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The potential impact of data integration and open data in the food supply chain

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The Problem

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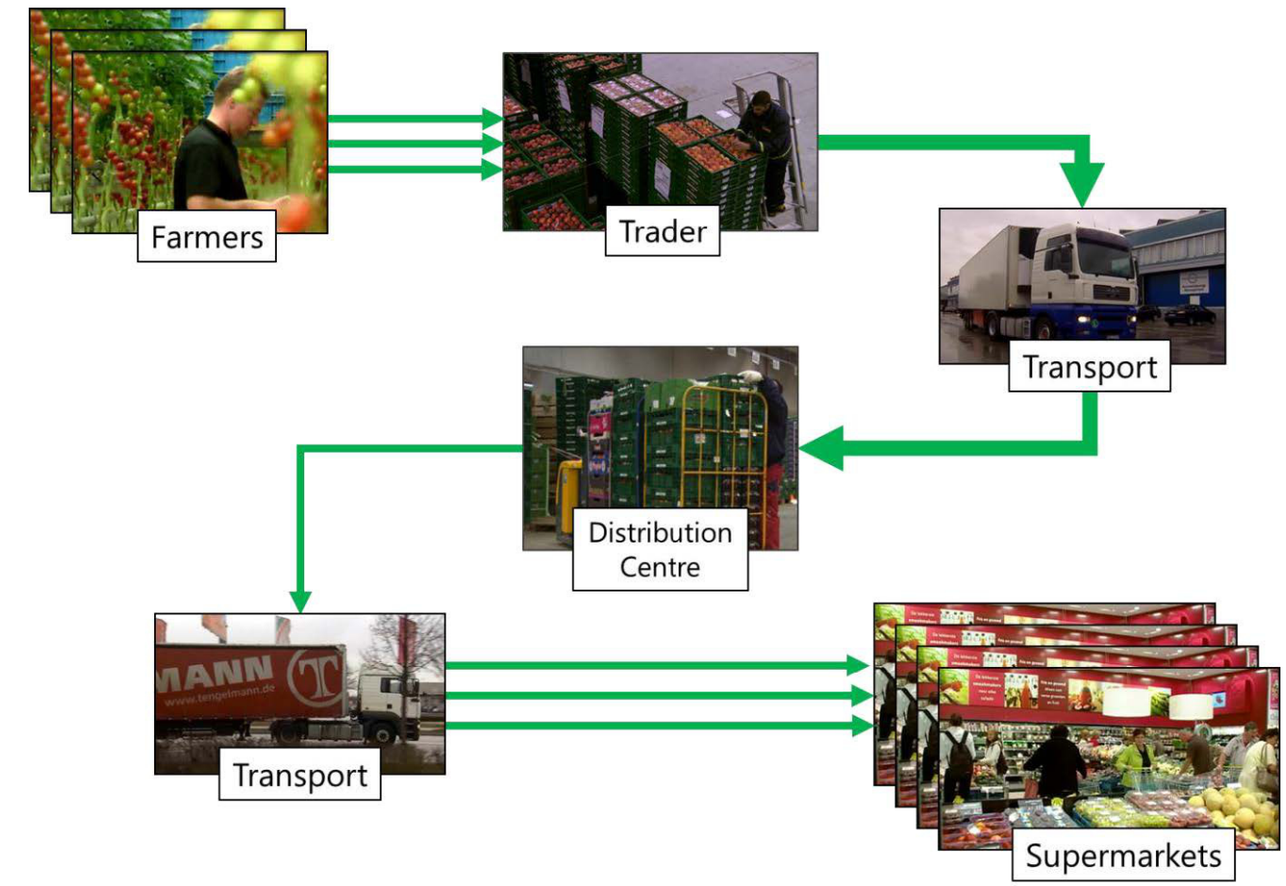
The Food Supply Chain

- From Farm to Fork
- The **agri-food system** includes much more
- More and more parts of this supply chain and agri-food system are leaving **digital trace** … in James Scott's terms becoming more "legible".



