31-MARCH-2022

AgriDISCRETE

DIGITALISATION ROADMAP OPPORTUNITIES

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EXECUTIVE SUMMARY

Farmers and others in the agri-food supply chain have always recorded and analysed data. With or without digital technology, this will continue as part of the management of all enterprises. However, the emergence of smart phone apps, the Internet-of-Things, and machine learning algorithms—among others—have led to an increased interest in farm data outside of the farm-gate. The collective analysis of data has benefits for farmers themselves, as well as regulatory, policy, research, and technology stakeholders. Digitalisation of farm activities offers great potential to all actors in the supply chain, including and up to the final consumer. In this document, findings and insights gained during the AgriDISCRETE project are presented as a series of opportunities to increase the digitalisation of Irish agriculture. Challenges and issues are summarised under five broad dimensions, acknowledging that these sometimes naturally intersect and that changes in one may impact another. For each dimension, potential avenues are outlined that could begin to address the particular challenge. These must be read in the context of the AgriDISCRETE project, where a multi-actor approach underpinned all tasks, and they do not necessarily represent the views of the researchers involved. The background to each challenge and each potential opportunity can be observed in earlier AgriDISCRETE deliverables on the project webpage: www.teagasc.ie/agridiscrete

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INTRODUCTION

AgriDISCRETE was a two-year research project (2020-22) funded by the Department of Agriculture, Food & the Marine (DAFM). It explored good data governance practices in agriculture and forestry in Ireland and considered current challenges presented by data use and data sharing when digital technologies are employed in agriculture and forestry. Technical and business-oriented challenges were examined, as well as socio-economic and ethical issues.

Bringing together an interdisciplinary research team comprised of data scientists, business scholars, and social/behavioural scientists, AgriDISCRETE took a holistic approach, with five integrated tasks that allowed the research team to map current technological challenges, identify diverse stakeholder concerns, and develop societally-acceptable technological solutions and social responses.

A series of co-design workshops were held with a wide variety of agriculture stakeholders. Participants discussed social and ethical concerns around data

governance in agriculture that become apparent as new technical solutions and business models emerge. The workshops facilitated a range of stakeholders to share their opinions and concerns on the future of digitalisation in agriculture and forestry in Ireland, and to suggest solutions for good data governance practices for the future.

An output of these workshops was the creation of a farmer-friendly infographic detailing the farm data journey. Additionally, the workshop findings informed the development of a multi-sided business platform, which envisions a data ecosystem where all participants co-create value. A technological proof-of-concept platform was developed to demonstrate the multi-sided business platform approach. The platform enables data providers and data consumers to engage in a system of multi-directional information flow. Embedding a multi-actor approach, AgriDISCRETE informs good data governance practices within Irish agriculture and forestry so that the benefits of digitalisation can be realised in a trajectory which is responsible and societally acceptable.

Opportunities to realise the benefits of further digitalisation in Irish agriculture are presented across five dimensions in this document. The related challenges for each dimension are described, together with some best practice examples.

DIMENSION-1: STRATEGIC DIRECTION AT MACRO LEVEL

Different agricultural sectors are at different stages of their digital journey which implies different market maturity models and implementation plans. Similarly, data is being gathered across sectors without considering collection standards and templates, or the subsequent interoperability of data sets. For example, providing farm data for regulatory compliance is a significant burden on farmers and they must often provide duplicate data to multiple agencies, each of which will have their own collection techniques and templates. While governance is very much a macro level issue, questions around data ownership, portability, and privacy are challenges which need to be addressed at more granular levels. Who stewards the data on its journey?

ROADMAP OPPORTUNITY

The opportunity at EU and national government level is to support the ignition of the agriculture data marketplace. This could, for example, take the form of establishing a regulatory data compliance system where data would be more accessible for government agencies, technology providers, and farmers. Another initiative could be to identify and establish quality assured core datasets in formats for commercial innovation and exploitation. Finally, a National Agriculture Data Management Policy could be created that leverages the EU code of conduct on agricultural data sharing to promote and raise awareness of the guiding framework for data management.

