



Big data in agriculture: sow today if you want to reap tomorrow

Ref: 2017P02-LB-SC-TERA-Big Data and Agriculture

TERA Consultants
39, rue d'Aboukir
75002 PARIS
Tél. + 33 (0) 1 55 04 87 10
Fax. +33 (0) 1 53 40 85 15
S.A.S. au capital de 200 000 €
RCS Paris B 394 948 731


“Big data is like teenage sex; everyone talks about it, nobody really knows how to do it, everyone thinks everyone else is doing it, so everyone claims they are doing it.”

Contacts: Laurent BENZONI: benzoni@tera.fr
Sara CLIGNET: clignet@tera.fr

Prof. Dan Ariely (MIT)

March 2017

Context

- 
- The digital realm and its new frontier, big data, has made inroads in agriculture.
 - Innovations are driving game-changing initiatives across the sector (equipment manufacturers, seed producers and suppliers, crop protection products, farmers, breeders, etc.).
 - Farms and farmers are an initial link in the food chain, they produce, collect and use data. They contribute to and are impacted by the advent of big data in agriculture, called agritech.
 - Today's players, both private and public, collect data which can be shared.
 - Agriculture is questioning an agritech ecosystem based on big data. Key issues include:
 - *Mutualizing data of individual farms for direct valuation (monetizing data) or indirect rise in the value of applications using the data.*
 - *Building a portal for farmers to aggregate their data and use an open data model to drive innovation and give value to their aggregated data, for today and tomorrow.*
 - *Defining the role that professional organizations and unions can play in light of current projects in agritech abroad and in other industries.*

Big Data, open data



Definitions:

Big Data: collecting massive amounts of data, *structured and/or non structured*, to store and analyze (deep learning), for prediction and decision-making.

Open data is a means to organize big data

Open data: mechanism which gives third parties access (on an exclusive or non-exclusive basis) to data which are collected by private and/or public entities. Data may be free or purchased. The term *Open* is also used for software, such as *open source*, or in R&D, *open innovation*, and refers to pooled resources.

Agriculture and big data: an emerging world

Agritech is part of Big Data. Digital agricultural data grows by the day as:

- *Equipment is digitalizing (tractors, harvesters, field sprayers, milking machines, irrigation systems, pedometers),*
- *Sensors are cheaper and easier to deploy across the board; Internet of Objects: sensors in fields, crops, buildings and on animals.*
- *Producing new images: satellites, drones, cameras, etc.*

As expected gains are high... the stakes are too

Agritech has leading projects in big data:

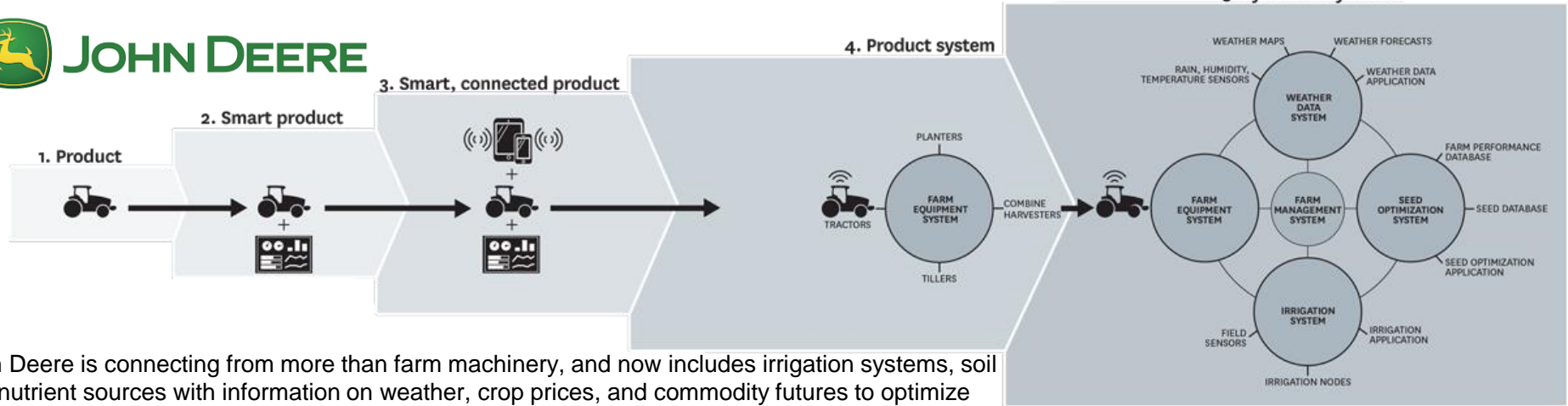
- *Improving yields (7 to 12q/h for corn in the USA)*
- *Optimizing crop health protection and treatment*
- *Preventing and managing risk*
- *Saving energy*
- *Improving traceability and transparency*
- *Using decision-making tools to select products, as well as make purchase and sales decisions*
- *Enhancing local and regional synergies*
- *Sharing best practices*