Data - Information - Knowledge

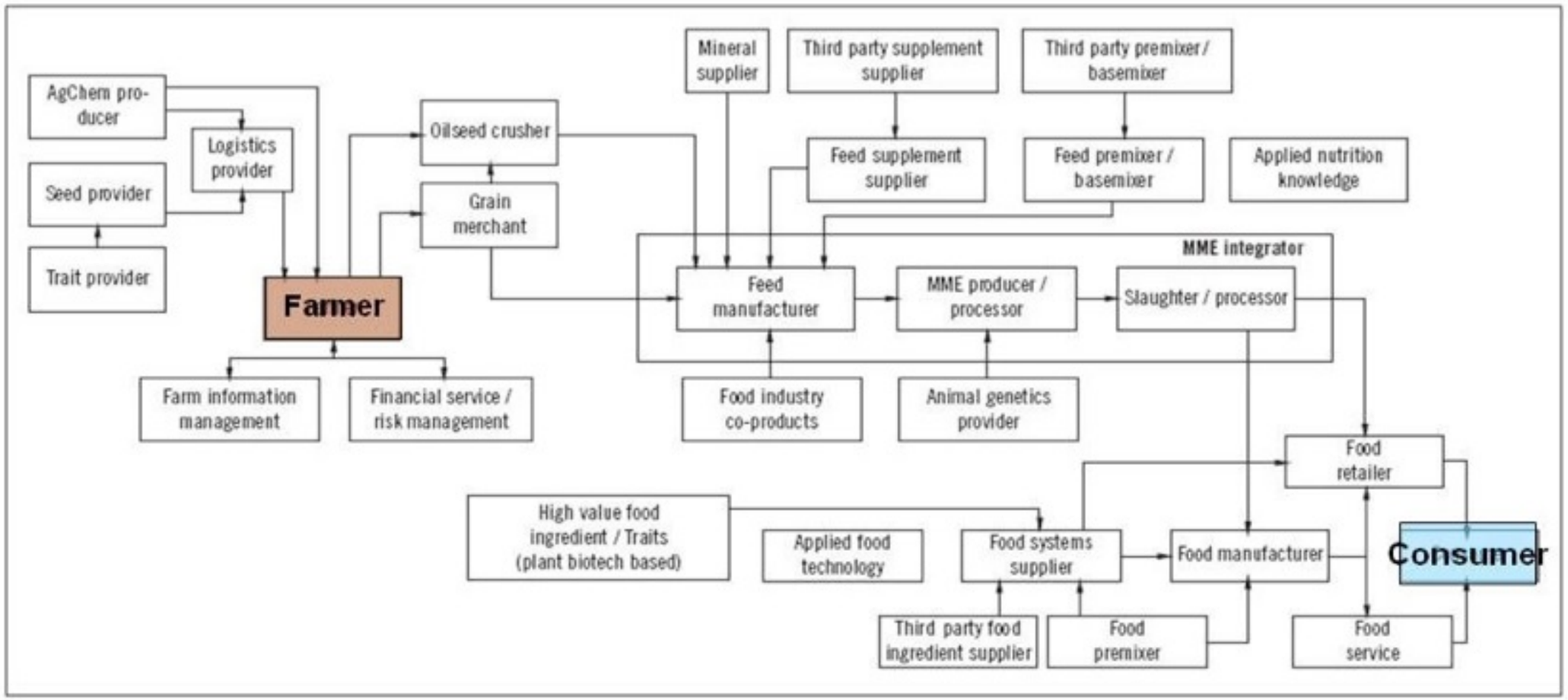
- The food supply chain involves hundred of actors, thousands of processes, millions of products and (potentially) billions of data points!
- Children believe milk comes from supermarkets!
- Too much or too little data?
- Why do we need it?

Characteristics of Supply Chain

- Large numbers of participants
- Heterogeneity of participants
- Huge variety in ICT uptake
- Poor information flow (need to know attitude)
  - Solved by regulation and certification

Food supply chain is …

A highly heterogenous loosely coupled large-scale network of entities with variable but largely minimal degrees of communication and trust between the actors



Drivers for Data Integration

- Need for transparency - tracking and tracing
- Desire for food awareness - on the part of consumers, but not only
- Regulatory pressure - e.g.EU Regulation 1169/2011
- New business opportunities ….

