

National Soil Data Project: Building a soils data community

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Australian Collaborative
Land Evaluation Program

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AUSTRALIAN NATIONAL DATA SERVICE



Overview

- National soil data project
- Community building & accessing private data for digital agriculture
- Towards a farmers data market

Australian Soil Resource Information System

- A platform for sharing soil and land resource data
- 20+ years Australian Collaborative Land Evaluation Program (ACLEP)
 - Nutrient Management
 - Crop Modelling
 - Atlas of Australian Soils
 - Physiographic Regions of Australia
 - National Soil Grids
 - Acid Sulfate Soils



But.....

- Built and operated through projects
- Primarily public, government data
- Reduced government spending on data capture
- Valuable 'private' sources of data exist
- Many barriers

National soil data project – a socio technical challenge

Technical architecture

A sustainable operational environment for accessible, interoperable and well managed soil information for Australia

Social architecture

a data sharing environment to benefit all providers and users across government, research, and private sectors

Soil data community project

- Agriculture focus
- Barriers and opportunities to public - private soil data sharing
- Social, institutional and economic aspects

Approach

- Explore issues and co-design solutions through workshops
- Economic and institutional analysis of issues identified in workshop

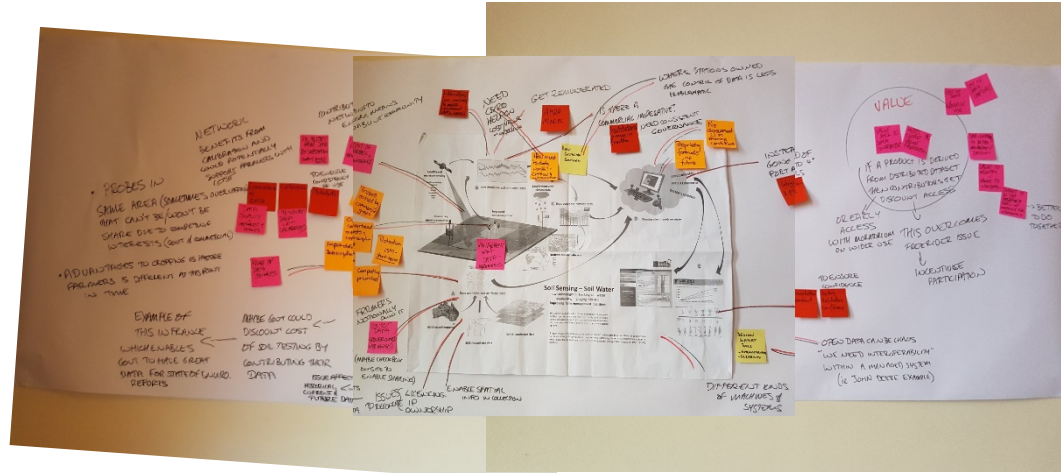
User engagement - the workshop

- Stakeholders - different world views and perspectives

- Farmer
- Ag industry – machinery, software,
- Agronomist
- Researchers
- Government

- Logic

- Common vision soil community
- Use case – soil moisture data
- Enablers and constraints
- Cost and benefits
- Value proposition
- Solutions



