

# The Internet of Food Things Network Plus

## Trust in data: collaboration models for agri-food 4 November 2020



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# Report overview

*"An overview of some of the ways that pioneers are exploring the digitalisation of the food production supply chain."*

## Understanding Digital Food Systems

- What are different collaborative practices?
- Report was commissioned to develop our understanding of underlying structures and systems
- Innovation Working Group supported IoFT
- Ambition to produce a short punchy report
- Aim to identify a range of economic models
- Interviews with a range of innovators



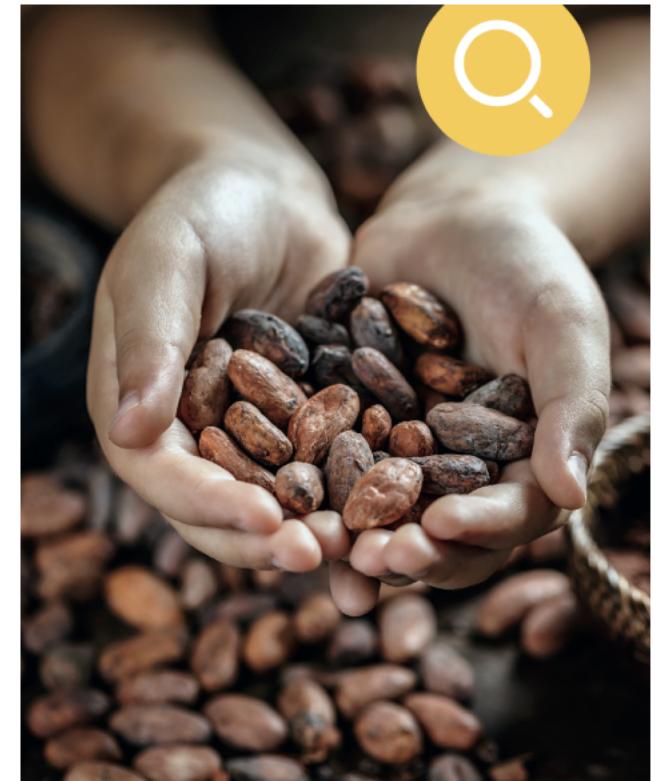
# Digital collaboration: motivation

- Report presents an overview of some of the ways that pioneers are exploring the digitalisation of the food production supply chain
- People have always collaborated in creating, processing and consuming food.
- These collaboration activities are becoming ever more necessary as we respond to complex challenges such as the climate crisis and food security.
- With the advent of Industry 4.0, it is clear that digital technologies offer the potential to transform how we respond to this complexity