DIMENSION-2: UNCERTAIN MARKET MODEL

Very few market mechanisms currently exist for stakeholders to engage with one another around data exchange and related services. Therefore, the roles and responsibilities of marketplace actors are not fully defined, especially around government and marketplace cross-overs. In this scenario, innovation becomes stagnant since there is essentially competition between government and marketplace actors. Another factor is the lack of validation for business outcomes where agriculture data is exchanged. The other side of this coin is the low level of data exchange which slows stakeholder collaboration and inhibits new business transactions. A functioning data market would be advanced through publicly supported incentives.

ROADMAP OPPORTUNITY

The opportunity is to employ some form of market mechanism that creates new data markets or data spaces for stakeholders. Defining the role of government agencies and market/commercial actors would be beneficial, with the resulting provisional boundaries allowing for engagement. For example, the government role might be to support knowledge creation and innovation, while market/commercial actors take responsibility for co-creation of value and further exploitation.

Another example would be the creation of a central data marketplace where data can be located, acquired, and shared in a trusted environment. Data providers might be offered incentives to engage in this data marketplace, where use-cases and business models would be built and validated in sector-specific scenarios.

DIMENSION-3: VALUE PROPOSITION OF MARKETPLACE IS UNCLEAR

Value needs to be defined as it does not relate only to monetary value but also to other forms of value exchange. There is a certain degree of fear being promoted that incumbents will lose out to new market entrants. The former have an advantage since they already have existing relationships with a critical mass of farmers. While awareness at farmer/producer level of the potential of data is increasing, it remains relatively low overall. Digital literacy among farmers is being addressed and this holds the potential to increase data understanding inside the farm-gate. There is also a lack of reciprocity around value exchange, including financial aspects, between farmers and agri-tech providers.

ROADMAP OPPORTUNITY

The opportunity is for industry stakeholders to become more attuned to the needs of the data provider; that is, the farmer. National technology demonstration sites could be established to enable technology providers to design products more aligned to a farmer-centric delivery. This could also facilitate greater interoperability between technology provider products. Equally however, farmers need to be informed of the benefits of sharing data and how their data could have value for third-parties. Incumbent technology providers and other value chain stakeholders will need to become familiar with the value of multi-sided platforms for business models. It might also be useful to create an agriculture innovation relay system between incumbents and technologists around collaboration and exploitation of the marketplace. It is the network of collaborative relationships that provides the key to understanding and realising the business model opportunities while enabling new entrants and novel skill sets into the network.

DIMENSION-4: LACK OF TRUST

Farmers are concerned that certain data—such as financial or environmental details—could be accessed by unauthorised third-parties and used against them. The lack of micro governance around data ownership and access-control leads to a degree of confusion and distrust that might sometimes be justified but other times might not. Agriculture data contracts are complex and a power imbalance exists between the (often large) technology provider and their individual farmer clients. For example, how difficult might it be for a farmer to update their technology contract or change provider? Most saliently, there is a historic lack of collaboration, empathy, and understanding amongst all the value chain stakeholders as to the requirements of each other.

ROADMAP OPPORTUNITY

Education is required across the entire value chain in terms of moving the perception that farmers as data producers are passive recipients in the value chain to equal members of that value chain. This could be complemented by establishing greater dialogue and moderated forums amongst value chain stakeholders. A National Agricultural Data Management Policy, mentioned in Dimension-1, would provide all stakeholders, especially farmers, with reassurance and trust that their data will not be used to harm them through a legal and regulatory framework that governs agriculture data management.

DIMENSION-5: INTERSECTION BETWEEN ICT AND AGRICULTURE INFRASTRUCTURES

While technology can increase the economic and environmental performance of the agriculture and forestry sectors, there remains a low level of adoption at farm level. Farmers have been seen historically as a major constraint in the adoption process, but it would be a mistake to assume they are averse to new technologies. The barriers to their uptake of new technologies include the initial investment required, a lack of awareness of technology tools, the usefulness and benefits of their application, and the lack of trust in technology providers. In essence, there is a digital disconnect between technology provision and technology adoption.