Food Crises and Scandals

- Major driver for greater data integration (whether open or closed).
- E. Coli in Germany in 2011 - spanish growers lost over €200M
- Horsemeat scandal across Europe in 2013 - impact very great on some supermarkets

Lack of Data Integration

- Both scandals suffered from lack of data and **data integration**
  - E. Coli - who affected? what purchased? where? when? and who participated in the supply chain
  - Horsemeat - six months for Irish FSA to map the supply chain network
- Need for greater supply chain transparency = need for data integration

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Trust - 1

Trust - 2

- More information, more data = more trust

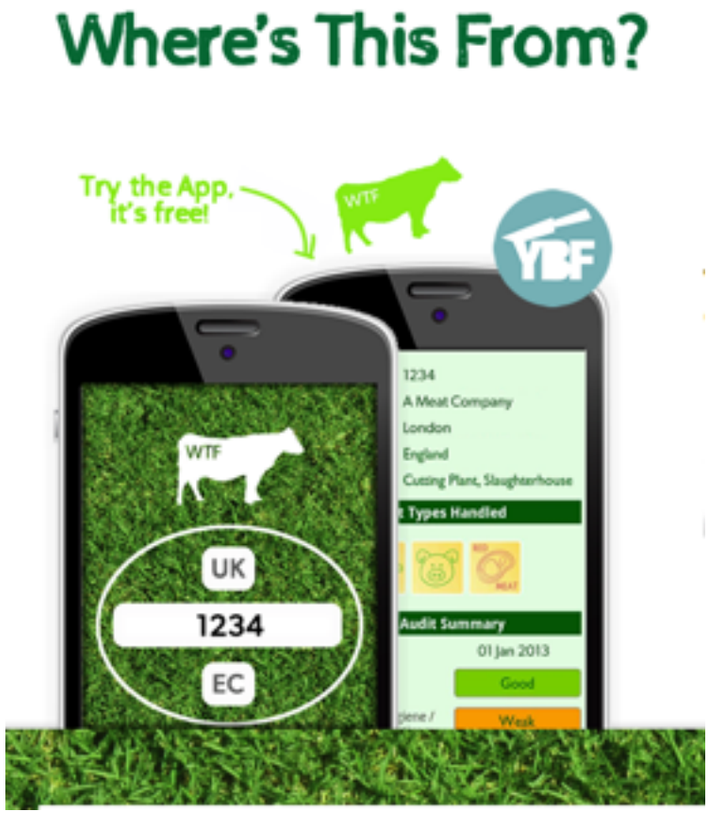
What role Open Data here?

Open Data in agri-food

- Suddenly Open Data is all the fashion cf. G-8 International Conference on Open Data for Agriculture April 2013
- World-wide explosion of data sources:
  - data.fao.org
  - http://www.gbif.org
  - (US) http://www.data.gov/food/community/food
  - http://inspire-geoportal.ec.europa.eu
  - http://www.foodsecurityportal.org
  - http://data.worldbank.org
  - http://open-data.europa.eu

Across Europe: UK

- World leader in Open Data
- data.gov.uk has very large collection of agri-food data sets
- Data comes from many government agencies
- Many agri-food data sets listed but not available e.g. from FERI and other institutes
- others will speak on this



Across Europe: The EC

- Most important is: http://open-data.europa.eu - many data sets out of date
- BUT
  - Health and Consumers (SANCO) **published** consolidated data sets from EFSA – European Food Safety Agency, ECDC – European Centre of Disease Control, EMA – European Medicines Agency, CPVO – Community Plant Variety Office
- Was available as RDF http://ec.europa.eu/dgs/health_consumer/information_systems/index_en.htm
- Again not up to date

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Across Europe: Germany

- Commitment to G8 initiative
- No national equivalent to data.gov.uk (yet - Nov 2013)
- National Statistics Office (https://www-genesis.destatis.de/)
- Main driver is KTBL (http://www.ktbl.de)
  - Main data sets include pesticide data/plant variety data
  - Probably soon to be released as Open Linked Data