Many players see the gains to be reaped and want to benefit from the added value. More, with today's technological changes, they want to redistribute the value they generate.

- *The many initiatives are varied: My John Deere, Monsanto's Fieldscript, Farm Mobile (venture capital), Farm Business Network (Google), AgriPlace etc.*



Incumbents and their strategies: from product to system, from selling goods to providing services.



John Deere is connecting from more than farm machinery, and now includes irrigation systems, soil and nutrient sources with information on weather, crop prices, and commodity futures to optimize overall farm performance. John Deere is broadening and redefining the industry. (Source: M. Porter, Hedelmann, Harvard Business Review, 2014).

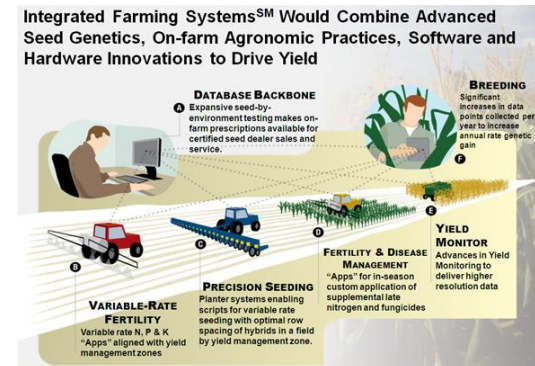
MONSANTO

FieldScripts

THE CLIMATE CORPORATION

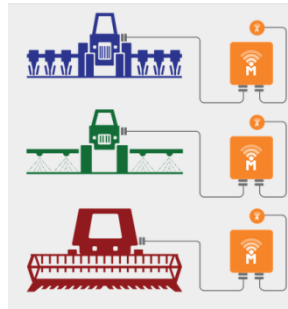
Precision Planting

150 billion data bytes on soil (Fieldscripts tracks 500 million acres).

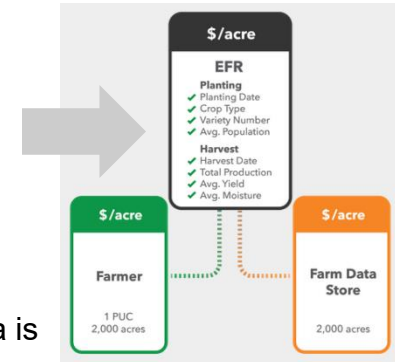


Source: corporate Internet sites

New entrant strategies: collaborating by using externalities



The PUC sensor, \$1 250/sensor/year (including telecoms subscription). With uploaded data, the site produces a standardized data sheet: planting dates, crop varieties, number of acres, harvest information...

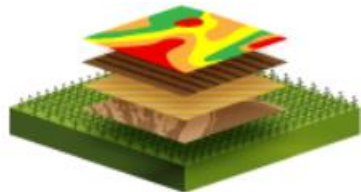


Individual data sheets are the farmer's proprietary data. S/he decides to sell them or not. If the data is sold, the site handles the transaction and the proceeds are split 50/50 between the farmer and Farmobile. In 2016, a full data sheet sold \$4 per acre.



