

Opportunities in ICT for knowledge creation and communication in agriculture

Krijn Poppe

LEI Wageningen UR

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Oslo



- I hope that you can say something about the opportunities for development for new knowledge, flow of knowledge in AKIS between farmer, extension and research, and how ICT can be developed as a tool. What initiatives are taken? Where are the 'holes' today? If you can give examples it is good. What is going on in EU, in the Netherlands. What is needed most: development of knowledge or technology? How can ICT be developed as tools for advisors and as decision tool?

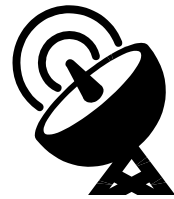
Disruptive ICT Trends:

- **Mobile/Cloud Computing** – smart phones, wearables, incl. sensors everywhere
- **Internet of Things** – everything gets connected in the internet (virtualisation, M2M, autonomous devices) anything
- **Location-based monitoring** - satellite and remote sensing technology, geo information, drones, etc. anywhere
- **Social media** - Facebook, Twitter, Wiki, etc.
- **Blockchain** – smart contracts everybody

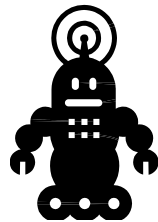
➤ **Big Data** - Web of Data, Linked Open Data, Analytics

High Potential for unprecedented innovations!

