Identifying the ICT challenges of the Agri-Food sector to define the Architectural Requirements for a Future Internet Core Platform

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The Challenge of ICT in Agri-food

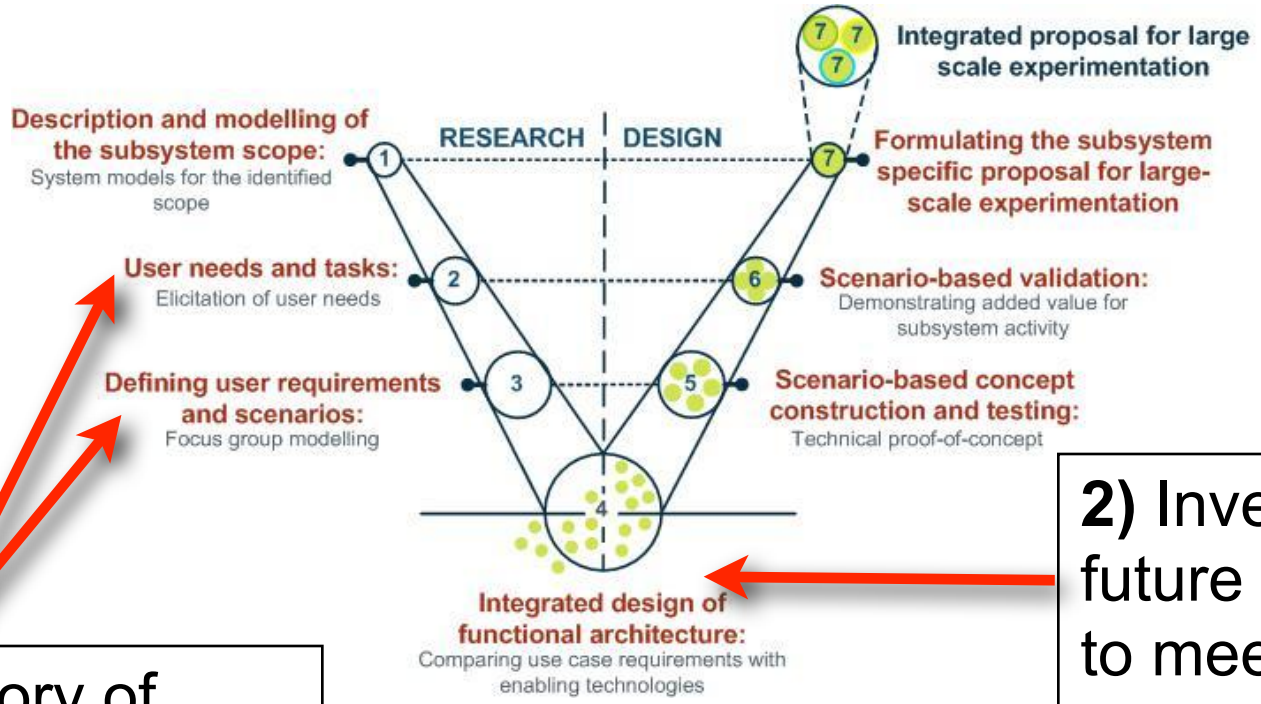
- Food and agriculture is 5.9% of GDP worldwide, 35% of employment worldwide.
  - In the EU, one of largest manufacturing sectors, e.g. 13% of UK workforce
- ICT uptake in agri-food mixed
  - Intense in some areas e.g. retailing, loyalty cards/data warehouses
  - Very limited in farming sector
- Very poor information flow in agri-food
  - Both within sectors, and along the supply chain
  - Very conservative “need to know” attitude
- Lack of information flow major challenge
  - Need for transparency due to consumer pressure
  - Need for tracking and tracing for food emergencies e.g. *E. Coli*

Research Objectives

- SmartAgrifood Project: Focusses on application of Future Internet technologies
- FI PPP - 21 partners across food supply chain: Three sub-areas:
  - Smart Farming
  - Smart Agri-logistics
  - Smart Food Awareness
- **Focus of this talk:**
  - **describe user and business requirements**
  - **identify the relevant technological possibilities**
  - **describe the over-arching vision for end-to-end data integration - the super-scenario**

Methodology

- A 7 step user centred approach was specified early on in the project:



1) Inventory of Short-term and Long-term needs of food-chain users

2) Inventory of future capabilities to meet those needs

Methodology (2)

- For 1) Food chain user needs:
  - Questionnaires completed in six EU countries (Germany, Hungary, Finland, Greece, UK, Spain) n=135
  - Focus groups were held in the same countries (except Spain) n=69
- For 2) Inventory of Future Capabilities: Combination of
  - Expertise from partner institutions
  - Results from the development of Generic Enablers in the FI-WARE project
- For the “end to end” super-scenario
  - A series of collaborative vision and road mapping session
  - Technology led
  - but with feedback from food chain actors

Results: Agri-food needs

- **Farming**:
  - information for daily decision making
  - sharing information/knowledge with neighbours
  - integration of sensor data
  - many existing systems but have poor interoperability and high cost

Results: Agri-Food needs

- **Agri-logistics:**
  - better co-ordination and decision making
  - real-time exchange of big data
  - proactive control of processes
  - shared online monitoring of trucks and cargo
  - integrated freight and fleet management

Results: Agri-Food needs

- **Food awareness:**
  - provision of more information: origin, production, treatment
  - information needed from all stages of the food chain
  - communication of product related information of growing importance

- **All areas:**
  - compatibility between systems and standardisation major issue
  - need for flexible data exchange - both within and across sectors

