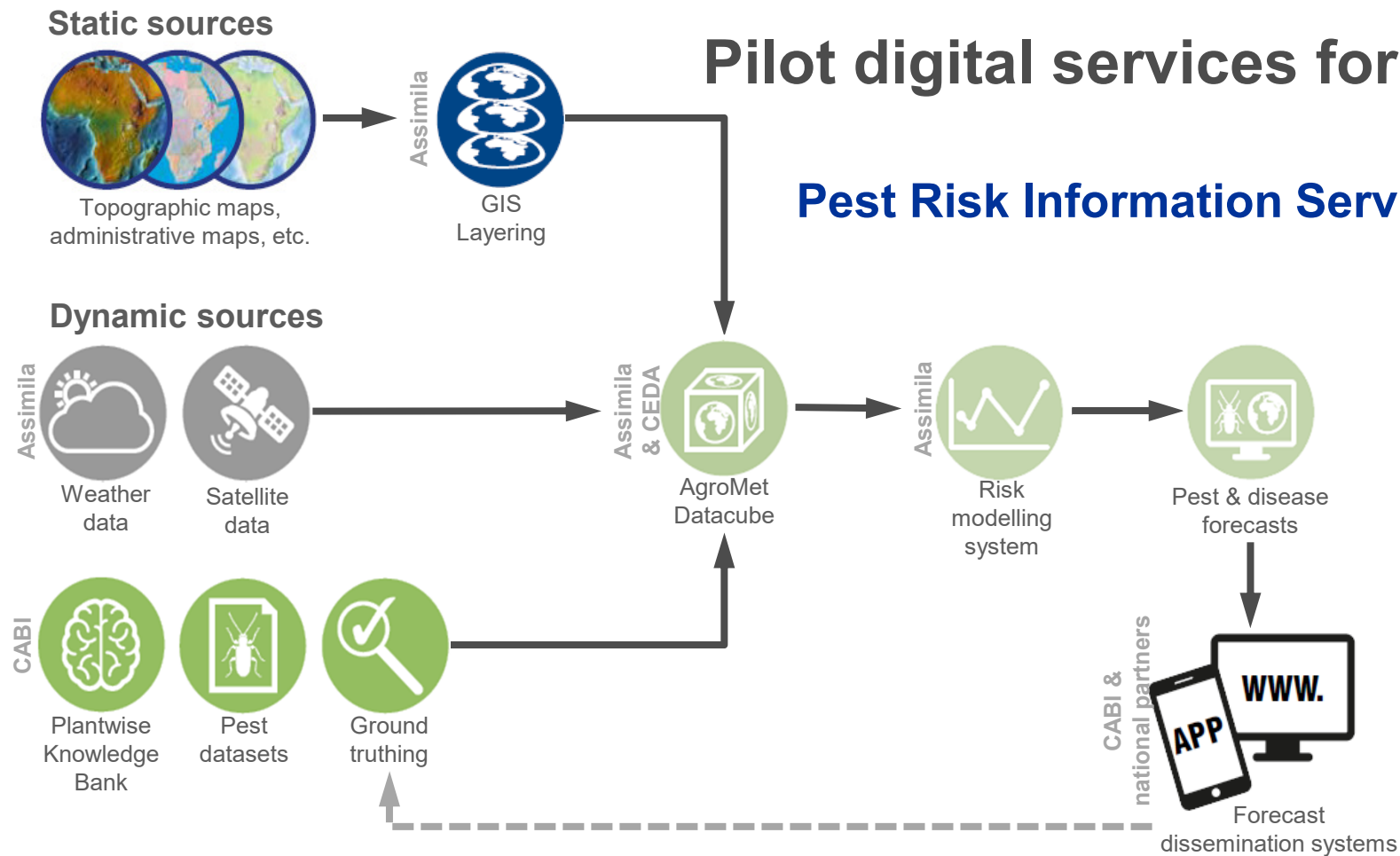
**...to improve
diagnostic services
and management
advice**

**...to make learning
fun, even in a
professional
environment**

**...to increase data
volume and speed of
data delivery**

Pilot digital services for extension

Pest Risk Information Service (PRISE)