IoT in Smart Farming



smart sensing
& monitoring



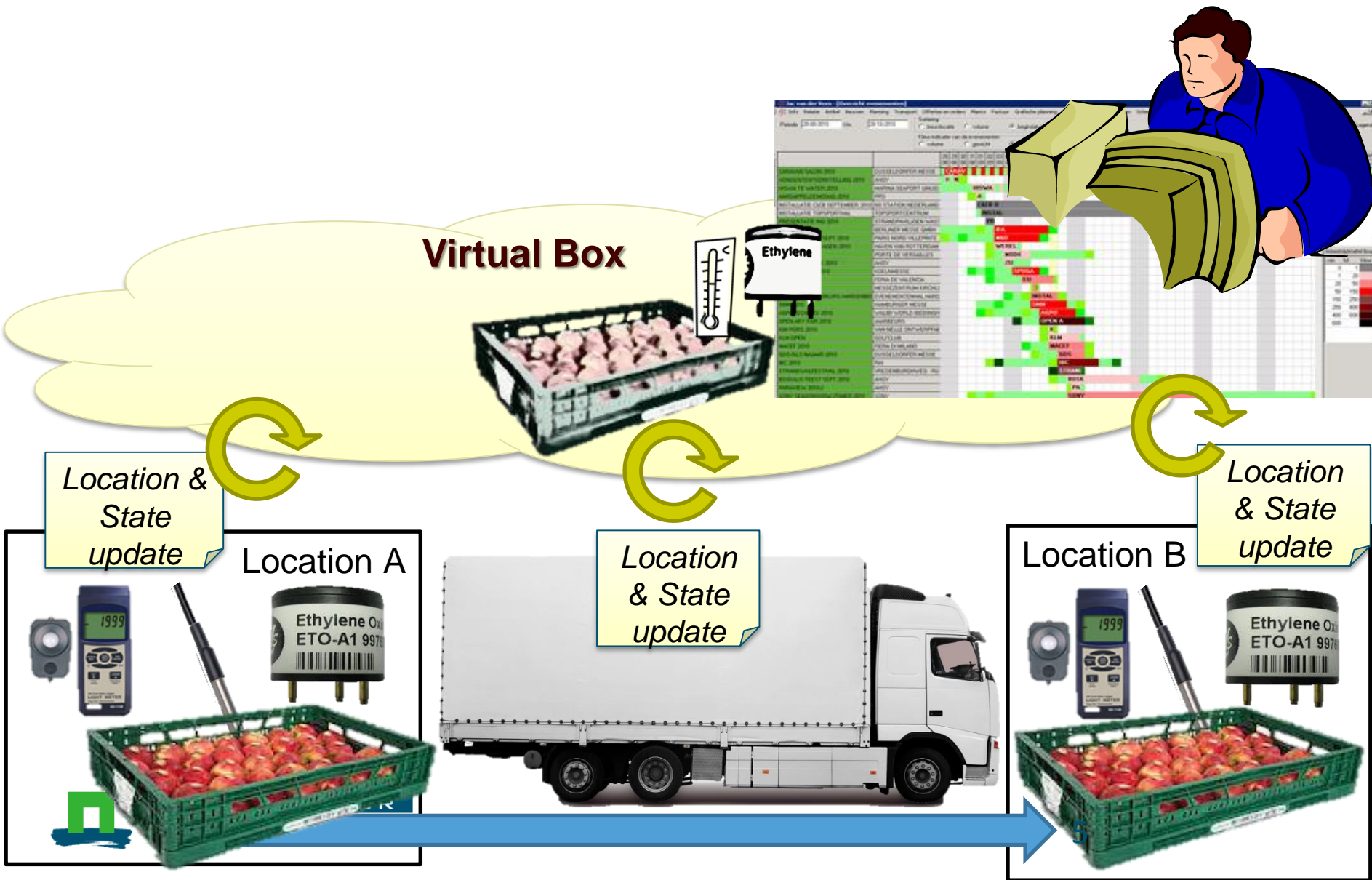
smart control



smart analysis
& planning



IoT in Agri-Food Supply Chains



IoT and the consumer

Smart Farming

tracking/& tracing

Smart Logistics



Domotics

Health

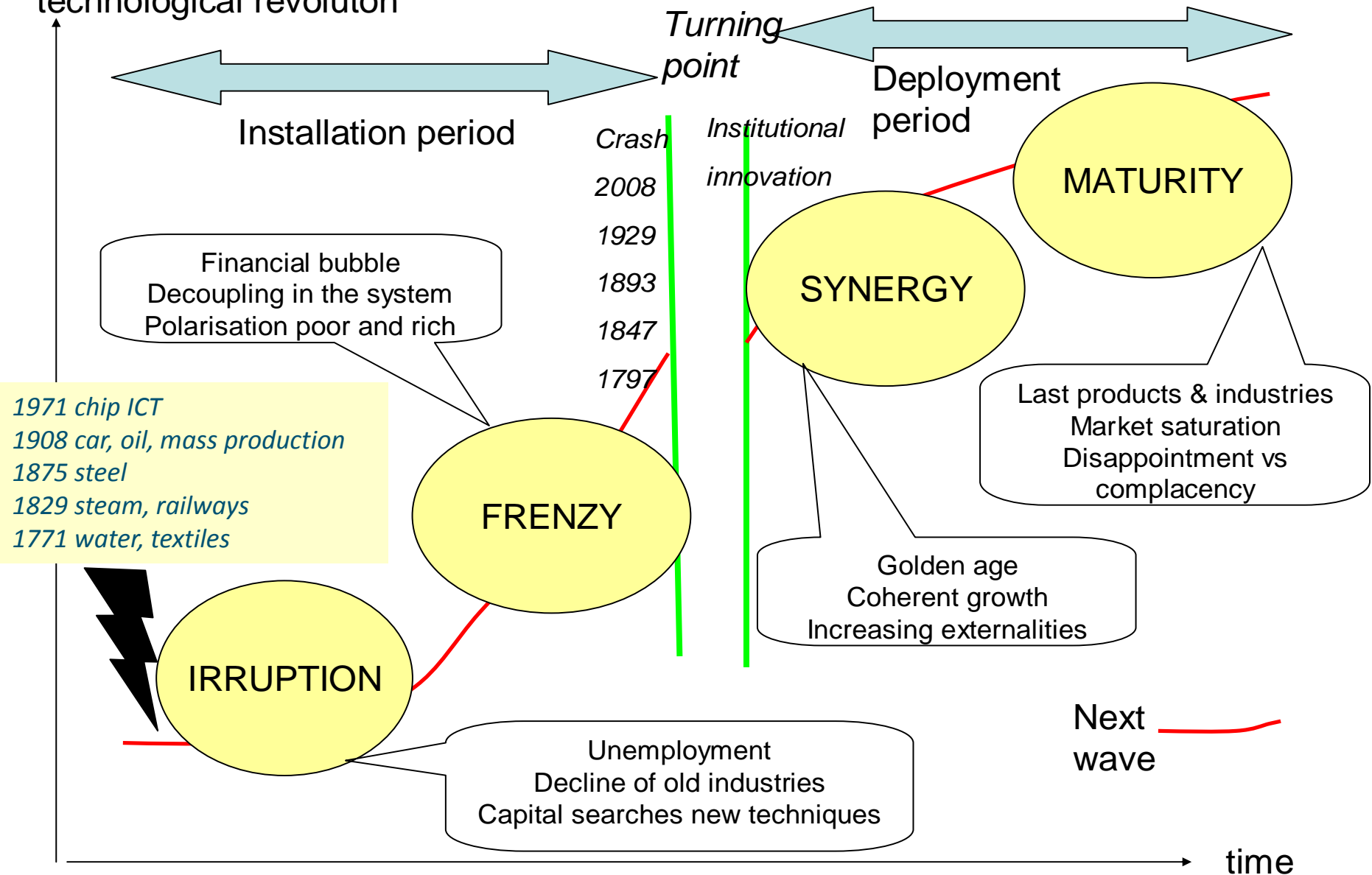
Fitness/Well-being

Health
Yourself



The opportunity for green growth

Degree of diffusion of the technological revolution



4 grand challenges: tomorrow's business