ROADMAP OPPORTUNITY

The opportunity centres on enhanced interdisciplinary collaboration across government, industry, and academia to achieve greater awareness of technology tools that are available and greater education of how these tools can be applied to the benefit of the farmer. There is a need for greater bottom-up and collaborative development of technologies rather than the current siloed technology development approach. This could be achieved by establishing multi-actor community building and collaboration space for innovation such as digital or data cooperatives.

Founded on principles of economic democracy, transparency, and solidarity, these digital cooperatives could give farmers sufficient agency and legitimacy in the data value chain. Cooperatives are already a familiar and successful concept in agriculture. Developing a farmer-centric digital cooperation model would involve supporting technology and tool access, shared hardware, data governance models, and training. This offers a considerable opportunity to advance the intersection of ICT and agriculture infrastructures.
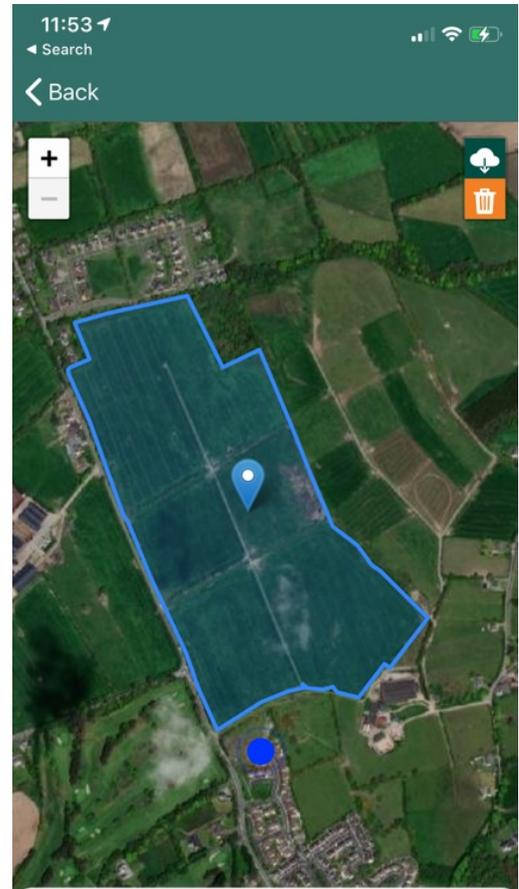
EXAMPLES OF GOOD PRACTICE

FARMER-CENTRIC TECHNOLOGY DEVELOPMENT

Technology developers worked directly with farmers in the NIVA project to create a smart-phone app that allows geo-tagged photos to be uploaded to a government website. This makes it easier and more efficient for farmers to submit applications and reduces the need for on-farm inspections. Social scientists provided the human-centred expertise that created *AgriSnap* which ultimately means a faster turnaround of farmer queries and therefore minimises payment delays. **MORE**: https://www.niva4cap.eu/uploads/downloads/UC4a.pdf

DATA-AS-A-SERVICE

VirtualVet is a private company whose business model is built around the idea that farmers' data is valuable and when it is digitised and aggregated, it should generate an economic value for the farmers supplying the data. In return for providing information on their veterinary medicine use, farmers receive a free recording service to reduce the stress and increase the accuracy of on-farm regulatory compliance. The VirtualVet service updates the farmer's official remedy book whenever they treat an animal. In return, VirtualVet analyses the data, interprets and trades the insights to supply chain actors. **MORE**: www.virtualvet.ie

LEVERAGING EXISTING RELATIONSHIPS

JoinData is a Dutch initiative that fosters data traffic between agri-businesses who have already been sharing data for decades. Data sharers include dairy farmers, milk processors, veterinary services, and food safety authorities. The JoinData platform enables users to share data they were already sharing, but in a more efficient and organised manner. **MORE**: https://join-data.nl

GENERAL PRINCIPLES

Copa Coegca's *EU Code of Conduct on Agricultural Data Sharing by Contractual Agreement,* published May-2020, outlines "...general principles for sharing agricultural data from farm to farm products within the agro-food chain. It constitutes a joint effort from signatory organisations to shed greater light on contractual relations and provide guidance on the use of agricultural data." **MORE**: https://www.copa-cogeca.eu/Archive/Download?id=3770357

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Department of Agriculture,
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