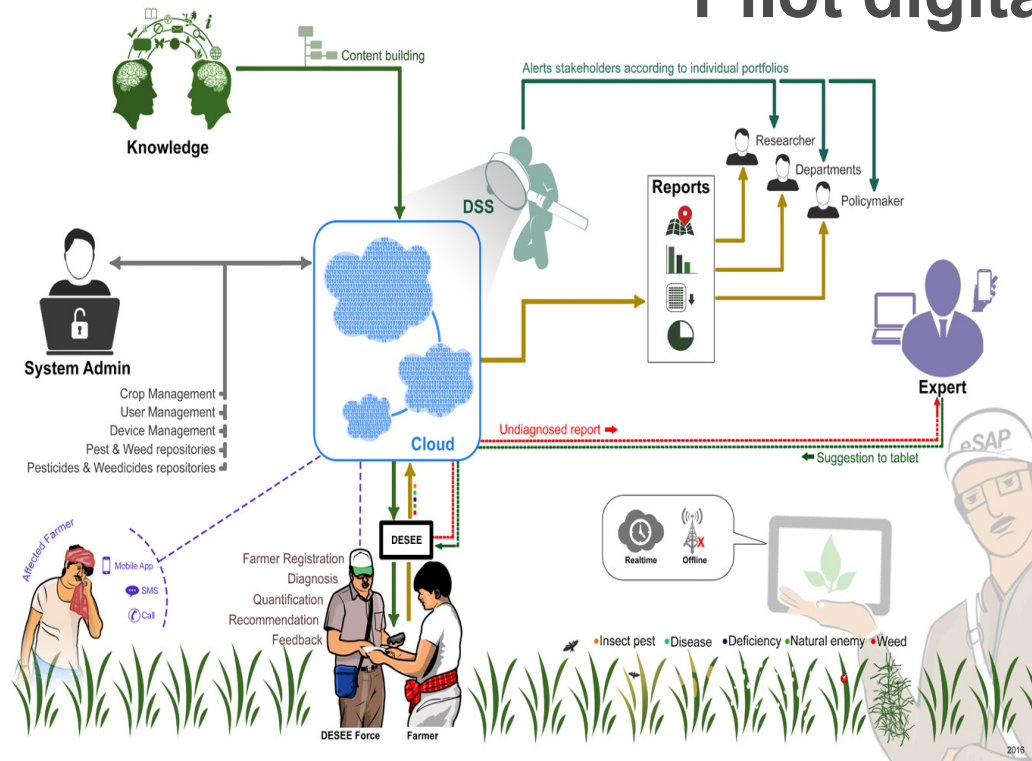
Brings together:

- Earth observation technology
- Plant health modelling
- Real-time field observations

➤ Widely communicates pest forecasts and appropriate action to take

Source: <http://www.spaceforsmartergovernment.uk/ipsp/>

Pilot digital services for extension



- An India-based start-up (Bhoomee) is facilitating a one-stop platform for farmers with the aim of empowering them to make agriculture a sustainable business

Stakeholders	Activity
University of Agricultural Sciences (Knowledge Partner)	Training DESEE force advisors; Content Development
DESEE force (Implementation Partner)	Unemployed youth trained to be private extension officers
M5 (Implementation Partner)	Identifying, recruiting and managing DESEE force in action
Tene Agro (Technology Partner)	Developing software for the tablets for DESEE force

- Plan to scale-up by 2020 to a total of 6 states in India, targeting about 6 million farmers

Source: DESEE Force,
<http://bhoomee.co.in/Aboutbhoomee/AboutBhoomee.aspx>

Other digital opportunities for farmers

Digitised financial services



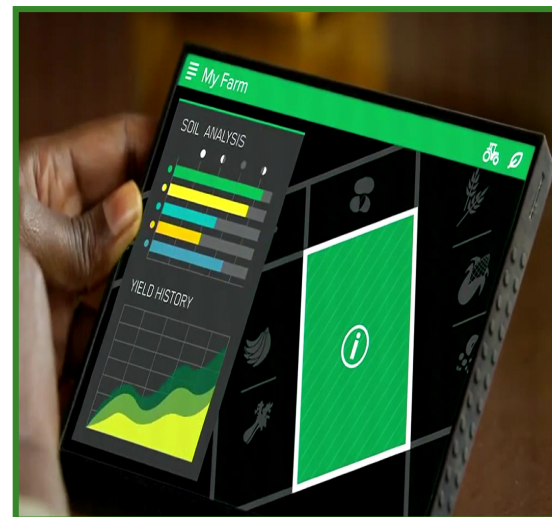
... to enable farmers to invest in improvements in farm productivity, mitigate risk and improve resilience

ICT-enabled market linkages



... to translate productivity gains into increased farmer incomes

Self-service farm management solutions



... to boost farm profitability and empower farmers to transition from smallholders to small businesses

Source: Transforming Rural Advisory Services in a Digital World, Agriculture Development Programme, Bill & Melinda Gates Foundation, 2017



Conclusions

- CABI believes that digital development and open/big data¹ will have a transformative power because it can enable:
 - **Transformation of scientific information into practical, actionable knowledge** that addresses real needs
 - **Two-way flow** of information and agricultural data, while respecting the 'FAIR principles'²
 - Recognition of **farmer heterogeneity/diversity**
 - Use of **inclusive and complementary communication channels** to facilitate stronger linkages
 - **Cost-effective opportunities** to systematically assess performance and ensure effective services

¹ www.godan.info ; ² www.force11.org/group/fairgroup/fairprinciples



Recommendations

- Considerable public and private investment in **digital development will facilitate impact at scale**:
 - **Greater adoption rates**
 - **Increased farmer income & yields**
 - **Cost savings for public systems**
- CABI's recommendations, in line with G20 Agricultural Ministers' Action Plan (Jan 2017):
 - Improve digital infrastructure to enable greater access to ICT-solutions
 - Improve capacities of extension workers and farmers to adopt and benefit from ICT-solutions
 - Implement appropriate measures to address data privacy and data security, within the open-data initiatives
 - Ensure effective delivery of targeted and needs-based information to relevant end users



شكرا جزيلا
mercí
शुक्रिया
zikomo
xie-xie
obrigado
efharistó
ありがとう
kiitos
thank you
tak
gracias
zikomo
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terima kasih
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