Across Europe: The Netherlands

- Netherlands has a national open data platform: https://data.overheid.nl
  - This includes interesting land use data (National Geo-register)
- Most active agri-food open data set concerns **export certificates** (The Netherlands is Europe's biggest agri exporter)

Across Europe: France

- Government data portal: http://www.data.gouv.fr (only 16 data sets concern agri-food)
- Two initiatives concerning food product data:
  - http://product-open-data.com —> now part of OKFN, has 900,000 GTIN codes
  - http://openfoodfacts.org —> crowd sourcing data, now has 14,000 products

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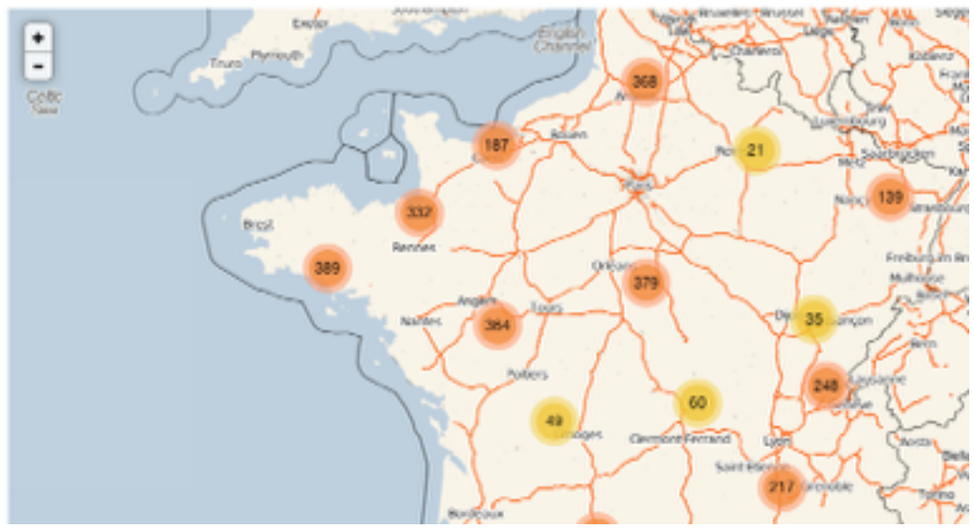
OpenFoodFacts

Consommer local ?