- Building trust
- Location
- Trusted intermediary Birchip Cropping Group

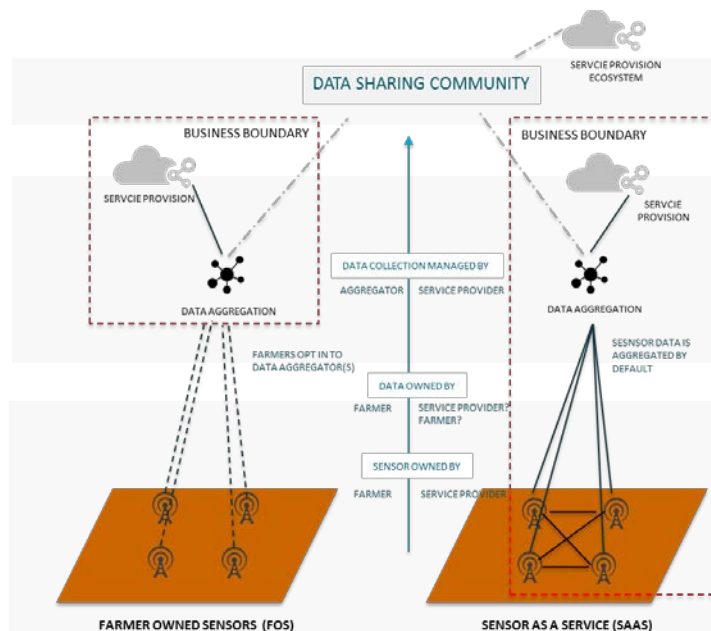
Soil moisture sensor data

Farmer owned sensor (FOS)

Sensor as a Service (SaaS)

Different

- Operational models
- Locus of costs and revenue
- Data ownership & rights – collection /downstream use



COSTS

Supplying data to others

Potential issue around ownership and rights in data when on-sold

Maintenance of:

- Platform
- Storage
- Exchange mechanisms

Sharing risks (e.g. with financial institutions).
Need clarify benefit outweighs costs/risk for individual and collective.

For FOS, data rights are clear. For SAAS rights about reuse are less clear.

FOS – farmer bears the cost of sensor purchase and operation

SAAS –service provider bears costs of sensor purchase and operation

- Sensors costs :
- Mobile data
 - Solar panels
 - Site visits
 - Batteries

REVENUE

Potential revenue through selling access to data and services

Potential to secure revenue stream through licensing access to data or selling services

FOS – farmers want to receive benefit for data sharing through e.g. Preferential service access or share in revenue of on-sold data

SAAS - need to generate Revenue to cover sensor sunk and operational costs

Workshop outcomes

Mission statement

To create a 'farmers' data-market' for trusted, equitable, efficient rule based, exchange of data and information, at a range of scales and for multiple use cases for the benefit of community members (farmers) and third parties.

Institutional

Standardise contractual arrangements around data

Clarify rights in data

Develop a governance framework

Enable providers to opt into data aggregations

Develop rules to minimise potential negative impacts of data sharing on farmers

Develop public- private partnerships to progress data sharing

Develop creative commons licensing for this data

Social

Need to develop trust within the community and around third party use of data

Provide education on data rights

Farmers benefit more than other users of data

Key stakeholder in the community include:

- Farmers
- Agronomists
- Farm machinery companies
- Financial institutions
- Researchers
- Citizen scientists
- Government

Economic

Determine a viable revenue stream/funding model for public private data exchange

Consider a hybrid model of fee for service, subsidies from government and subscriptions to incentivise and cover costs of data sharing

Design incentives (e.g. Government subsidies) to enable soil survey data sharing

Technical

Harness standards and vocabularies from OGC and others to enable data exchange

Technology and infrastructure exist- need to harmonise

Need agreements in place for system interoperability and exchange of data

Need to provide education to build skills and capacity in data management, analysis and use

