

# Agricultural Knowledge and Innovation in Europe – state of the art

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# Content of the presentation

- Some relevant trends in society
- Effects on AKIS – Agricultural Knowledge and Innovation System
- Potential consequences for CAP and 'FP-9'



# Some relevant trends in society

- Economy: out of the crisis – at least in the core (metropolises) but inequality and a feeling of being neglected (rural areas). Regionalism over globalism.
- Environment: climate change as dominant issue
- Technology: disruptive role of ICT
- Social: the end of the expert and the answer of citizen science
- Issues in the food chain: sustainability and health



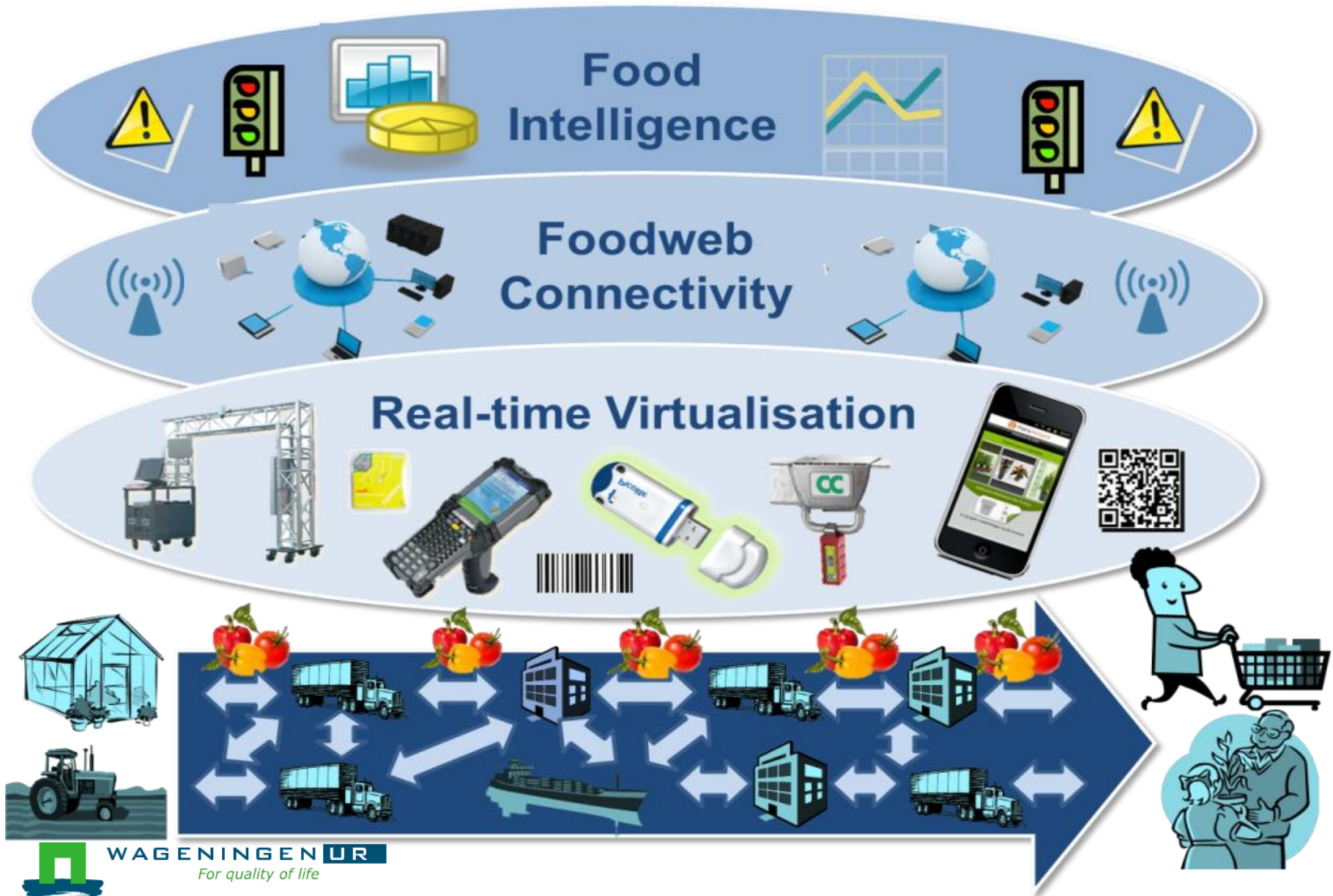
# Disruptive ICT Trends:

- **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.
- **Block Chain** – Tracing & Tracking, Contracts everybody
- **Big Data** - Web of Data, Linked Open Data, Big data algorithms

***High Potential for unprecedented innovations!***



# ICT reorganises the full food chain



# Big Data – the 'official' definition: 5 V's

- Volume – vast amounts of data
- Velocity – different types, unstructured
- Veracity – speed of generation / transfer
- Veriaty – messiness / trustworthiness
- Value – generated by artificial intelligence
  - Symbolic reasoning
  - Connections modeled on the basis of the brain's neurons
  - Evolutionary algorithms that test variation
  - Bayesian inference
  - Systems that learn by analogy



# Big Data - Promises

- The idea is that we can learn from a large body of information things that we could not comprehend when we used only smaller amounts
- Big data (machine learning) helps answer what, not why
- The spark of invention becomes what the data do not say.

Source: Cukier, K. and Mayer-Schoenberger, V., 2013. Rise of Big Data: How it's Changing the Way We Think about the World, *The. Foreign Aff.*, 92, p.28.



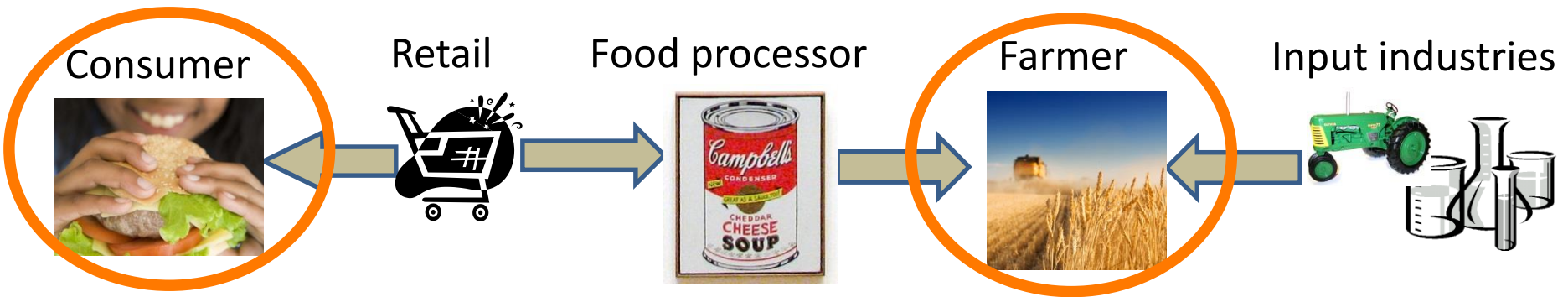
# The end of the expert and the answer of citizen science

- Post-modernism: *"science is just another opinion"*
- There is distrust of experts; and of elites / the powerful
- But also search for 'gurus' (e.g. in food consumption)
- Commercial and competitive influences in research (funding, need to be in the media, publications and citations as yardstick)
- Media looking for new business models (advertising goes online)
- Politicians more short sighted, focussed on next vote?

One answer: citizen science, (digital) commons ????



# Food chain: 2 weak spots – opportunity?



- Public health issues – obesity, Diabetes-2 etc.
- Climate change asks for changes in diet
- Strong structural change
- Environmental costs need to be internalised
- Climate change (GHG) strengthens this

Is it coincidence that these 2 are the weakest groups?  
Are these issues business opportunities and do new technologies like ICT help?