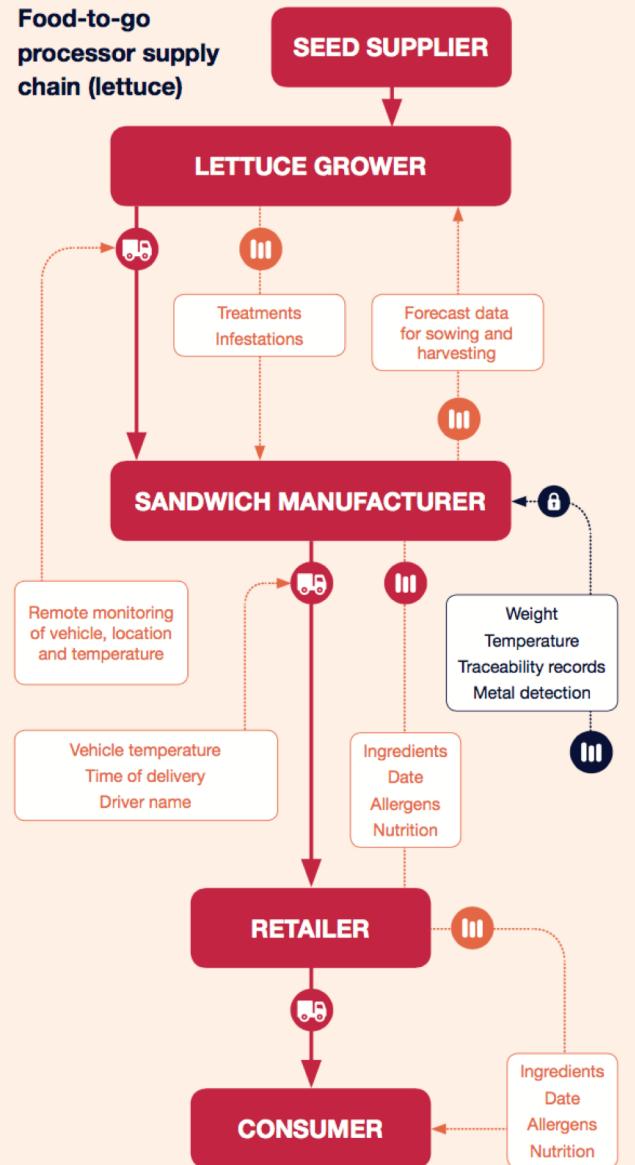
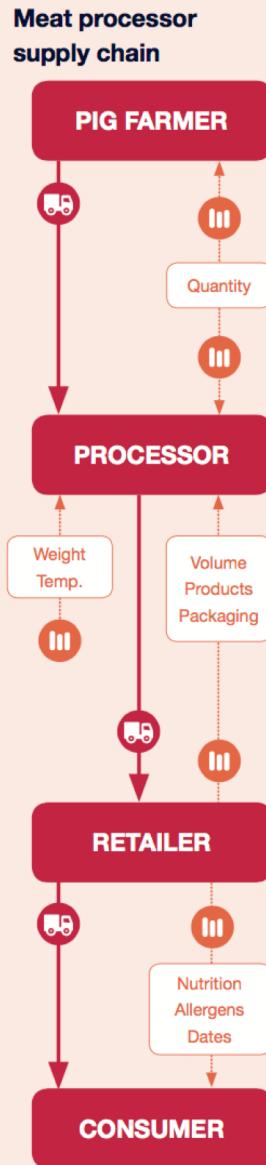
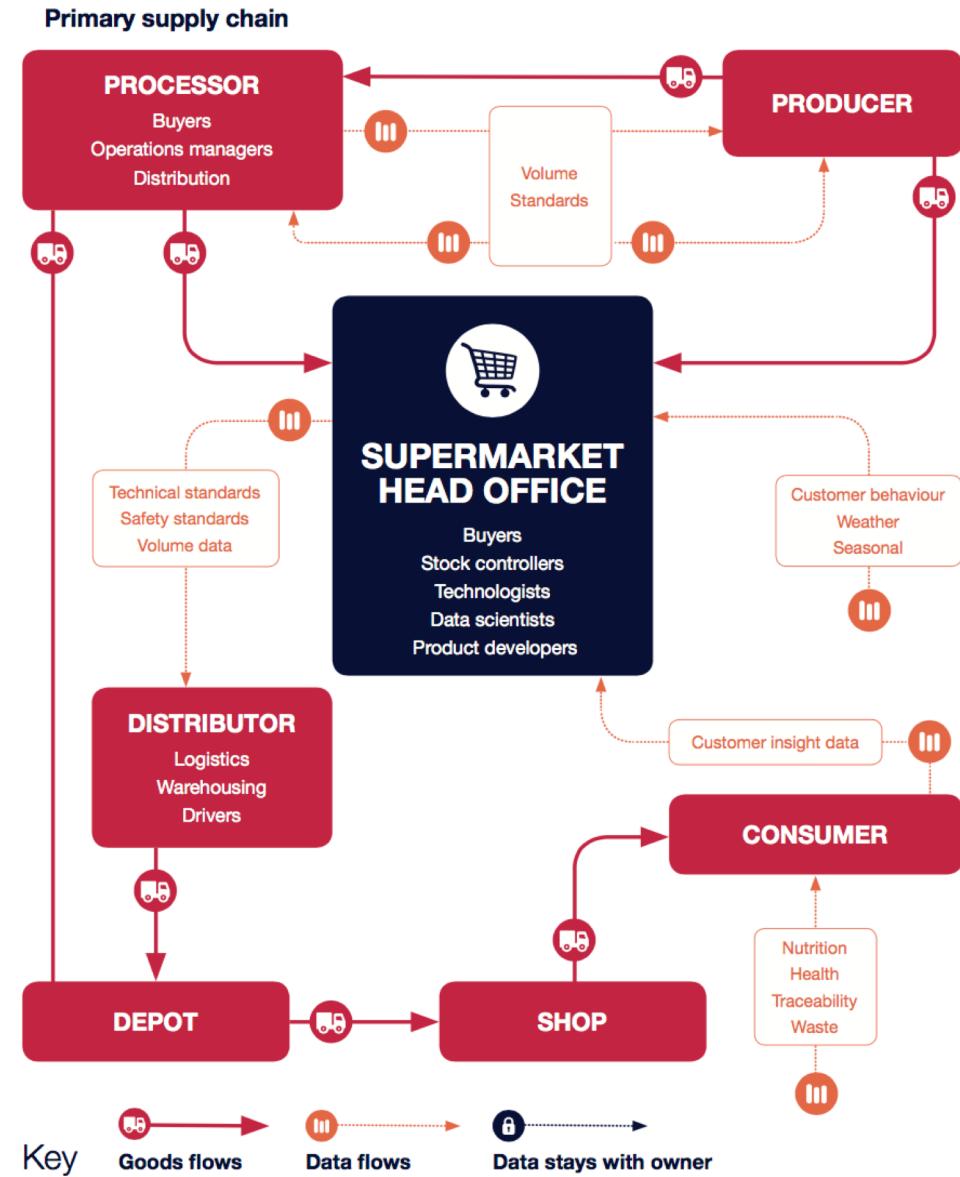