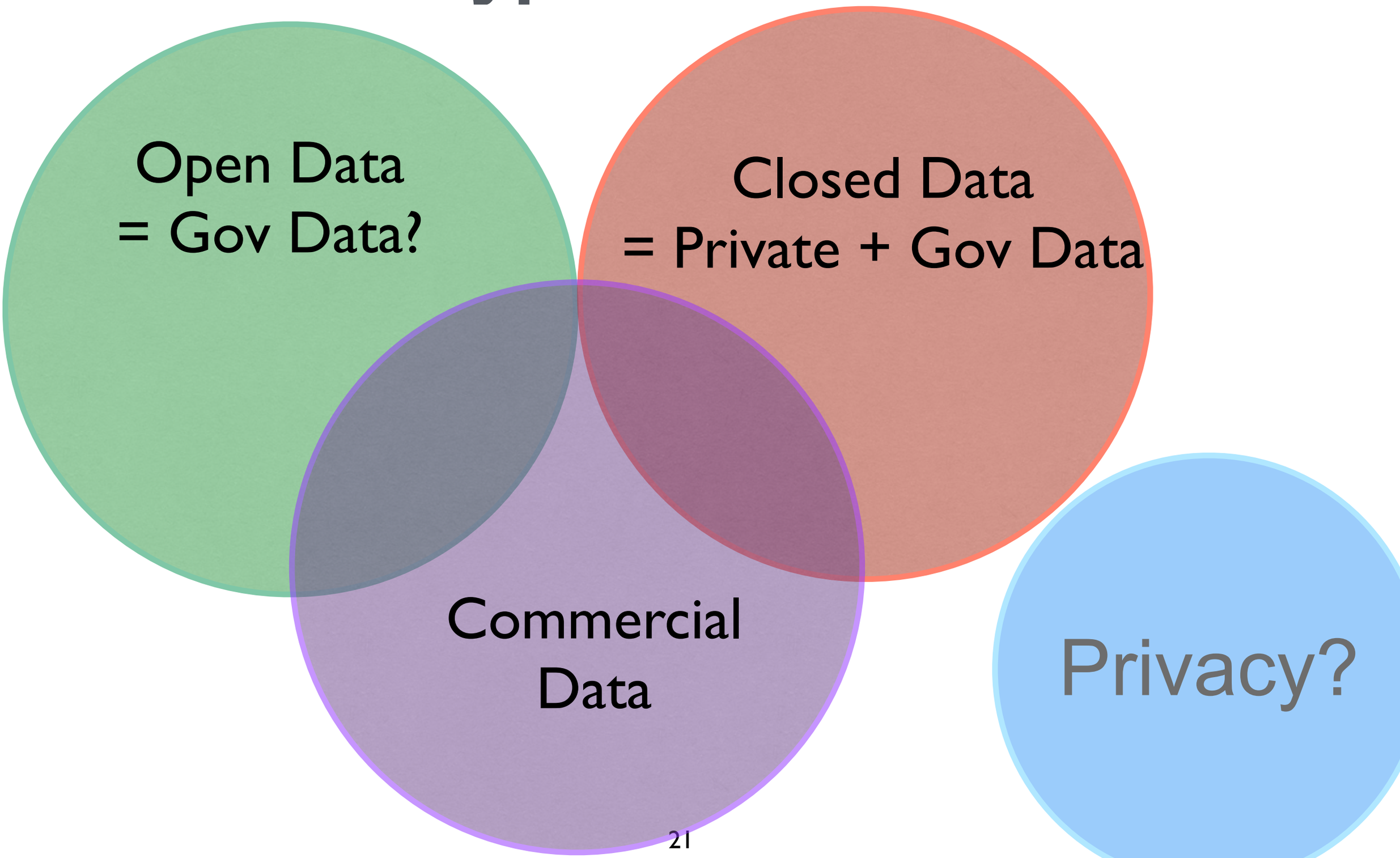
C'est fabriqué près de chez vous montre sur une carte les lieux de production, de transformation et/ou d'emball
Cette carte peut vous être utile si vous êtes adepte du "consommer local", ou si vous êtes curieux de voir quels
de chez vous et quelle est la provenance de leurs ingrédients.



GS1 - Hopefully soon open data (?)

- GS1 product information - everything connected to barcodes/RFID
- Fundamental link between products along the supply chain
- Sort of available:
  - GEPIR: Global Electronic Party Information Registry - allows limited lookup of GTINs
  - Data belongs to food producers …. and not yet openly available
- GS1 are aware of the need to open up ….

Types of Data



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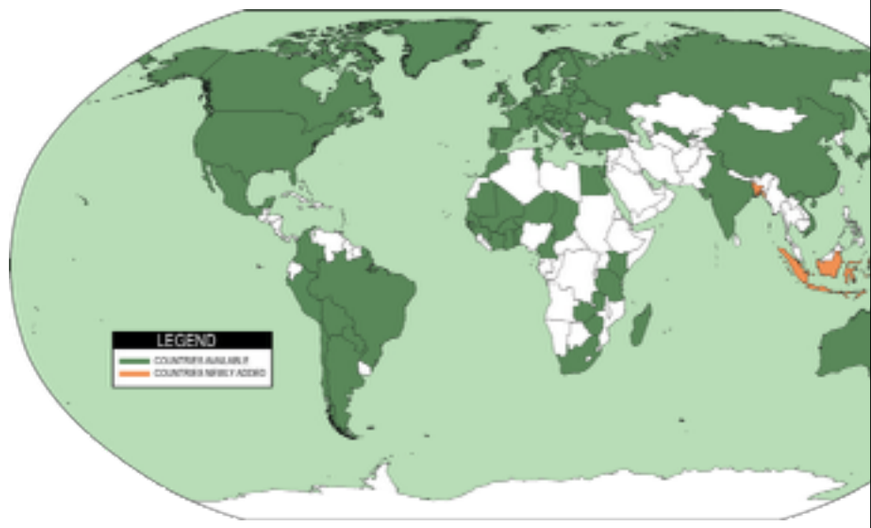
Homologa

- "Homologa ™, The Global Crop Protection Database" - http://www.agrobase-logigram.com/pages/homologa.html
- Combines pesticide regulations and Minimum Residue Level data from around the world
- Commercial product built on multiple sources including public/open data.