FARMERSSM
BUSINESS NETWORK

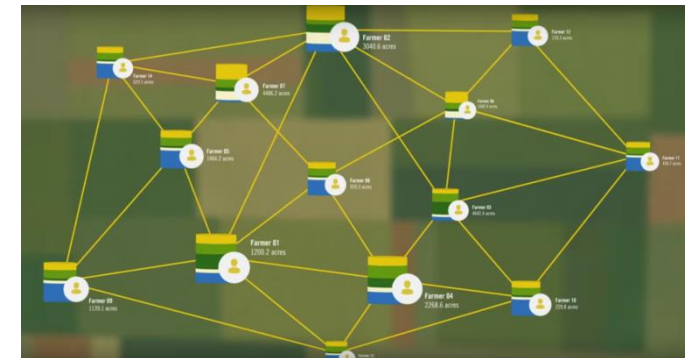
A premium social network to share information, take better decisions and to serve as a platform for grouped purchases and sales. All data is valued: soil, harvest, crop protection, sales purchases, etc.,



Agronomic Intelligence

Data can be made anonymous for other members. Data status isn't public (does the operator keep the data? Resell it?).

The site explicitly states that the larger the network, the greater the value of the information shared. The site refers to gains linked to better decision making processes and purchases (ex. Brand name seeds versus generic brands). Site with Google as sellers.