# Digital collaboration

- Digital collaboration is complex
- Supply chains are constantly evolving as transactional relationships coalesce, mature and fragment
- Four common settings identified for digital trading activity:
  1. Complex collaboration: strategically powerful network of trading partners
  2. Community-driven cooperative networks, eg. food hubs
  3. Coordinated arrangement: relatively simple structures, eg. trade body or ethically-driven movement
  4. Open market: eg. traditional ad hoc, data-driven disruptor start-ups



# Product and data flows in the supermarket supply chain ecosystem



# What is standing in the way of digital collaboration?

Through our interviews we identified a number of inhibitors to greater digital collaboration. These ranged from the purely technological – such as poor connectivity in remote areas preventing farmers adopting more digital ways of handling data – to challenges that had a greater relationship with skills, mindsets and collective culture than a technological deficit.



## What might help?

### A social approach: data trusts and platform co-ops

- New governance arrangements such as food hub cooperative platforms
- Ethically driven audit schemes and not-for-profit trade bodies
- Data Trusts as proven and trusted frameworks:
  - Agreements to facilitate the sharing of data between organisations,
  - Independent stewardship of data.

### A technology approach: distributed ledger technology / blockchain:

- No central administrator or centralised data storage
- Immutable records captured throughout the lifetime of the supply chain for the mutual benefit of all actors in that chain.

# Key questions need to be explored (1 of 2):

1. Can we identify discrete models to represent digital collaboration?
2. How can the trustworthiness of organisations and data sharing models be determined, and what encourages or inhibits willingness to share data?
3. What is the impact of digital collaboration on power relationships and value capture in the traditional food production supply chain?
4. How can we represent value creation, value capture and, more challengingly, trustworthiness?

# Key questions need to be explored (2 of 2):

5. Various data management technologies are emerging as innovation drivers, including blockchain and distributed ledgers, but how **can we ensure the veracity, relevance and significance** of the data and information captured with the systems?
6. The general public and politicians are becoming more concerned with the **ethical dimension of the food production** supply chain. To what extent can data demonstrably address these concerns?
7. Integrating food industry and health sector data in such a way that government, external bodies and other citizen representatives gain **actionable insights** will require **complex management of trust relationships**. How might this be achieved?

# New research working groups

The following themes have been identified to support the Digital Food System:

- New business models for a governed data system in food
- Cyber security options for data sharing in the food sector, including privacy enhancing technologies such as homomorphic encryption
- Ethical dimensions of digital collaboration in the food sector, such as unintended consequence of AI
- Data ontologies, interoperability and other new ways of using data to secure trust across the food network
- The FSA Data Trust project real world use cases will support the research
- New projects planned to further develop the Digital Food System as a platform

# Data trusts: exploring the problem

- Multi-dimensional problem space: technology, legal and governance, business and behaviour
- Origins: need for sharing within and between orgs
- Drivers: AI, ML, SCs, risk, coordinated exchange and permissioned sharing
- Terms: data, trust, organisations, clusters, networks, clubs
- Problems: trust, meaning, risks, cyber security, reputation, economic, misrepresentation, ethics (AI etc.), GDPR, regulatory
- ODI: “*A data trust is a legal structure that provides independent stewardship of data.*”
- Goals: reduce duplication of data, but triangulate between similar items
- Industry seeks: reduced friction, not extra costs, greater resilience

# Solutions: ideas, concepts, examples

- Solutions: standards, regulations, agreements, organisations, associations
- Other initiatives: National Data Strategy, National Food strategy,...
- Trust frameworks: organised structures, arrangements
  - Centralised v decentralised, collated v distributed, interlinked v interdependent
  - Technical solutions: BC, DLT, tokenisation, data bases, software defined networks (SDNs), identity, interoperability, APIs
  - Data: data standards, semantically linked, traceability, persistence, FAIR, immutability, personal v public v commercial
- Governance and organisation: hierarchical v non-hierarchical, multi-tier v. cooperative