Food & nutrition security



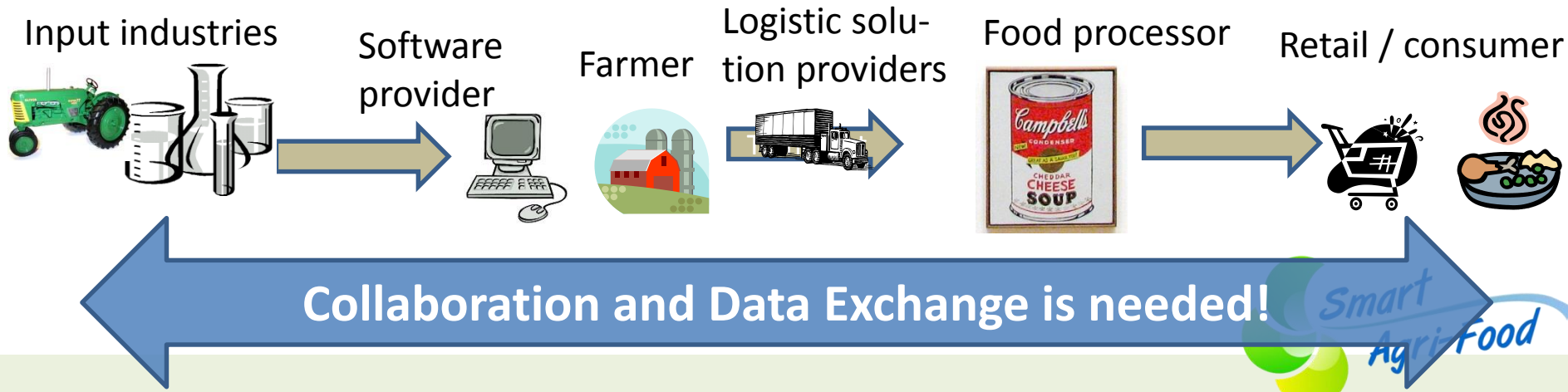
Climate change



Environmental issues

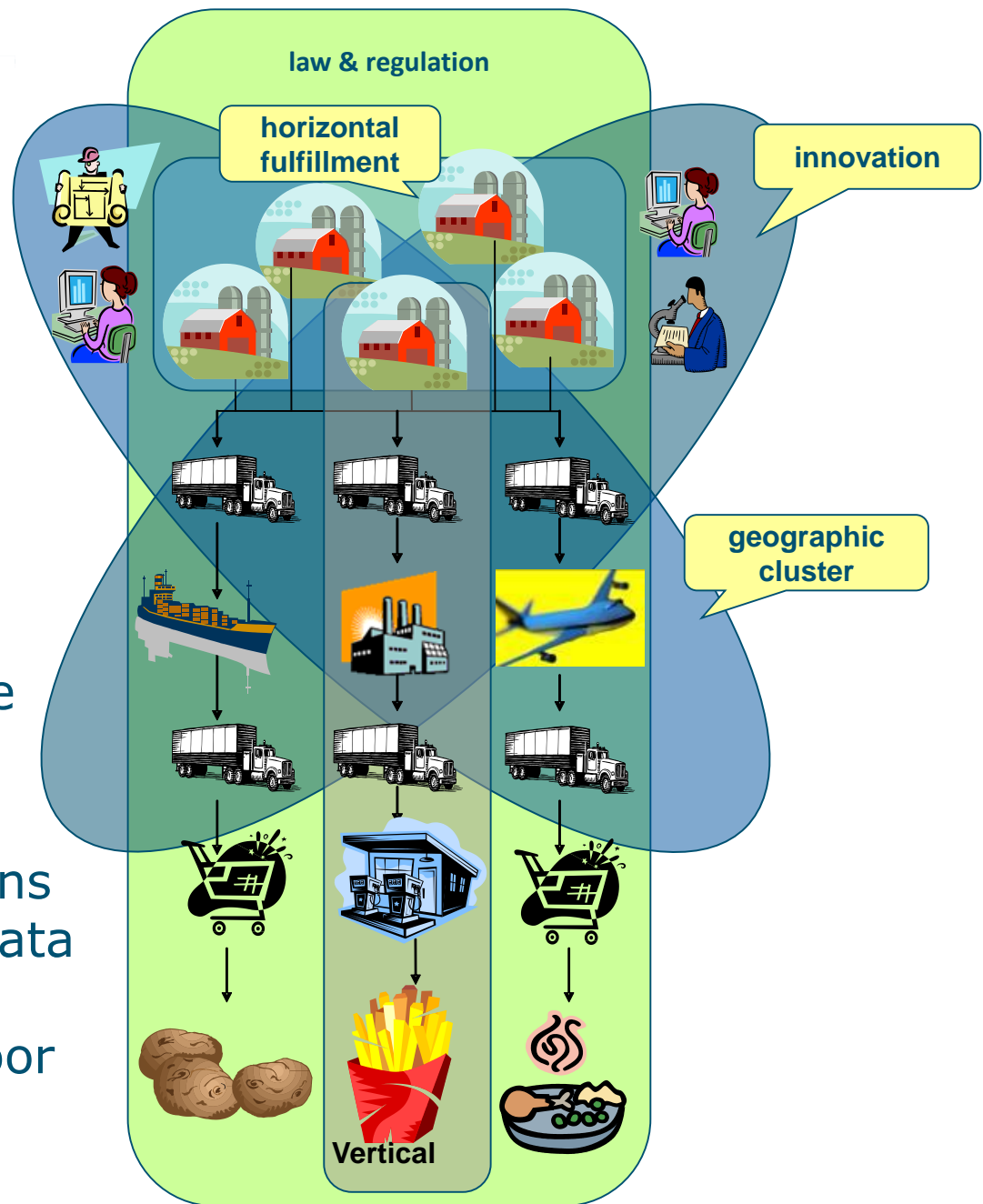


Healthy diet for a healthy life

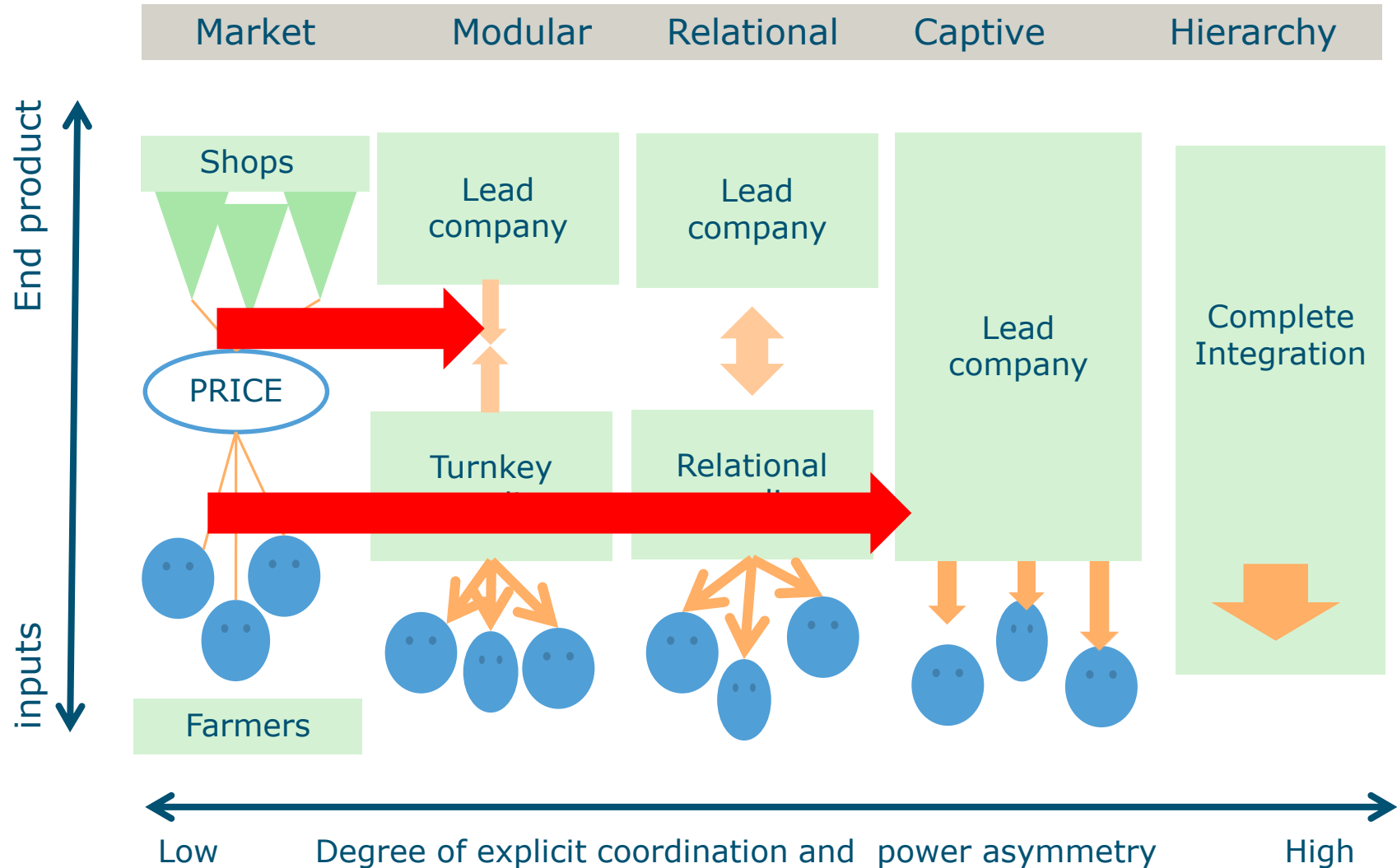


There is a need for software ecosystems for ABCDEFs: Agri-Business Collaboration & Data Exchange Facilities

- Large organisations have gone digital, with ERP systems
- But between organisations (especially with SMEs) data exchange and interoperability is still poor
- ABCDEF platforms help



Chain organisation changes (©Gereffi et al., 2005)



2 Scenarios, with significant impacts ?

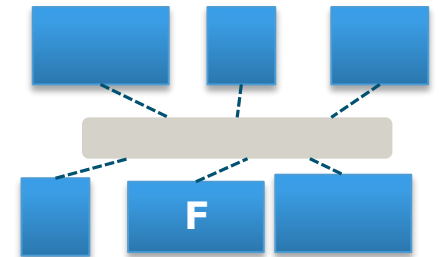
1. Scenario CAPTIVE PRODUCT CHAINS:

- Farmer becomes part of one integrated supply chain as a franchiser/contractor with limited freedom
- one platform for potato breeder, machinery company, chemical company, farmers and french fries processor.
- Weak integration with service providers, government ?