DATE	TYPE	CTRY	
27-NOV-13	REGISTRATIONS	INDONESIA	New upd
27-NOV-13	MRLS	ARGENTINA	New upd
26-NOV-13	REGISTRATIONS	CHINA	New upd
26-NOV-13	REGISTRATIONS	UKRAINE	New upd
26-NOV-13	REGISTRATIONS	ESTONIA	New upd
26-NOV-13	REGISTRATIONS	BELGIUM	New upd
25-NOV-13	REGISTRATIONS	CZECH REP.	New upd
23-NOV-13	REGISTRATIONS	JAPAN	New upd
22-NOV-13	REGISTRATIONS	GERMANY	New upd
19-NOV-13	REGISTRATIONS	NETHERLANDS	New upd
19-NOV-13	MRLS	NORWAY	New upd
15-NOV-13	REGISTRATIONS	SWITZERLAND	New upd

Static vs. Dynamic Data

- Most open data is static
  - One off
  - Snapshot i.e. data at a given moment
  - Can change often though
- Useful for strategic planning
- Can answer question like:
  - What pesticides to use/not use?
  - What are climate predictions for this region?
  - What ingredients go into this product?

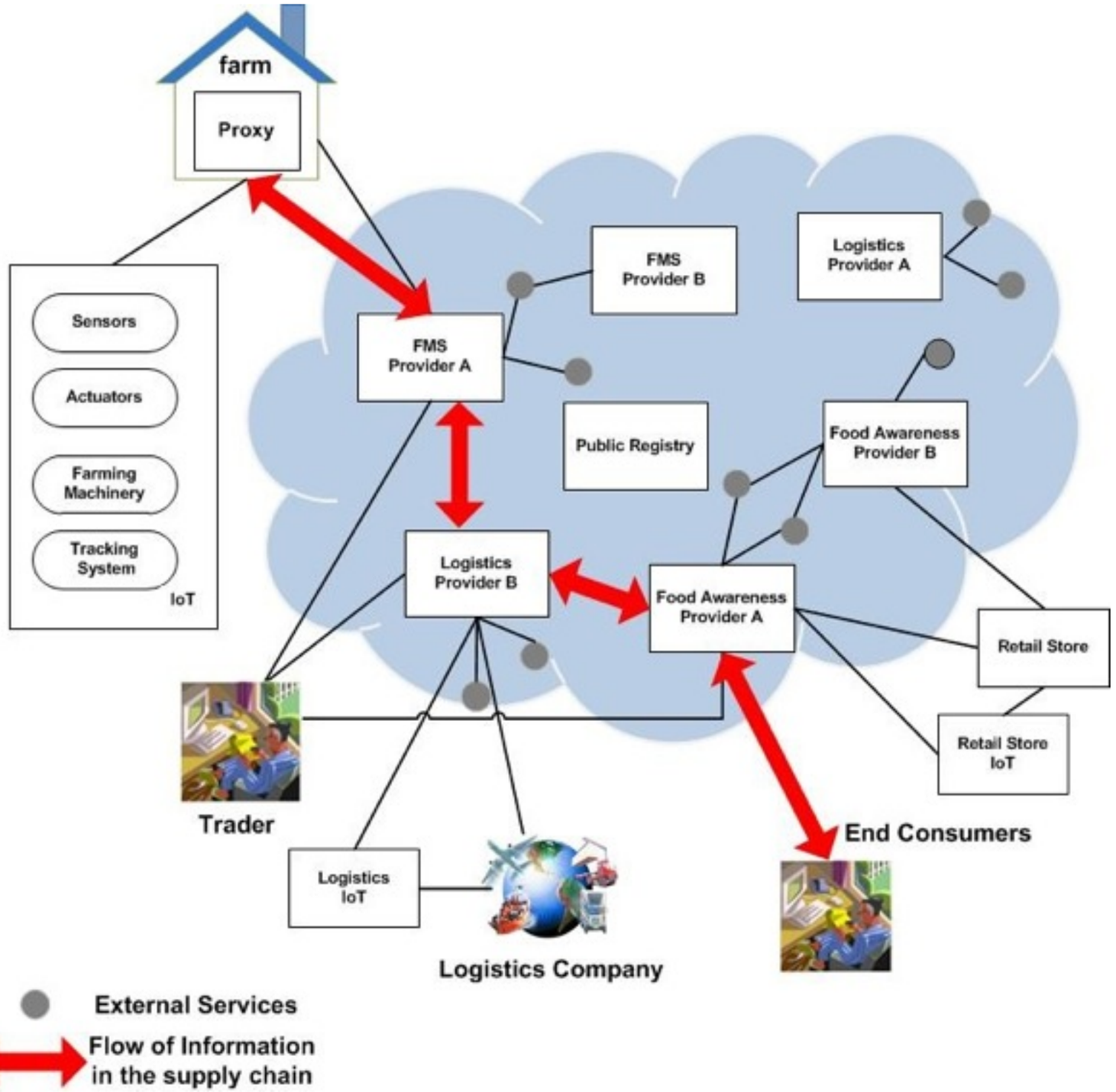
Dynamic Supply Chain Data

- In reality:
- Each season, each crop, each lot is different.
- Every day consumption patterns change
- Farmer, logistics, retailer, and consumer all need **dynamic data**
- We have the technology and the need, but …

SmartAgriFood

- FI PPP project 2011-2013
- Focus on three sub areas:
  - **Smart farming**, individual treatment of animals, plants or areas of land using sensing & monitoring, decision support and precise application to improve efficiency, productivity, quality, flexibility and chain responsiveness
  - **Smart logistics,** intelligent matching demand and sourcing followed by smart transport and logistics of agri-food products
  - **Smart Food Awareness,** enabling the consumer with relevant information e.g. concerning safety, availability, health, environmental protection, animal welfare, methods of production (organic, fair trade, halal, kosher, etc.)

The SmartAgriFood Vision



Kaloxylos et. al HAICTA 2013

SmartAgriFood Vision

- Cloud based services
- Different services available to different players on demand
- Complete data integration, from sensors for precision farming, through logistics virtualisation to consumer information
- A vision of dynamic data continuously updated
