Modelling & Data Analysis for Agriculture Network

www.modelia.org

Digital Agriculture Network

numerique.acta.asso.fr

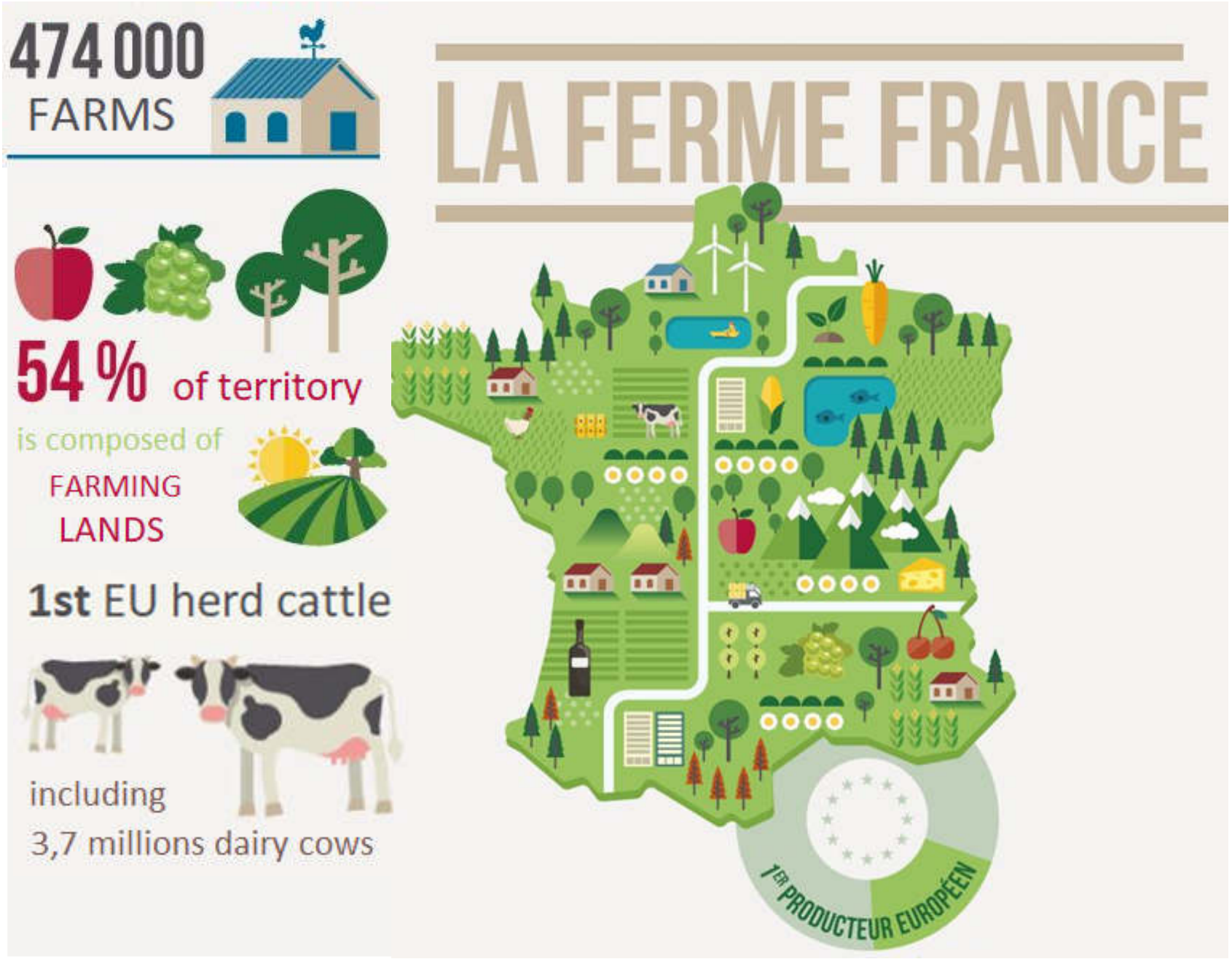
AgTech – Digital Agriculture
Current development in France