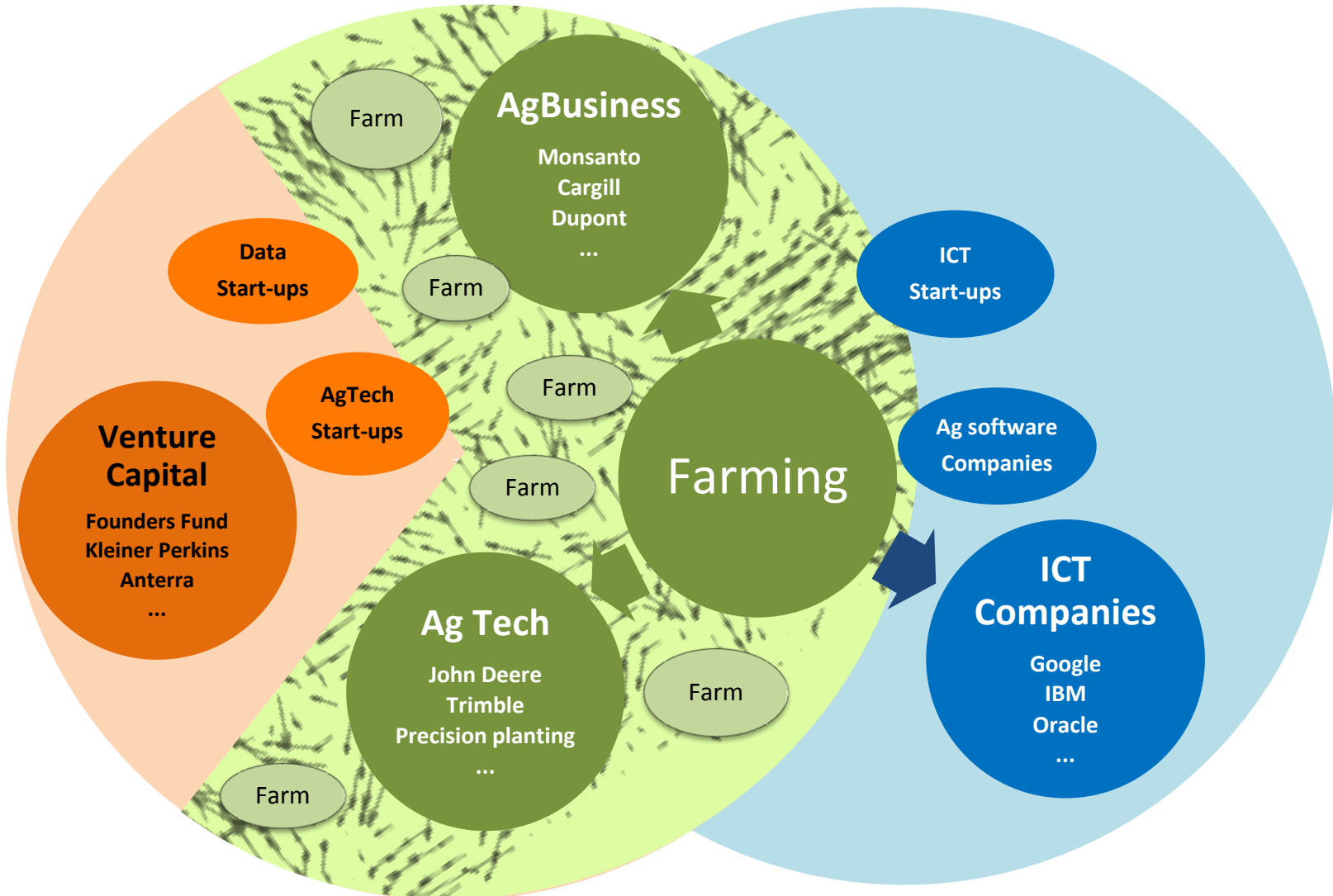


2. Scenario OPEN NETWORK COLLABORATION:

- Market for services, apps and data
- Common, open platform(s) are needed
- Higher upfront, common investment ??
- Business model of such a platform more difficult?
- More empowerment of farmers and cooperatives?



Dynamic landscape of Big Data & Farming



USA Start ups in different activities

The Agriculture Tech Market Map

Farm Management Software



Precision Agriculture and Predictive Data Analytics



Drones and Robots



Smart Irrigation



Sensors



Created By



Marketplaces



New Farms



ICT has effect on business models: how to earn money with data?

1. basic data sales (commercial equivalent of open data; new example: Farm Mobile)
2. product innovation (new tools, active machinery industry, e.g. John Deere, Lely's milking robots)
3. commodity swap: data for data (e.g. between farmers and food manufacturers to increase service-component)
4. value chain integration (e.g. Monsanto's Fieldscript for prescriptive farming)
5. value net creation (platforms to pool data from the same consumers each other or for others: e.g. AgriPlace)

See: Arent van 't Spijker: "The New Oil - using innovative business models to turn data into profit", 2014

Farm data harvesting initiatives



Fieldscripts: Monsanto (et al.)