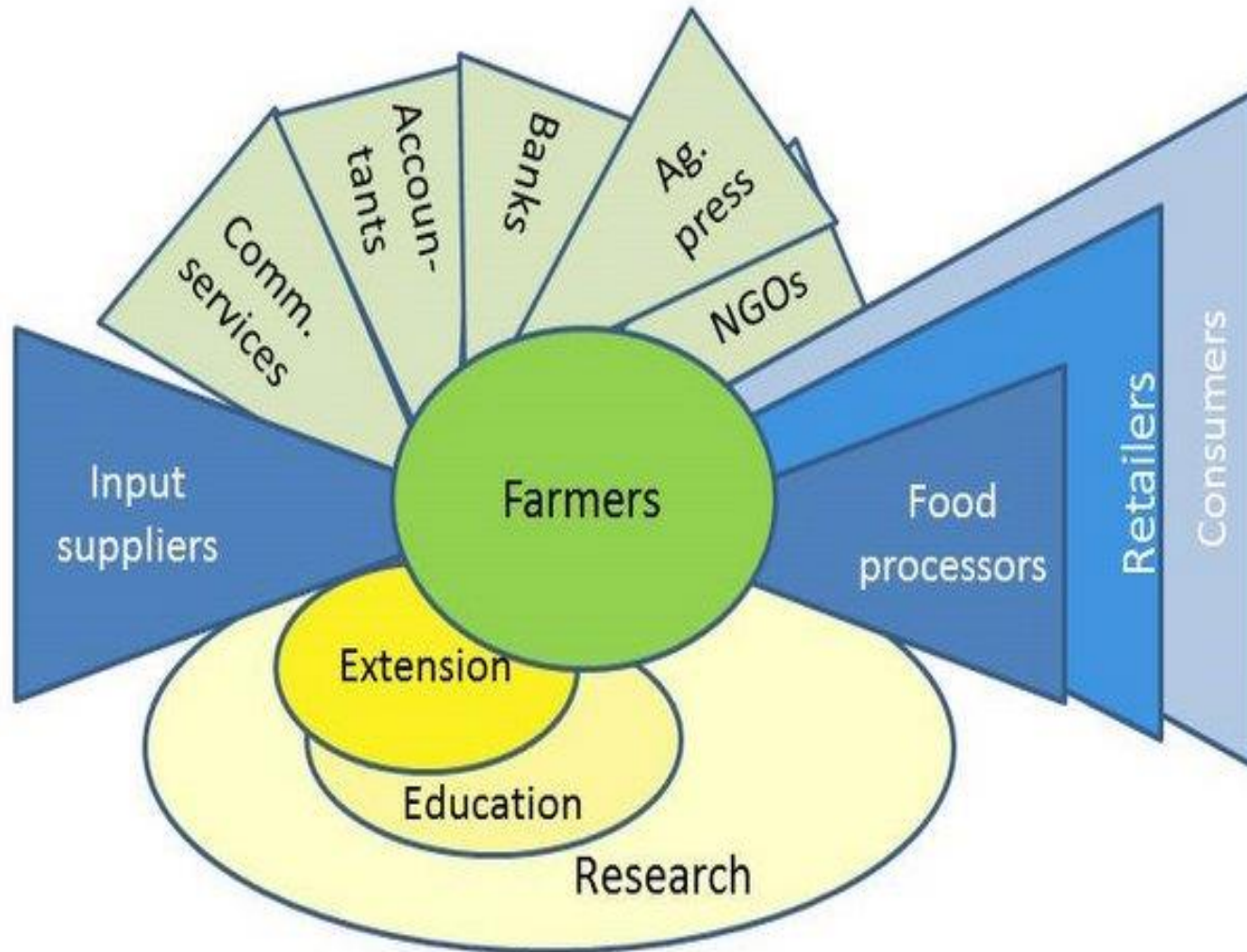
# Food Systems thinking gains ground

A food system is defined as a system that:

- embraces all the elements (environment, people, inputs, processes, infrastructure, institutions, markets and trade) and
- activities that relate to the production, processing, distribution and marketing, preparation and consumption of food and
- the outputs of these activities, including socio-economic and environmental outcomes.

A sustainable food system is a food system that delivers food and nutrition security for all in such a way that the economic, social and environmental bases to generate food security and nutrition for future generations are not compromised.

# The FOOD CHAIN and AKIS



# 3 Scenario's to explore the future

- **HighTech:** strong influence new technology owned by multinationals. Driverless tractors, contract farming and a rural exodus. US of Europe. Rich society with inequality. Sustainability issues solved. Bio-boom scenario.
- **Self-organisation:** Europe of regions where new ICT technologies with disruptive business models lead to self-organisation, bottom-up democracy, short-supply chains, multi-functional agriculture. European institutions are weak, regions and cities rule. Inequalities between regions, depending on endowments.
- **Collapse:** Big climate change effects, mass-migration and political turbulence leads to a collapse of institutions and European integration. Regional and local communities look for self-sufficiency. Bio-scarcity and labour intensive agriculture. Technology development becomes dependent on science in China, India, Brazil.