François Brun & Théo-Paul Haezebrouck

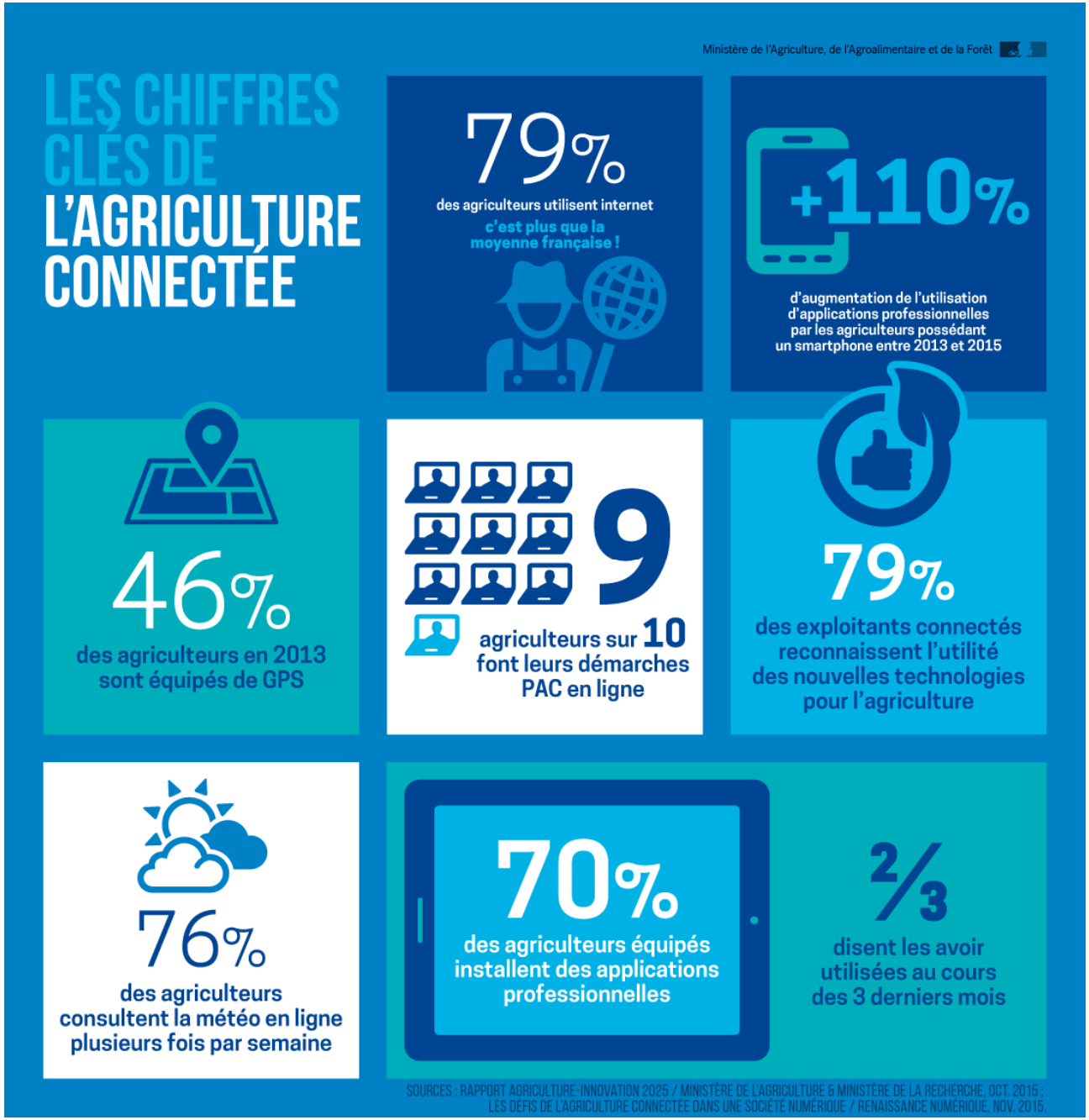
ACTA – French Technical Institutes

Big Data, a multiscale solution for a sustainable agriculture
September 20-21, 2017
Copenhagen, Denmark

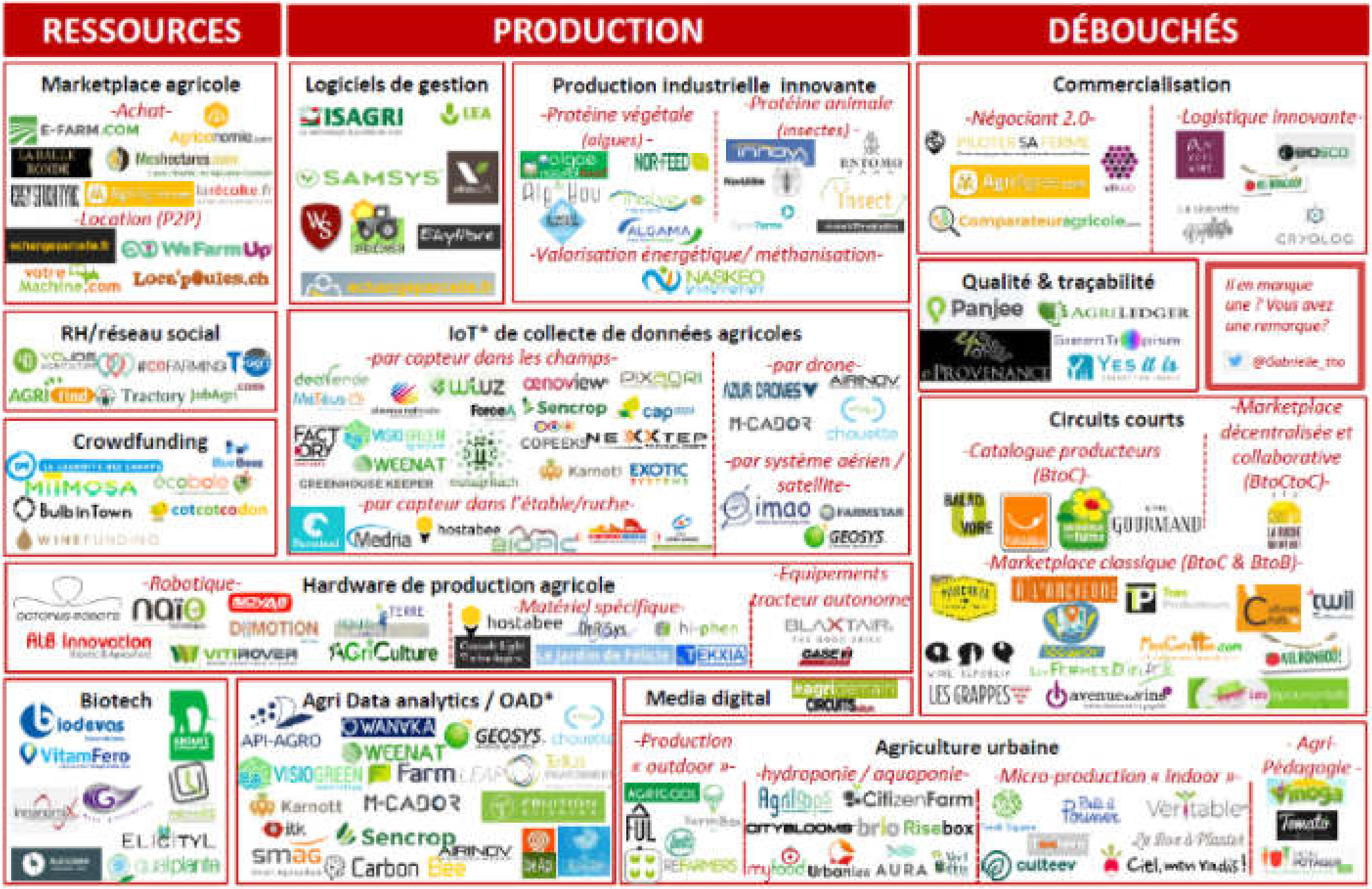
What do we farm in France ?



How digital comes into farms ?