- What is missing? **The data backbone - this should be open data**

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Data As Infrastructure

- Like all infrastructure somebody pays for it
- It moves like roads (in the 18th century) from a private invention to a public utility
- So agri-food data needs to move into “public utility”
- Where we draw a sensible line between public and private/commercial data is up for discussion and negotiation
- Cost of data capture is decreasing
- That will be a major revolution for agri-food as a sector!

The Visible and Invisible

- If every item has a barcode …
- If every data point has a URI …
  - The what happens to those products that don't ….?

- Danger of a different kind of digital divide

Social Opportunities

- to connect farmers to eaters
- to connect eaters to the sources of their food
- to connect people who share common food and agricultural interests
  - connect farmers at a local level
  - connect connect eaters to each other
- enable every actor along the food supply chain to feed data/queries into the network

Business Opportunities

- Allowing farmers to ‘know’ their end consumers
- Enabling better planning, faster response to changing demand
- Reducing waste through the supply chain
- .... many unforeseeable opportunities

The Ethical Challenge

- Will this be beneficial for farmers?
  - for consumers/eater?
- Complex networks tie people into complex systems
- Will this benefit the soil?
- **Possibly, in part, if we make careful choices**

What is Open Data?

- Open Data is part of a wider movement (cf. wikipedia)
- Open Data is part of a movement for more efficient decision making processes than **price signalling** (cf. Hayek 1945)
- **More information rich, more equitable (if we are lucky)**

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Thank you

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Smart Agri-Food

http:/www.smartagrifood.eu

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http:/www.fispace.eu

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