Source: corporate Internet sites

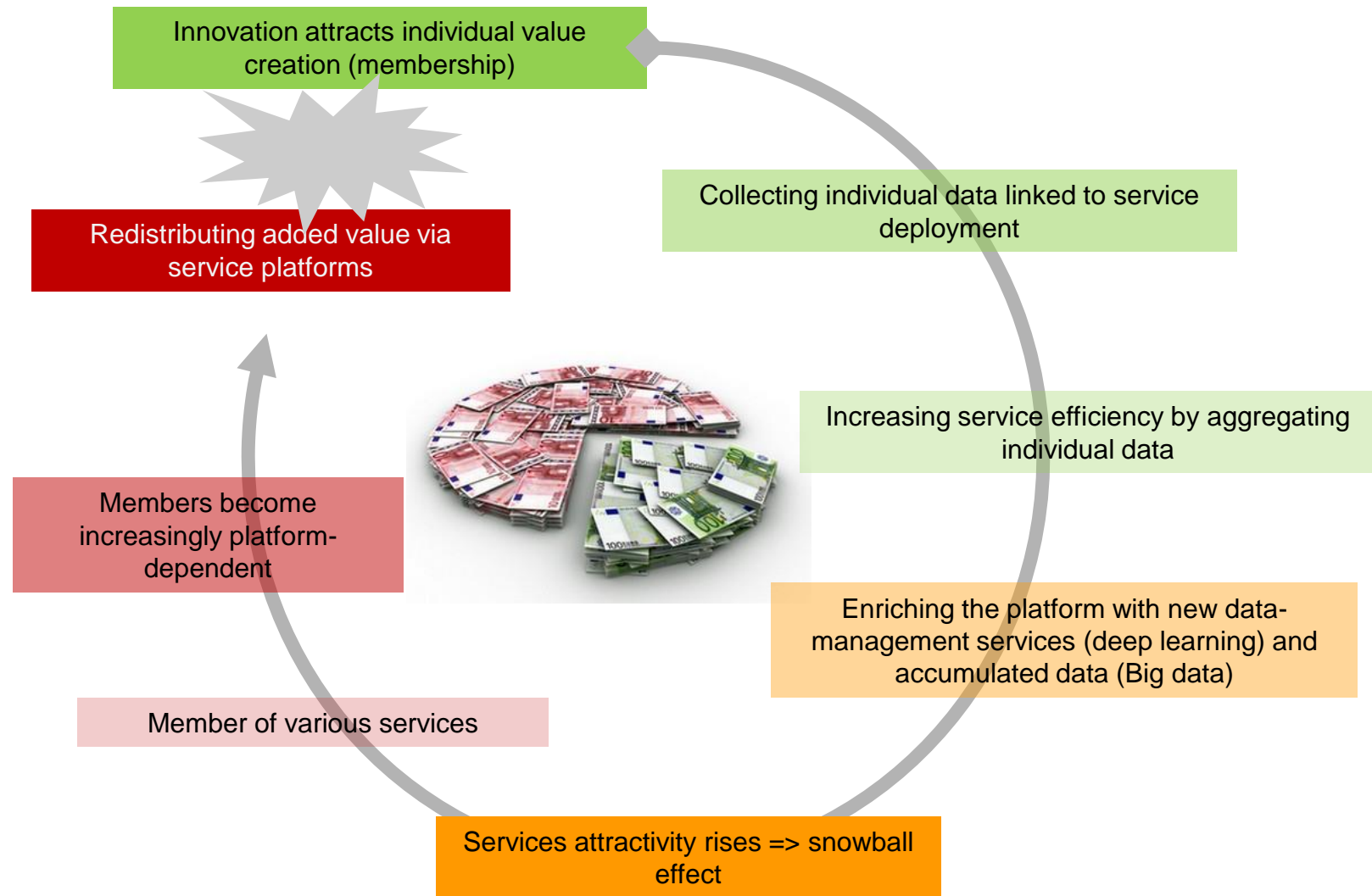
Property of Tera Consultants

Economic analysis of Big data: lessons for farmers


- Data value (predictive and prescriptive capacities) is all the greater as value is diverse in terms of scope and source. Value is tied to interdependence, also referred to as **positive network externalities**. Each individual retains value from being a network member, and also gives the network more value because of their membership. The more members, the greater the network's muscle.
- Big data's economic mechanisms in agriculture mirror the mechanisms in other sectors. When **critical mass of members is reached**, the externality generates a **cumulative effect**. A single member retains greater benefits from being part of the largest network. The member's individual potential rises with its appeal. The network with critical mass reaps market growth (**snowball effect**) and leaves competitors behind (**winner take all**). As the market **concentrates**, the dominant player can redistribute the value it has created (cf. search engines, short term rentals, social networks, chauffeur services, video streaming, etc.)
- Obligatory data collection and acquisition mechanisms are **key to the start-up phase**, since collected individual data has little value. Data becomes valuable when it is aggregated in volume and analyzed.
- **Player strategies need to** be viewed bearing this mechanism in mind. For example, Monsanto's purchase of The Climate Corporation for US\$1 bn reflects the same strategy as Facebook's (US\$15 bn) purchase of WhatsApp or Instagram, or Microsoft's (US\$16.1 bn) acquisition of LinkedIn. The price tag is only justified by data's forward-looking value.



From innovation's promises to platform-dependent farmers?



Key questions?

- 
- Is agritech just starting or is the spiral for farmers towards platform dependence irreversibly underway?
 - Where do various agricultural industries stand in terms of digitalization?
 - Does data aggregation have the same appeal on a local, regional, national and international scope?
 - Do small, local agritech players have a future or are they already preyed upon by global players?
 - Who will dominate? Today's Internet giants who are new agritech entrants (GAFA: Google, Amazon, Facebook, Apple, Microsoft) or industry leaders (like DEAMON: Deere, AGCO, Monsanto,...)? Start-ups or others?
 - In a framework where the spotlight is on constant technical innovation, what can farmers do to retain control over and value of their data?
 - What role do national telecommunications companies play and can others take on: deploying networks on a given territory (Lora, Sigfox, 5G, etc.), neutral data guardians (cloud), third-party management (open data, free and/or premium) ?
 - What role can agricultural organizations play: data ownership? Certify agritech players and oversee the fair use of individual data (property, portability, exclusivity, etc.)? Participate directly and/or indirectly to back initiatives, create data via agricultural coops to be used by members or sectors (portals, social networks, dedicated servers)?