What we learn from 180 AgriTech companies



How agri R&D structure to answer these questions

ACTA Digital and Agriculture Network

API-AGRO: French data portal of agriculture

#DigitAg: research (thesis) on digital agriculture

AgroTIC: consortium of companies and universities

Modelling & Data Analysis for Agriculture Network

www.modelia.org

Digital Agriculture Network

numerique.acta.asso.fr

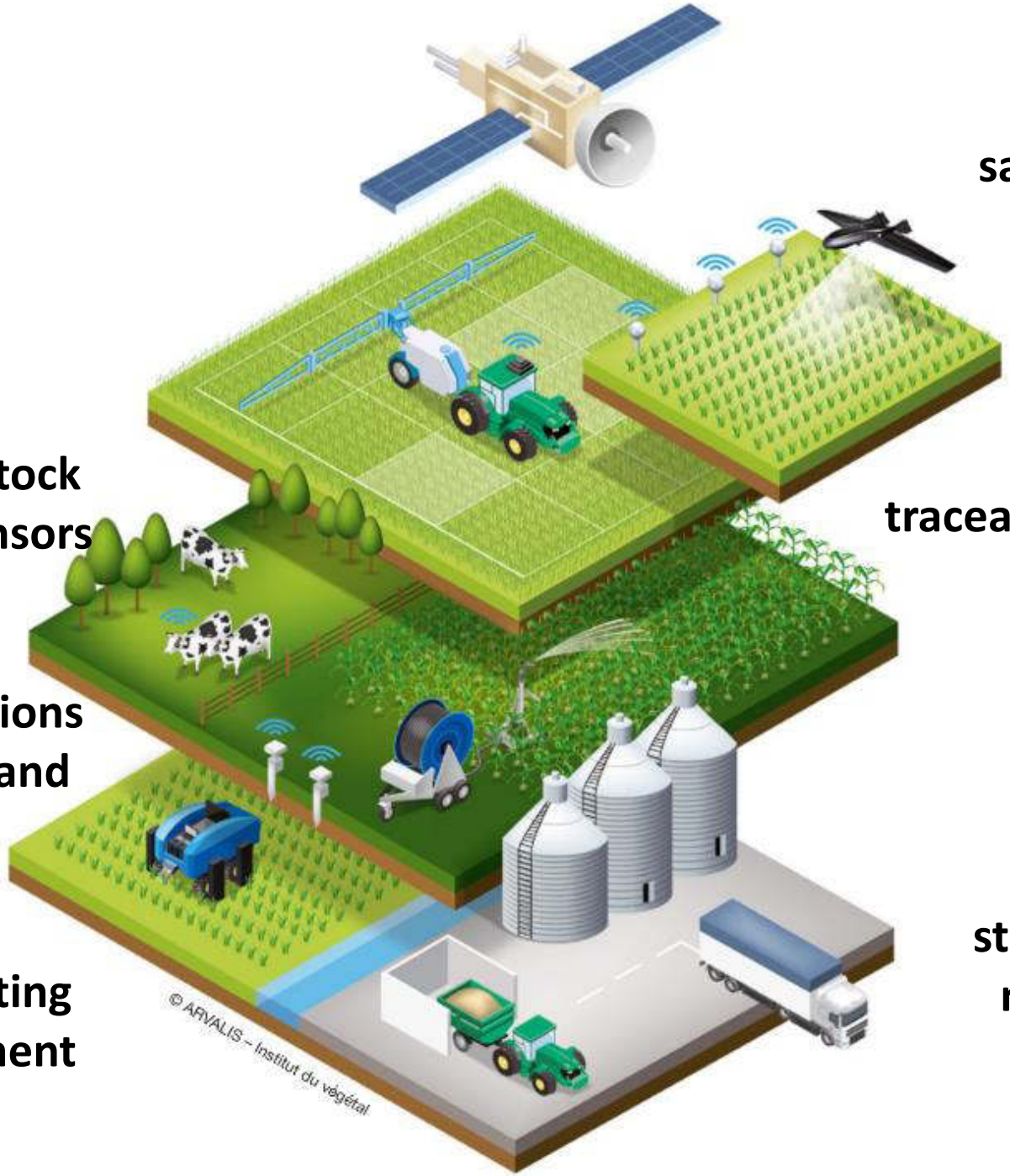
Examples of Data valorization for the agricultural sector

François Brun & Théo-Paul Haezebrouck

ACTA – French Technical Institutes

Big Data, a multiscale solution for a sustainable agriculture
September 20-21, 2017
Copenhagen, Denmark

Diversity of data at the farm level



satellite or drone spatial data

field and livestock monitoring sensors

traceability of technical operations

data based decisions for automation and robotics

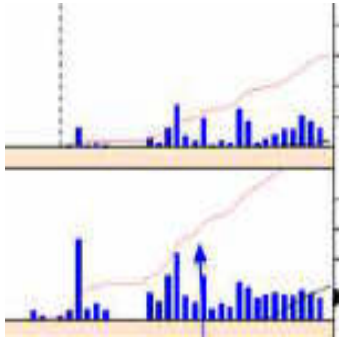
stock & logistics management

digital accounting and management buy/sell

Types of data ?