# Digital Food System and “*Data Trust*”, Responsible Innovation

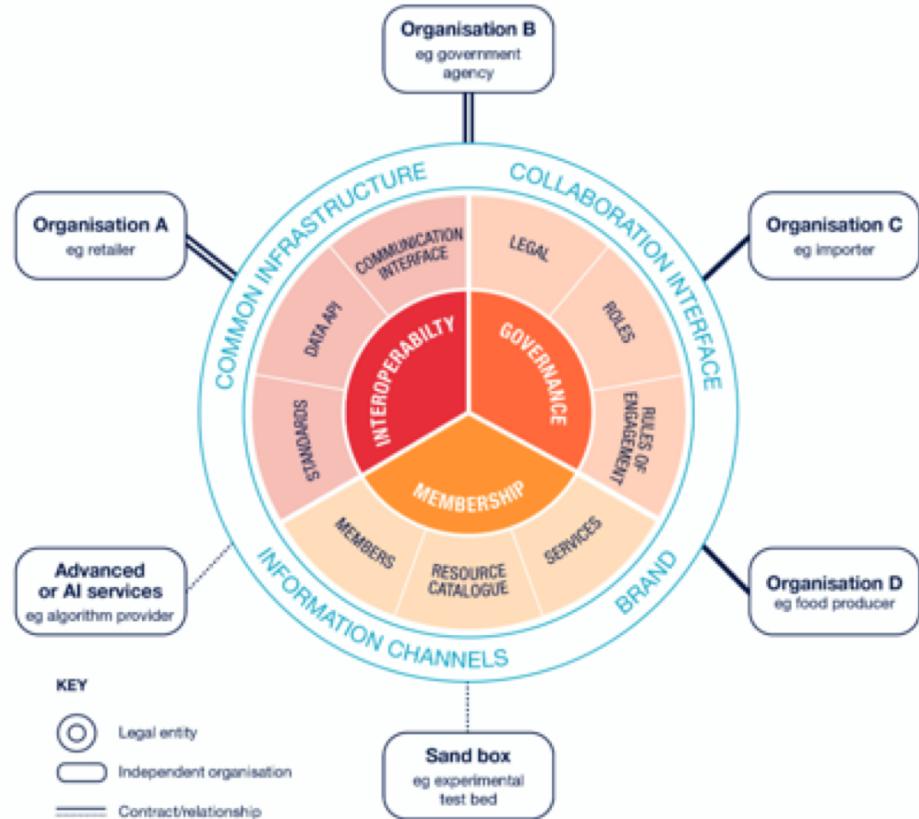
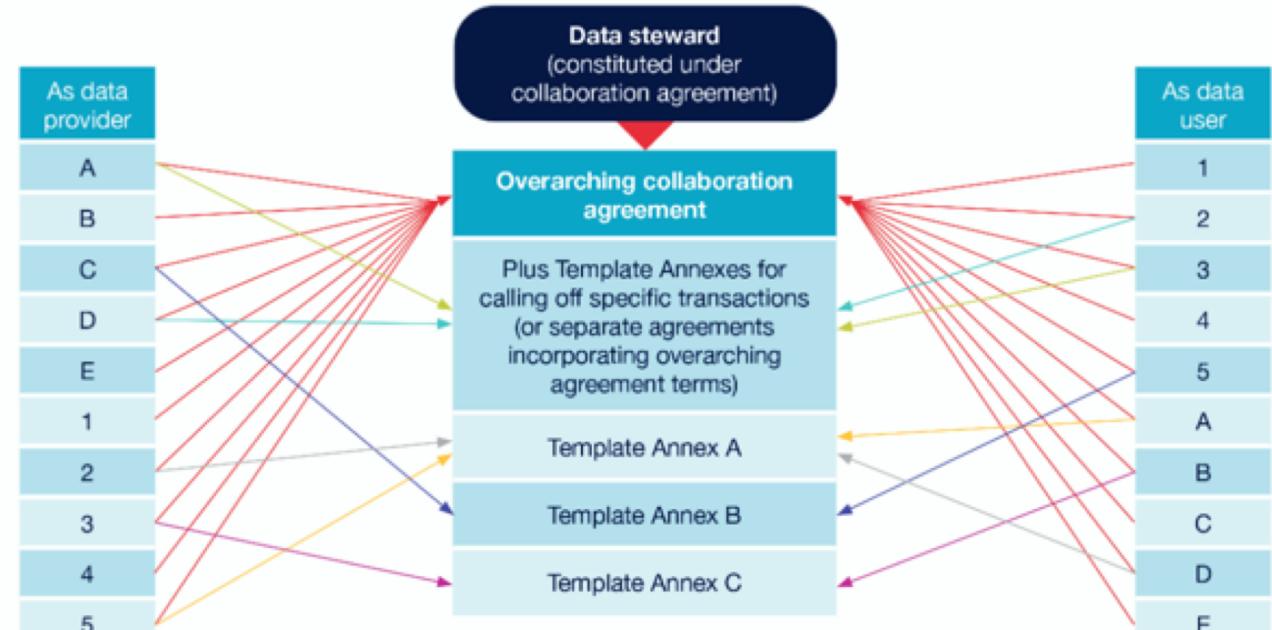