MONSANTO



PRESCRIPTIVE
FARMING

based on
VARIABLE RATE
APPLICATION



WAGENINGEN UR

For quality of life

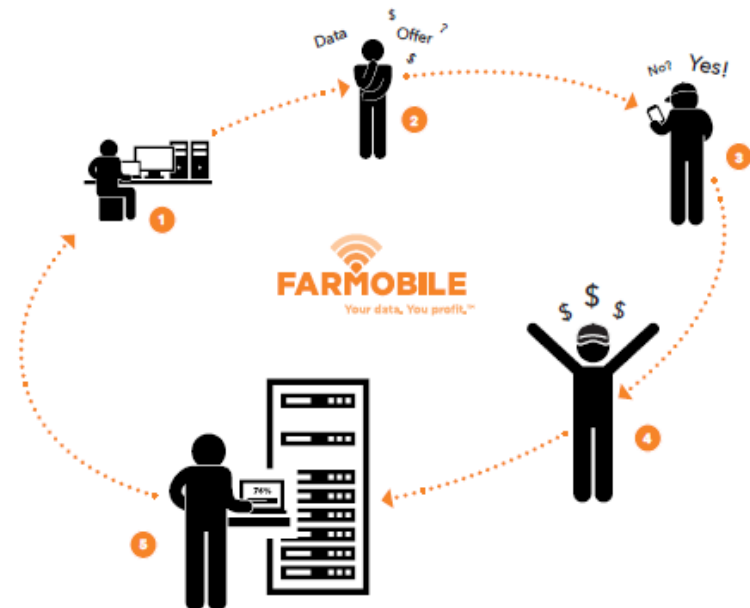
USA: Farm Mobile



“Farmers believe their trust has been violated”:
their data go to multinationals, that announce
big future income from big data, while they have
pay for everything.

2016 = Farmer renewable revenue.

Farmers collect
'crop stories'
and decide where
they travel (and get a
few cents per item?)
(venture capital based)



USA: Farmers Business Network



Farmers' owned,
investment by Google
Ventures



Summer 2015:

FBN has aggregated data from 7 million acres of farm land across 17 states, and they're growing 30% month over month. The platform is currently able to assess the performance of 500 seeds and 16 different crops.

Costs farmer \$ 500 / year.

What does this mean for the AKIS ?

Big Data and other ICT developments will not only influence agriculture but also science, research and development and innovation processes in the AKIS.

This goes much deeper than *open access* and *linked open data* sets in science. Where the past is characterised by doing research on data from one experimental farm or only a sample of farms (like in the FADN) that results into one set of advice for everybody, the future is characterised by doing research *on data of all farms*, in *real time*, that results in *individually customised advice* for individual farms. That *blurs borders in AKIS between research and advice* and advisors will need continuous training on these developments.

(c) EU SCAR AKIS Towards the future – a foresight paper, 2015

Reasons for government intervention in innovation:

- Public objectives including food security, and regional development are not automatically guaranteed by the market. More uptake of ICT could help.
- Many SMEs in agriculture, the food and the machinery industry that underinvest in knowledge. Pooling of funds makes sense.
- Systemic bottlenecks in collaboration between agriculture and ICT-sector.
- Need for common pool investments (infrastructure like ABCDEFs, standards for data exchange etc.)
- Negative)external effects of ICT need attention: privacy, data ownership, potential discrimination by software algorithms, power balance in the food or software chain etc.
- Negative external effects in agriculture that could be more attractively solved by ICT than by regulation (e.g. precision agriculture should benefit the environment)
- Government is a user of ICT

Different objectives,
methods, and public roles

Science

- Science driven knowledge development
- Basic research
- Linear model
- Cross overs sectors
- Society sets agenda
- PUBLIC TASK**

Market
driven
R&D

- Science for competitiveness or social issues
- Business sets agenda, helps to steer, uses results
- **PRIVATE-PUBLIC PARTNERSHIPS**