- Manual input

- Sensors data

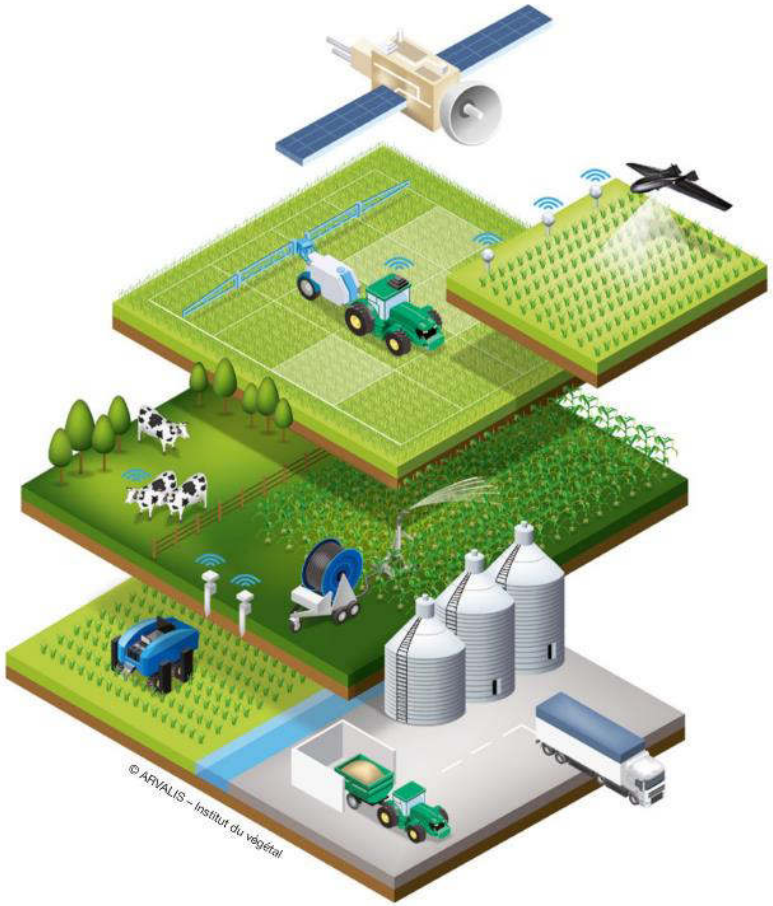


- Simulations data

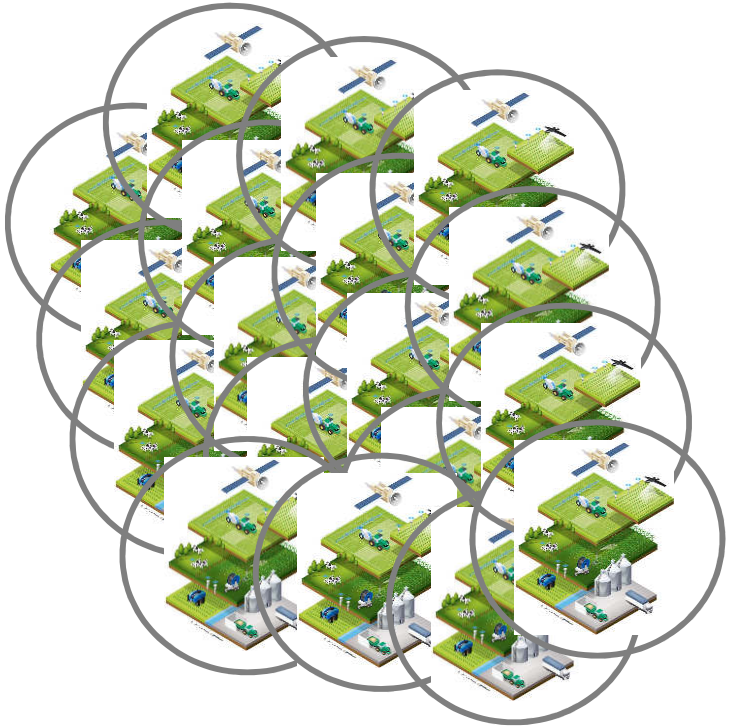
Diverse data …. to ….

Big Data

Field/Farm Level



Regional Level



Potential

Monitoring
Decision Support

Collective and Digital Intelligence
Improvement of predictive models

Crowd sourcing to estimate regional/national yield in real time

1) Farmer registration

2) Collection of yield data during harvest

3) Real time estimations

⇒ **Simple crowd sourcing for collective use**

(Sources : Arvalis, Terres Inovia, ITAB, direct-moissons.arvalis.fr)

Crowd Sourcing and Benchmark

Comparison of

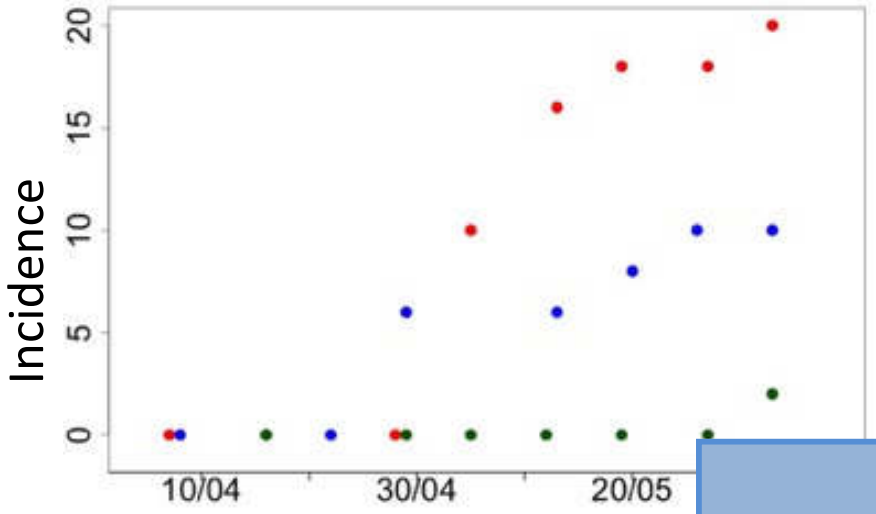
- **prices of inputs**
- **agronomic practices**
- **agronomic performance**
- **economic performance**
- **…**