Pre-competitive space can achieve standardisation of data early in the chain

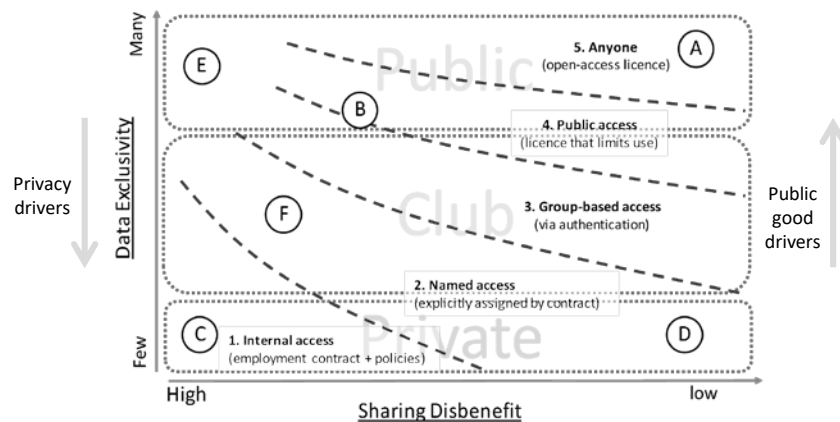
inform technical requirements



Data economics – incentives for sharing

Public, private or club goods - exclusivity and sharing dis-benefit

- Data can be made available as private, public or club goods
- Defined by combinations degree of **exclusivity** and **sharing disbenefit** (to provider)
- Providers determine level of exclusivity (who is excluded from its use) based on an assessment of the disbenefits of sharing the data.
- Institutions funding, policy, legislation, norms can be used to incentivize pro-sharing behaviour.



Examples of data representing different types of economic good

- A** BoM weather observation data is produced by government and made available publicly at no disbenefit to anyone
- B** Government-held public health records or Census data.
- E** Here be dragons
- F** Water trading within an cooperative water sharing network
- C** Soil moisture data held by a single farmer and not shared
- D** Crop planting choice data

A farmers' data market – incentives and institutions

Markets enabled by institutions bring together providers and consumers of data and services, facilitated by digital platforms that lower the transaction cost of interactions to discover, access and use data and services.

1

Data providers - data holders can choose whether they engage with a market and offer data as private, club or public goods. Their willingness to offer data into the market is influenced by benefits they receive and costs and risks they bear.

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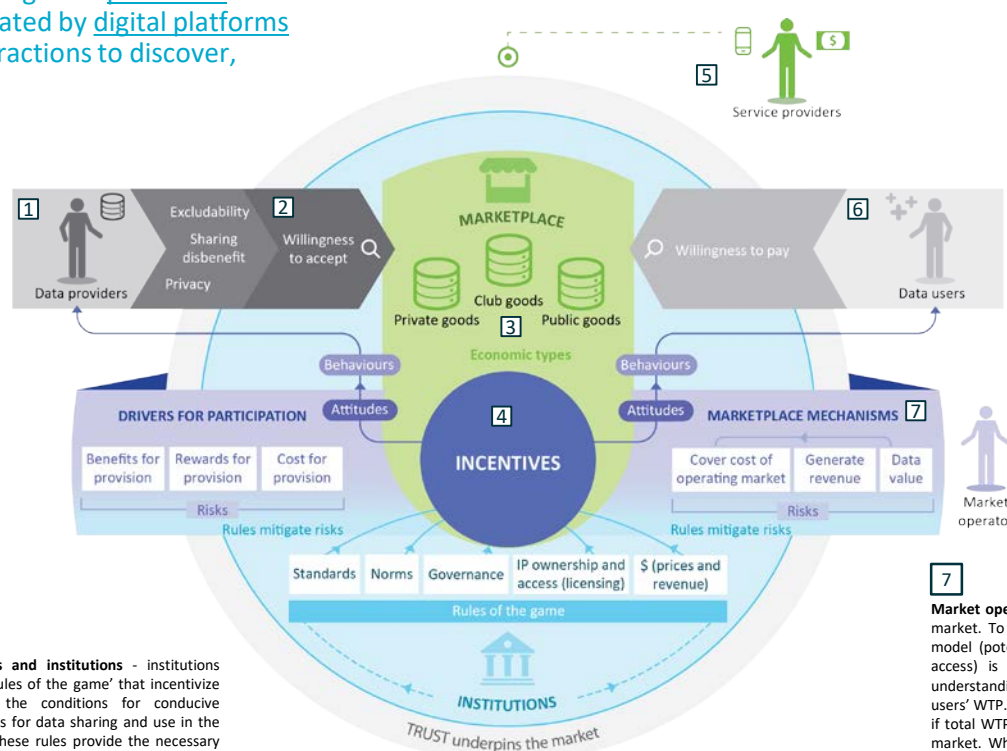
Data providers - make decisions about if, how and with whom to share their data. Potential data providers' attitudes towards excludability, rivalrousness (or disbenefit of sharing) determines under what conditions the data is offered and to whom. Privacy and commercial confidentiality are major factors that may cause disbenefit in sharing arrangements. Collectively these factors determine data providers' 'willingness to accept' (WTA) – the minimum benefit they have to receive to share their data.