Innovation
in
partnership

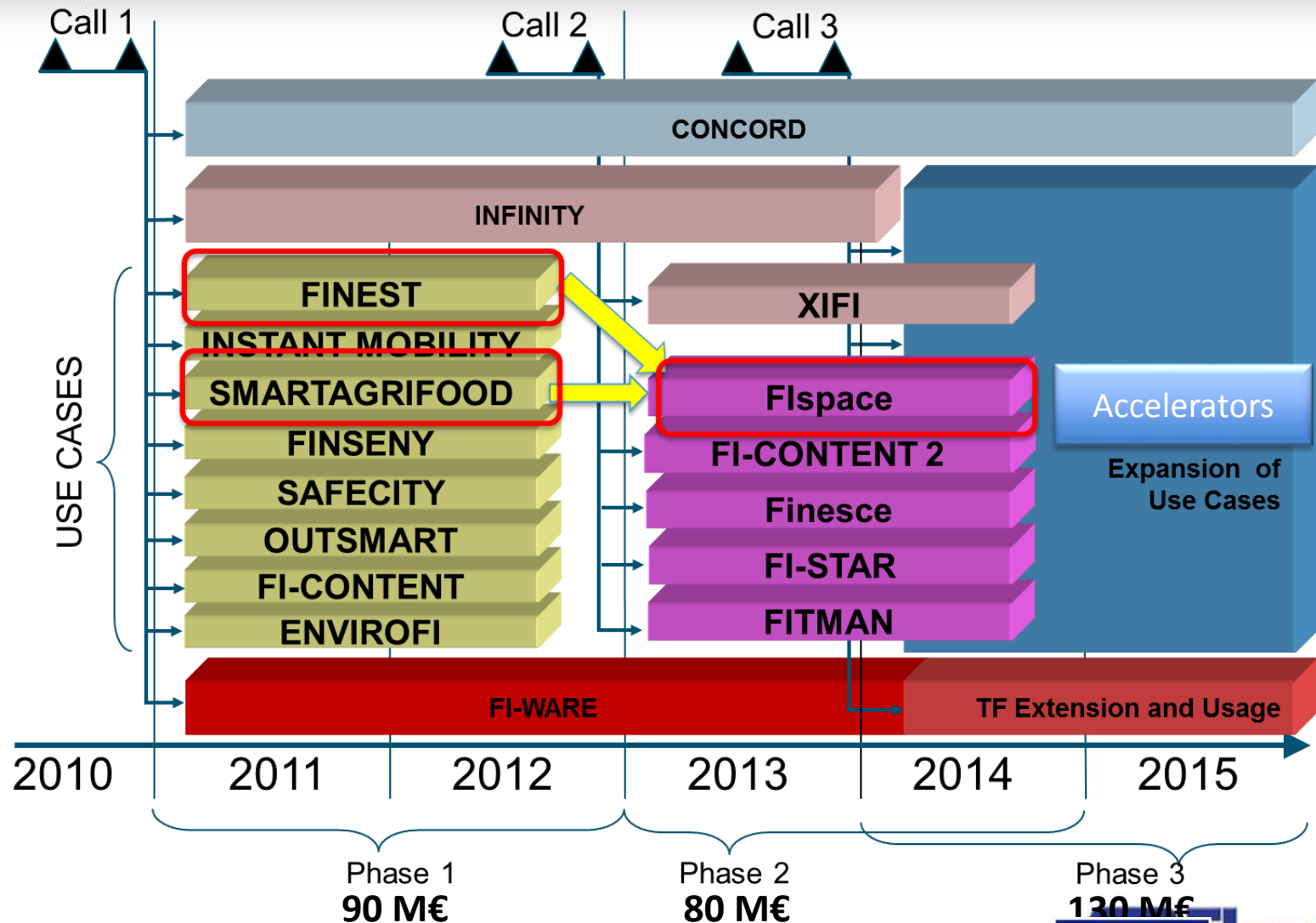
- Prototypes // Localisation
- Change business models / finance
- Food chain is co-creator
- (De-)regulation, procurement etc.
- **LEARNING AND INNOVATION NETWORKS**
- **INFORMATION BROKERS**

What is going on in the EU (and Norway)

- EU SCAR AKIS Towards the future – a foresight paper, 2015
- ERA-NET ICT AGRI: strategic research agenda
- Future Internet PPP
 - Smart AgriFood
 - Finspace
 - Accelerator projects: Finish, SmartAgrifood2, Fractals
- H2020: Internet-of-Food-2020: Internet of Things
- European Innovation Partnership: seminar data driven data models (Sofia) + benchmarking
- DISH-RI en RICHFIELDS: consumer data on food, lifestyle and health
- Plus several other projects in H2020 where ict is an important work package (e.g. Valerie)



FI-PPP Programme Architecture



SOFTWARE THAT WORKS



INTERNET OF THINGS

- Things Abstraction
- NGSI IoT Events Triggering
- Data & Metadata Acquisition
- Seamless M2M Techs. Integration



DATA / CONTEXT

- BigData Analysis
- Events Composition & Subscription (NGSI)
- Location
- Video Analysis
- Semantic Tools



CLOUD

- OpenStack core
- Object Storage
- IaaS Service
- VMs provision to 3rd party trials



SECURITY

- Uniform Oauth2.0 access control
- Security Monitoring
- Secured Storage
- M2M-Specific Security Tools



DEVICE/NETWORK INTERFACES

- Developers' Access to Terminal Capabilities
- Cloud Proxies Connection
- Open Networking Information and Control
- Access to Network Capabilities and Services

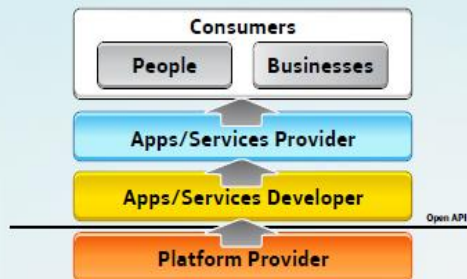


APPS ECOSYSTEM

- Services Repository
- Visual Services Composition
- Services Publish Support
- Business Models Support & Templates