⇒ Collective data for individual progress

(Sources : www.farmersbusinessnetwork.com, www.farmleap.com

Building predictive tools for plant health

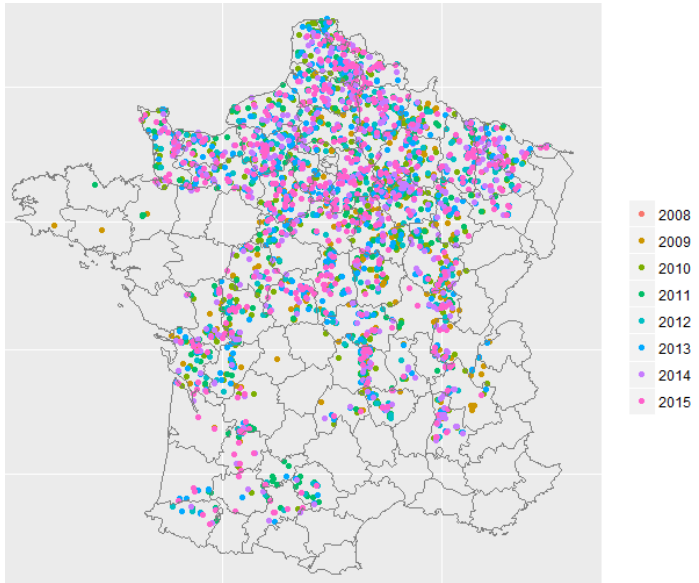
Incidence time series : few sites



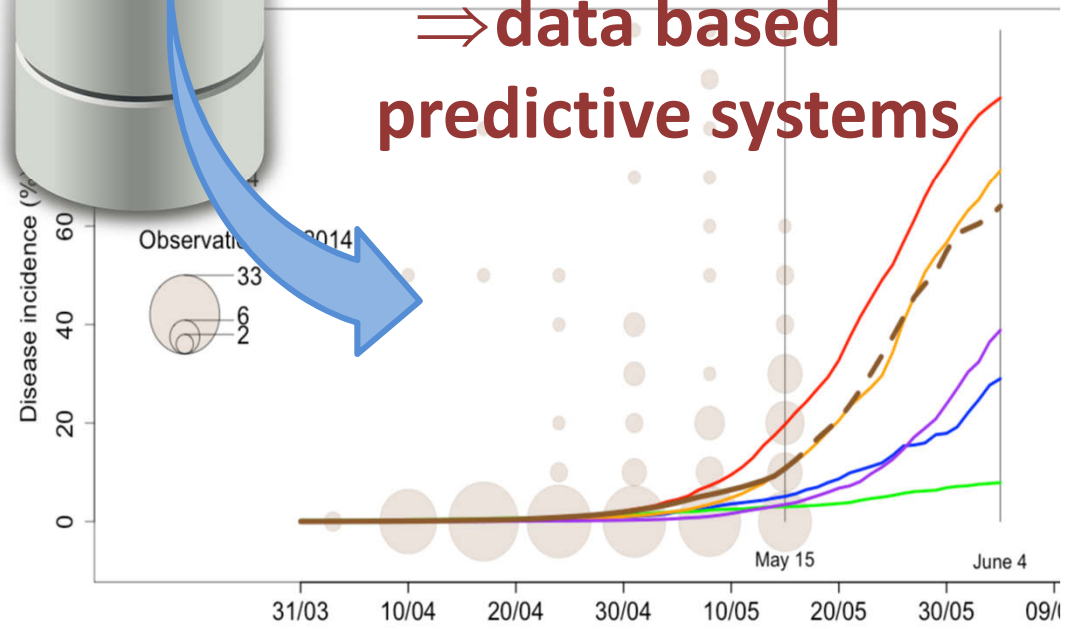
Others databases :
weather, resistance,…

Millions of data

Multi-annual observation network



⇒data based predictive systems

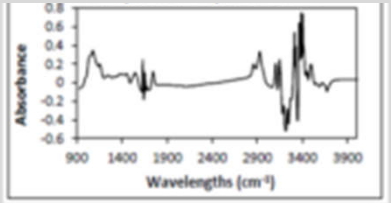


Sources : ACTA-INRA-Arvalis, Michel et al, 2016

Analysis of milk quality

dairy control : spectral analysis

Individual spectrum



International database

AREA		RECORDED COWS	
BE		72,236	72,236
FR		2,459,434	36,865
			55,689
			186,146
			82,416
			2,098,318
DE		627,640	284,612
			343,028
IE		564,229	564,229
UK		491,266	491,266
LU		35,344	35,344
NWE		4,250,149	

Standardisation of spectrum + datascience

$$y = X\beta + Z\gamma + \varepsilon$$

- Data patterns
- Modeling data
- Exploratory Analysis

⇒ **Precise milk quality predictions based on standard analysis**

(Sources : OPTIMIR-IDELE, goo.gl/7MwJ8d)