3

Types of economic goods - In data markets, three types of data goods co-exist, each of which exhibit different properties: private, public and club. Providers make a conscious (and institutionally conditioned) decision about how their data is treated in the market. In some cases, regulation may prevent data from being shared (e.g. privacy legislation) and in some cases data providers may not want to share data. Money or access to services may be offered as an incentive to share some private data with

4

Incentives and institutions - institutions set the 'rules of the game' that incentivize and set the conditions for conducive behaviours for data sharing and use in the market. These rules provide the necessary trust underpinning the market.



5

A multi-sided market – service providers access data and create services for users. Services may be offered as public (free), private (commercial) or club (offered for free or at reduced prices to club members e.g. data providers) services.

6

Data and service users – users engage in the market to find and access data and services that meet their needs. Users' demand for data and services can be described as their 'willingness to pay' (WTP) – the maximum amount they are willing to pay to get access.

7

Market operation - there is a cost to establish and run the market. To create and operate a viable market, a revenue model (potentially with fees charged for data and service access) is required. This model needs to factor in an understanding of data providers WTA and of data and service users' WTP. Revenue streams can be generated for platforms if total WTP exceeds total WTA for data and services in the market. Where private WTP is weak but public demand is strong, then other funding models are required.

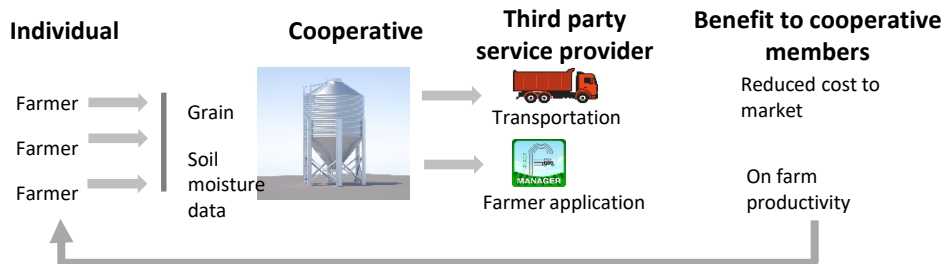
The role of data co-operatives

Agricultural cooperatives - pool resources to gain economies of scale

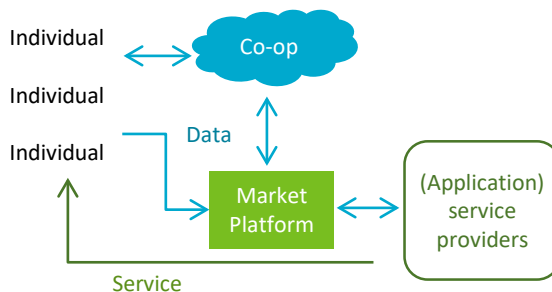
- **supply** – supplying inputs for agricultural production
- **marketing** - collaborate to transport, package, distribute and market farm outputs

Data co-operatives - formed to achieve economies of scale (and reduced transaction costs) for members through pooling resources to share data

- create, maximise and ensure the flow of collective data value back to data providers



What is the role of a data cooperatives in a data market?



Take aways

- Barriers are social, institutional & economic
- Trust is key – farmers are wary of information asymmetry
- Researchers are not necessarily trusted
- Framing as a data market a useful design and communication tool
- Academic commons or cooperatives and club goods?

Thank you

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