Value Chain Proposition

FI-WARE splits the value chain making a flexible architecture where different pieces can be glued to build your service

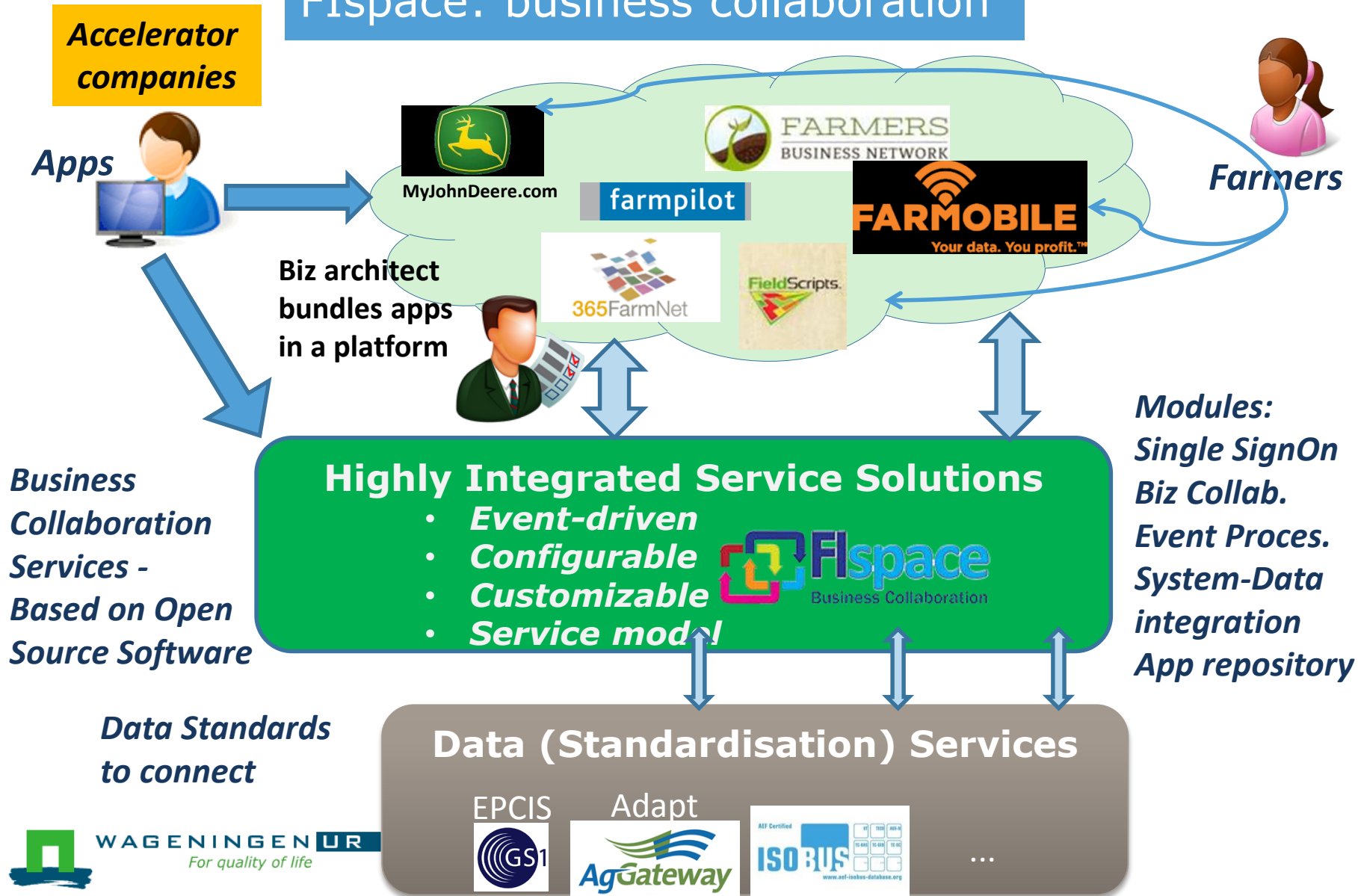


Example Scenario



Ecosystem to link platforms, apps, data

Fispace: business collaboration



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Two platform examples from our work



- Agriplace – compliance in food safety etc. made easy



- RICHFIELDS: manage your food, lifestyle, health data and donate data to research infrastructure



Elements for an Agri-ICT strategy

- Promote data-exchange (reduce administrative burdens, create value via combination, aggregation)
 - Standardisation for interoperability; e.g. AgGateway Europe, UN/CEFACT
 - Platform(s) for data exchange (NL: AgriTrust, EDI-circle; Danish solution)
 - Open data by government
- Promote innovation with new services
 - Especially ict-start ups, connect with farmers and companies (e.g. FIware 3 stage approach)
 - Internet of Things
 - Big Data (use of social media data, machine learning etc.) ?
- Advisory service: “just” another player in data exchange + update own software
- Research: support this + real time agronomic models.

Thanks for your attention

krijn.poppe@wur.nl



www.lei.wur.nl