Honeybees monitoring & predictions

Automatic weighing machine on beehive

weight monitoring

+

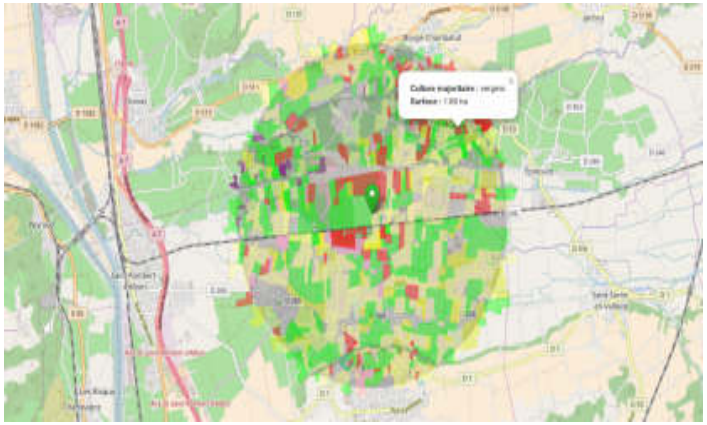
Beekeeper operations

+

Weather conditions

+

Landscape occupancy

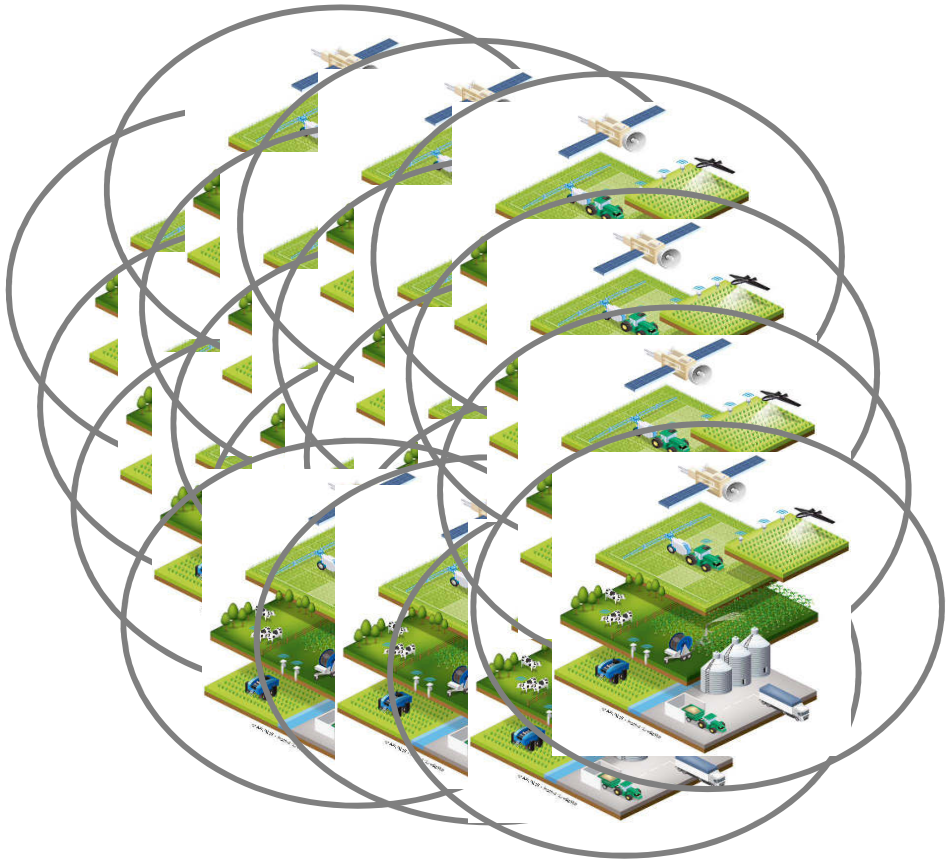


=

Prediction of honey accumulation ?

(Sources : ITSAP, itsap.asso.fr/projet_recherche/miellees

Potential applications



For farmers

- Technical and Economical Benchmarking
- New predictive tools

For agricultural cooperatives

- Better planning and production estimate

For the environment

- More efficient systems

Current situation

- Consolidation : Individual data => Collective data

(data exchange, standardization, API)

Today : tools exist, but issues on access and property

- Basic service : Collective data => Benchmarking

(crowd sourcing, simple statistic summaries, contextualization)

Today : more and more tools exist

- Higher level of service : Collective data => Predictive

(data science, crossing different databases)

Today : No really exciting tools, but active investments on this field

Modelling & Data Analysis for Agriculture Network

www.modelia.org

Digital Agriculture Network

numerique.acta.asso.fr

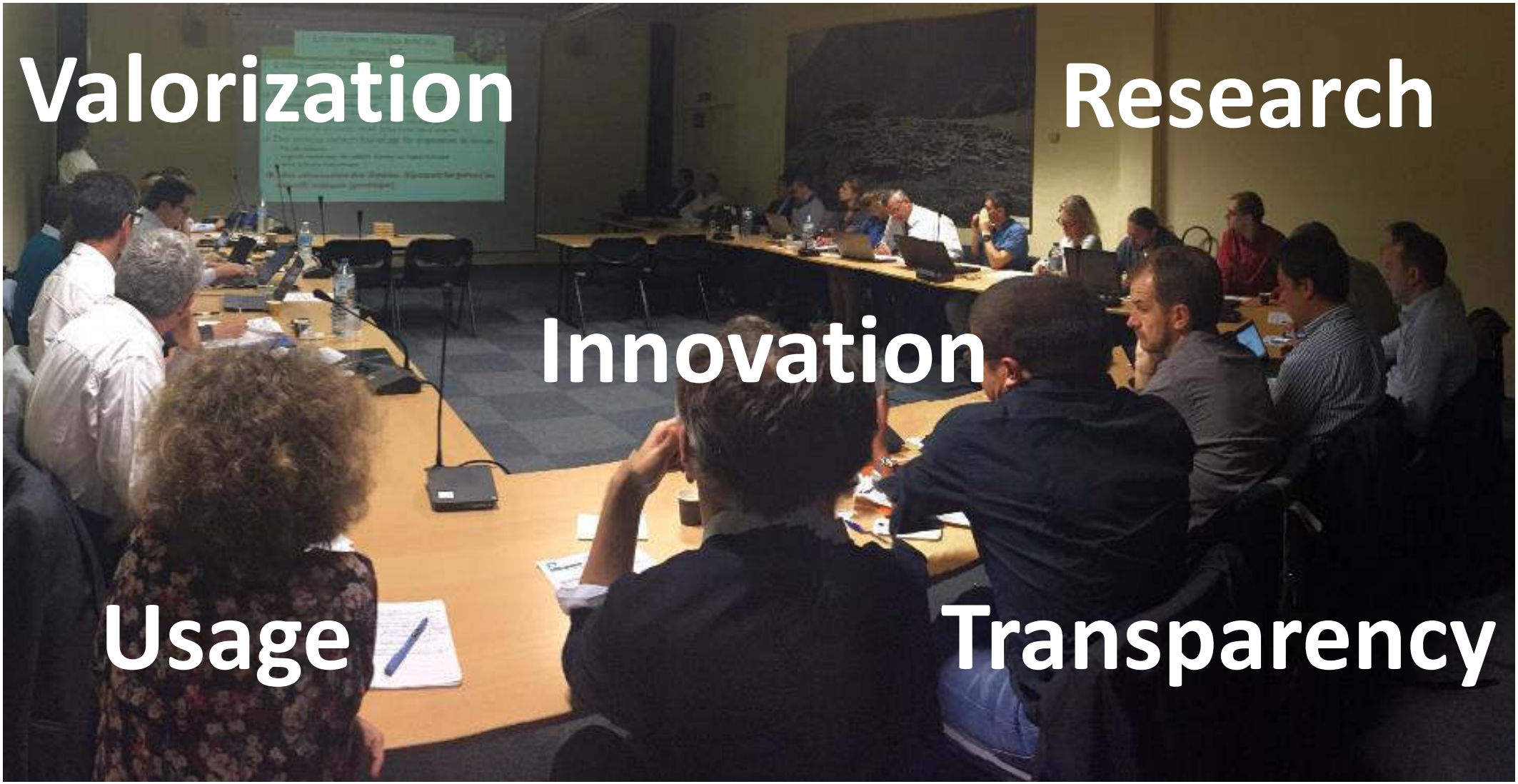
10 recommendations to favor the access and the valuation of data White paper of the French Technical Agricultural Institutes