Scenario Specifications

- Detailed use cases were developed
  - for validation of FI-WARE Generic Enablers
  - for demonstration system features and functional requirements
- **Smart Farming**
  - precision farming, smart decision making, disease management
  - objective: increase yields, reduce resources, improve traceablility and production methods

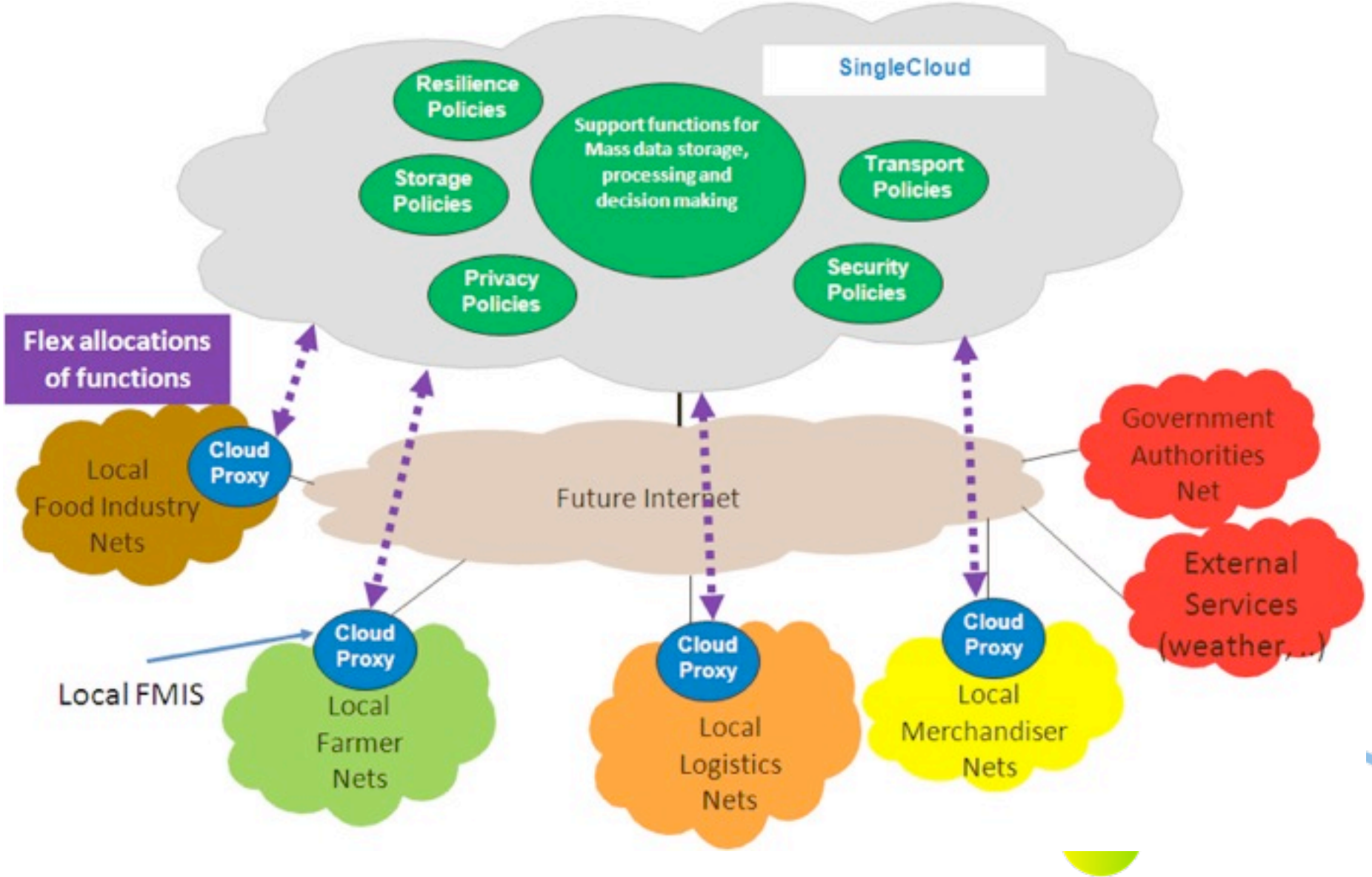
Scenario Specifications (2)

- **Smart Agri-logistics**
  - based on GS1 technologies/standards
  - real time virtualisation of planning, control and orchestration
  - intelligent event management and early warning and forecasting
  - objective: increase efficiency, reduce costs, reduce waste losses
- **Smart Food Awareness**
  - tracking and tracing for health and safety
  - tailoring the consumer experience with integrated data
  - objective: build trust, enhance transparency, increase retailer market share
- Details of the pilots and specifications in the paper

Super Scenario

- Analysis showed need for “end-to-end” scenario
- Drivers:
  - regulatory pressures
  - consumer pressure for transparency
  - need for tracking and tracing in food emergencies
- Clear need for standards:
  - to make data easily accessible
  - to allow system integration
  - to provide advances services = easy service composition
- This would make possible:
  - farmer selecting meteo service + policy service + advisory service
  - integration of multiple data sources for smartphone app for targeted consumer
  - adaptability to constant changing information needs

Super Scenario (2)



Conclusion and outlook

- SmartAgriFood has identified:
  - a set of user needs in agri-food community
  - a set of potential technologies to fulfil those needs
- Implication:
  - FI technologies in agri-food will increase industrial agriculture but reduce environmental impact
  - More efficient logistics and forecasting can reduce food waste
  - Increased food awareness can enable (not ensure) more environmentally conscious consumer purchasing
  - Most radically: increase fluidity, responsiveness of food chain and reduce entry barriers
  - Important for urban food management, increasing efficiency with the “food shed” of major cities, enabling more urban agriculture

Thank you
Questions?