Figure (1) Collaboration framework

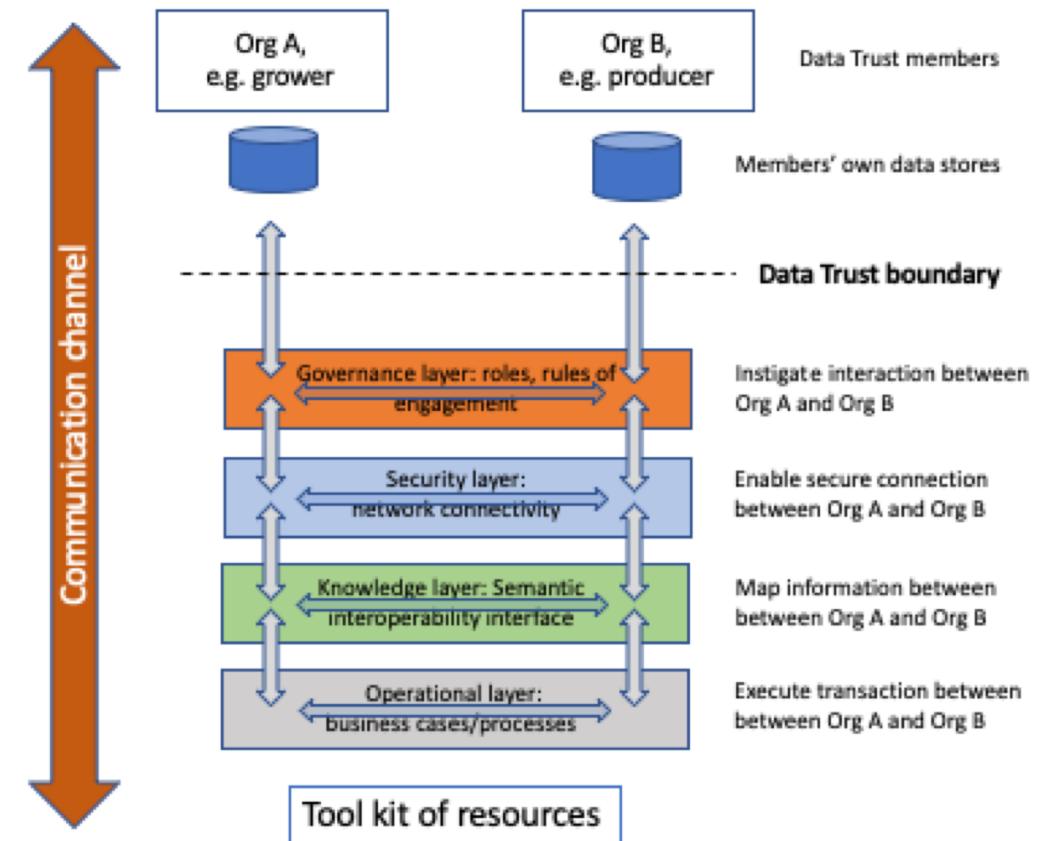


Responsible Innovation: GHG, Pesticides, GMO's, Nitrates, Water, Biodiversity, Food prices

# Logical layers

1. Trust Framework solution could be based around logical layers: governance, security, information and operations
2. Solutions to each of these concepts could be based theoretical concepts and existing examples.
3. Solution be based on standards and community developed APIs.
4. How do we overcome the market failure that prevents the ecosystem creating its own solution?
5. Best practice to deliver the minimum intervention that simply acts as a facilitating structure to allow the market to thrive?

Conceptual model of the layers of interaction within the data trust



# The future?

- Governance models: federations and foundations
- Regulatory oversight: products (food), information (data), infrastructure (telecoms)
- The future: solutions, discussions, experiments, test beds, standards, protocols, frameworks, collaboration agreements, legal entities, regulations...

# References

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