François Brun & Théo-Paul Haezebrouck

ACTA – French Technical Institutes

Big Data, a multiscale solution for a sustainable agriculture
September 20-21, 2017
Copenhagen, Denmark

Exchanges on the issue of data access (2015-2016)

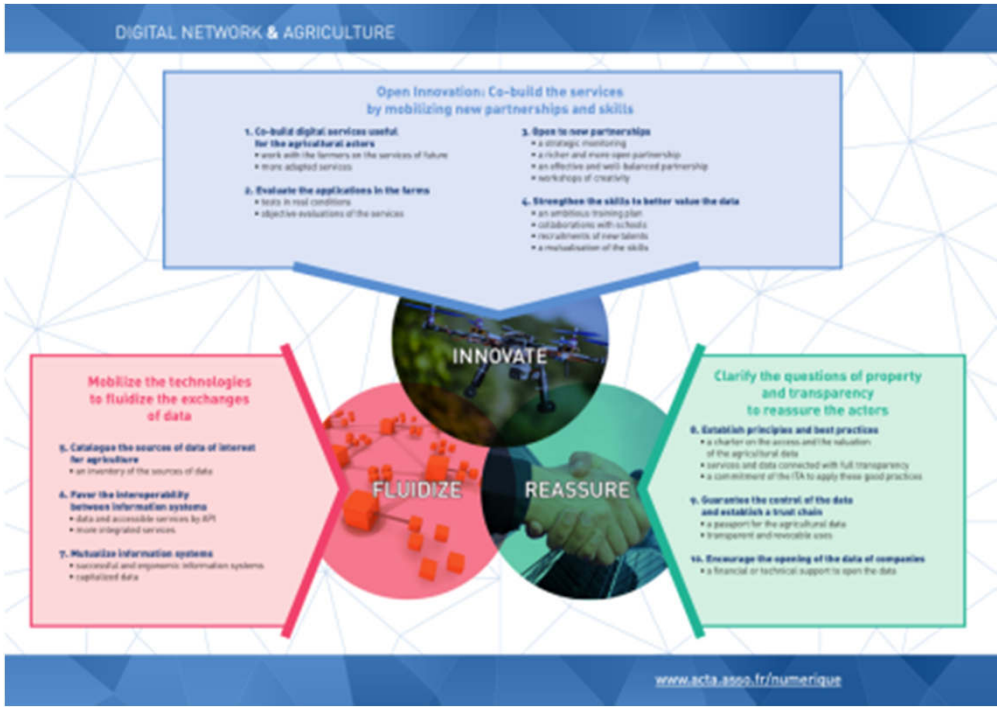


Formalized as a white paper at the end of 2016

Available for free :

www.acta.asso.fr/numerique

with a summary in English



Let us look ahead a near futur…

Technological context

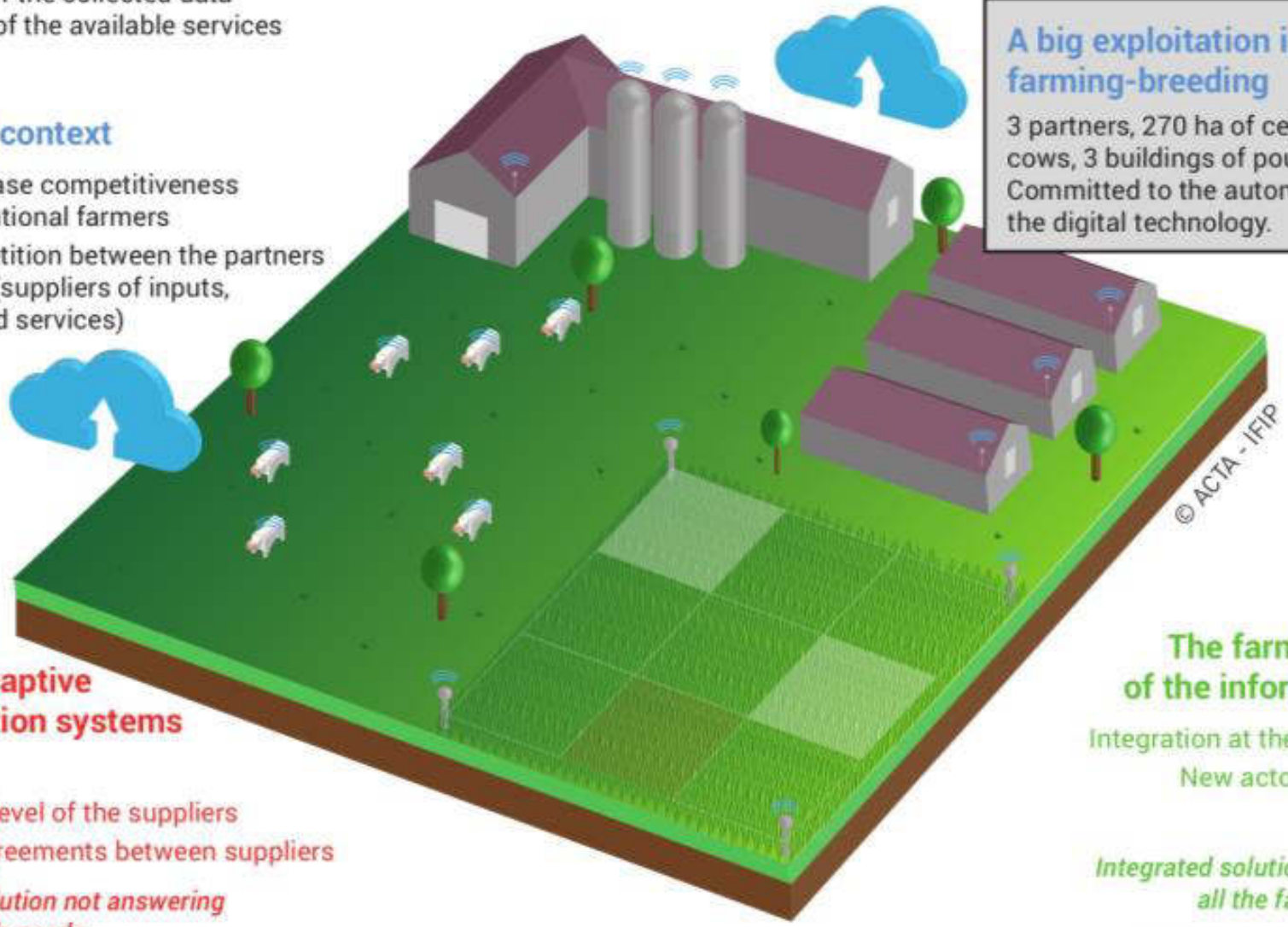
- Mature technologies and plethora of offers at low cost
- Proliferation of the collected data
- Proliferation of the available services