# AKIS in the 3 scenario's

	HIGH TECH	SELF-ORGANISATION	COLLAPSE
<b>Uni- versity</b>	A few big Life Science Uni's. Intense collaboration with companies. MOOCs and TEDx's (3 <sup>rd</sup> generation model: innovation)	Many regional universities that specialise. 2 <sup>nd</sup> generation (teaching and research).	Reduced public funding, struggle to keep alive and stay relevant. Back to first generation university (teaching).
<b>Applied research</b>	Moves into (applied) universities.	Moves into applied (higher) education.	Relatively important over fundamental research..
<b>Farm research stations</b>	Public and collective funding ends; disappear	More intertwined with applied research and advisory service.	disappear
<b>Advisory service</b>	Service provided by multi-nationals and their computer-generated advice.	Mix of public extension service and commercial advisory organisations.	Disappear, some help from local do-gooders / lead farmers. Big role of donors



# Can we make AKIS more robust ?

- Experiment with public-private partnerships
- Welcome regions, cities and NGO's as partners
- Create links (cross-overs) with other sectors: Bio-economy, energy, ict, food & health, logistics etc.
- Transdisciplinary, Social dialogue, Governance issues
- Create research-infrastructures that foster collaboration (ERA), that support national / regional research and innovation and help to introduce E-Science
- Don't forget education - link it better in AKIS
- Collaborate with international partners (US, China, India) and better integrate AR and ARD

## POLICY BRIEF

# The future of Advisory Services in an evolving AKIS

- ▶ The brief proposes ways forward **to connect in a better interlinked AKIS**
- ▶ Possibilities for **online and automated advice** necessitate **stepping up advisory competences** and tools enabling the **multiple use of data**
- ▶ The essence of future advising is **face-to-face and on-farm**
- ▶ A main bottleneck: **many advisory organizations do not have strong back-office** processes
- ▶ **Authorities should not act too “top down”** when designing advisory systems: **respect local institutions**

## POLICY BRIEF

# The future of Advisory Services in an evolving AKIS

**Emerging new challenges** for future advisory systems:

- ▶ covering new needs (incl. innovation brokerage and market issues),
- ▶ adapting to new farmers' profiles (new entrants, part-time etc.)
- ▶ broadening access to information (incl. inter- and transdisciplinary cooperation/collaboration, use of ICT tools),
- ▶ closing the gap between research and advisory services
- ▶ promoting holistic approach to advice (connect technical advice to farm market issues) and at the same time seek more specialized advice
- ▶ linking to international networks to find knowledge and advisors with specialized competences where needed
- ▶ or specialists from other countries on specific techniques

# E-science and digital hubs

- Can E-science help to link experts and farmers, citizens? Their role in data gathering, experimenting, providing local knowledge, directly contact experts?
- Can E-science help to link core and periphery (and soften the trend to empty, remote rural regions)?
- Can (digital) hubs link research, innovation and education?
- How to build trust in those E-systems, what about data “ownership”, which business models and governance - do we need digital commons to prevent network-monopolies ?
- How to adjust for different learning styles of people and different institutional settings ?

# Effects on CAP-post 2020

- Budget cuts (BREXIT, MAFF) should not lead to less attention to innovation, on the contrary
- Calls for risk management and climate-change-related greening are also a need for innovation
- Free advisors from orientation on paper work for subsidies (digitalisation, move to accountants/auditors)
- Given concentration in production (regions): speed up knowledge transfer from core to remote periphery – make cross border collaboration easier
- Take a food system approach and respect different institutional arrangements in regions.



## Effects on FP9: FOOD 2030



**NUTRITION** for sustainable and healthy diets



**CLIMATE** smart and environmentally sustainable food systems



**CIRCULARITY** and resource efficiency of food systems



**INNOVATION** and empowerment of communities



# Thanks to some references:

- SCAR-AKIS 1,2,3 reports
- Mary Wigham: E-science for participating in agricultural research (chapter in AKIS-3 report)
- SCAR-AKIS Advisory Policy Brief, 2017
- Laurens Klerkx, Pieter Seuneke, Pieter de Wolf, Walter A.H. Rossing: Replication and translation of co-innovation, in: Land Use Policy, 2016
- Laurens Klerkx, Egil Petter Stræte, Gunn-Turid Kvam, Eystein Ystad and Renate Marie Butli Hårstad: Achieving best-fit configurations through advisory subsystems in AKIS, in JOURNAL OF AGRICULTURAL EDUCATION AND EXTENSION, 2017
- My earlier presentations on ICT, see Slideshare

# Thanks for your attention



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