Agricultural context

- Need to increase competitiveness for the conventional farmers
- Strong competition between the partners of the farmer (suppliers of inputs, equipment and services)

A big exploitation in mixed farming-breeding

3 partners, 270 ha of cereal, 150 dairy cows, 3 buildings of poultry farming. Committed to the automation and to the digital technology.



The farmer is captive of the information systems of the partner

Integration at the level of the suppliers

Exclusive trade agreements between suppliers

Integrated solution not answering all the farmer's needs

The agricultural R&D disconnected from the modern agricultural world

Difficulties of accessing to the data

Impossibility to compare and estimate the innovative services

The farmer at the heart of the information system

Integration at the level of the farmer

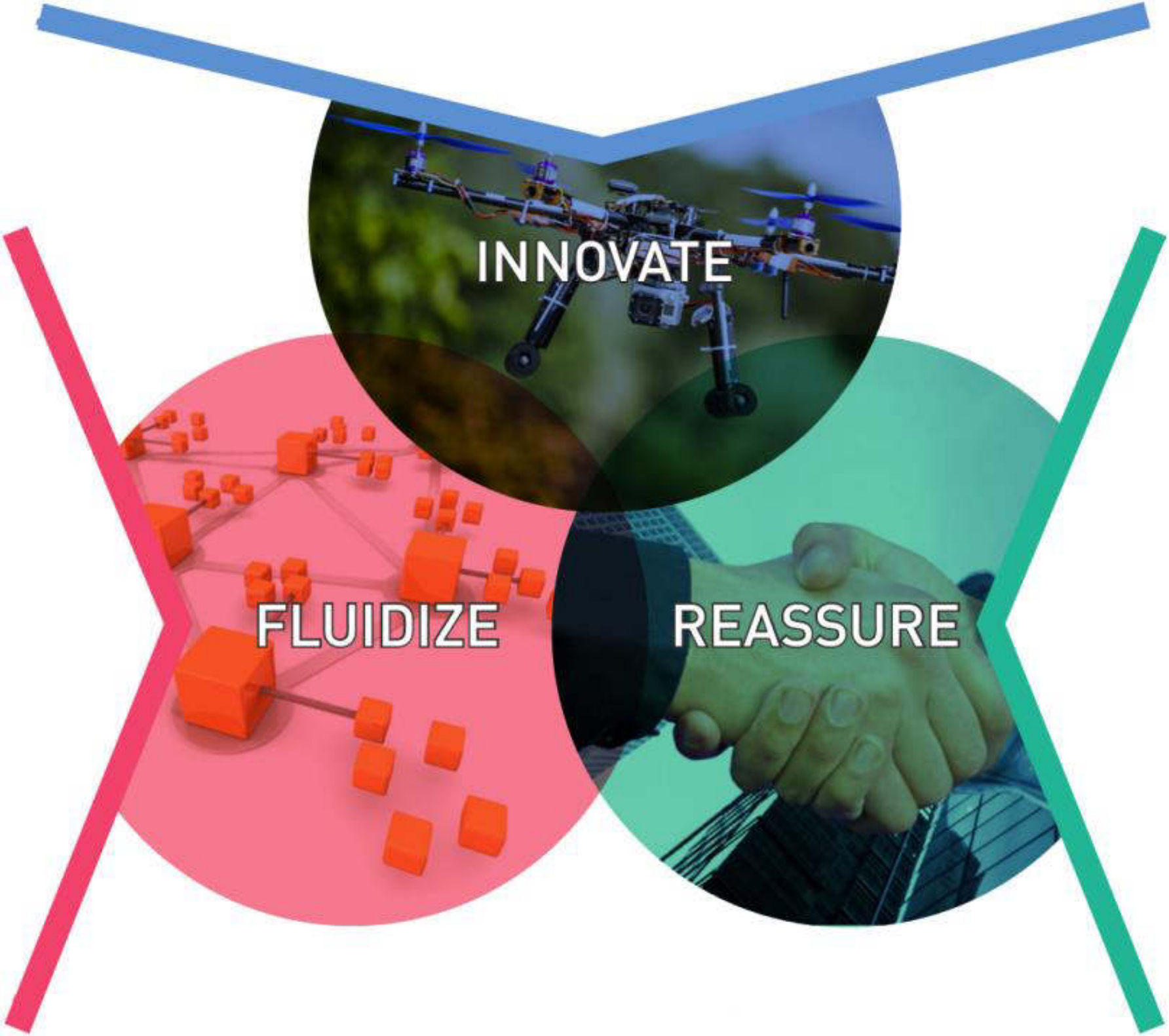
New actors integrating data and valuing them

Integrated solution answering all the farmer's needs

An efficient agricultural R&D and representative of the agricultural world

More representative references

Innovative services more reliable and bringing added value


INNOVATE
FLUIDIZE
REASSURE

API-AGRO : open- and co-innovation

www.api-agro.fr

Next step : robotics !!!

- For experiment and phenotypage
  - PHENOMOBILE
  - https://www.youtube.com/watch?v=SlnRJHsmbvI

- For farmer
  - Ecorobotix tested on Digifermes

https://www.youtube.com/watch?v=XZ27OePcIVw

  - Naïo

https://www.youtube.com/watch?v=iGH01