# SESSION 4: TRANSFORMATIONAL CHANGE BASED ON INNOVATION PLATFORMS

## *Overview:* Taking the hope and fear out of agricultural service innovation

Dr Mike Briers AO

Food Agility CRC and Internet of Things Alliance

**Abstract**

Agriculture lags other sectors in the development and uptake of digital services needed for safe and sustainable food production. Challenges to digital readiness include Internet connectivity in rural areas. Whilst connectivity solutions are emerging, two key enablers of digital service innovation are lacking and often overlooked. The first is the absence of reliable underpinning information systems calibrated for decision-making (knowledge infrastructure) to enable services to be scaled and repurposed for different use-cases. Progress is being made in the development of such systems which will attract new investment and open many transformational opportunities across the food and agriculture ecosystem. The second relates to the maturity of contemporary lean start-up approaches to iterative co-design and market validation prevalent in the sector. These methods place the customer or service consumer at the centre of a co-creation process to ensure that value is delivered and ultimately adoption is maximised. This is particularly relevant for agriculture in both advanced economies and developing countries characterised by a highly complex and volatile decision-making context. Designed and executed well, this approach to deliberate service innovation removes the hope and fear elements more commonly experienced.

I feel a little bit humbled by the number of people in this room that genuinely care about the world and want to do good things in that world. I spent 20 years of my professional life in commercial business in the fintech industry, almost at the dawn of the Internet age and the first really 'big data' types of applications. For the last five years, as a student of agriculture, I have tried to understand the lessons that I learnt over that time, as they can be applied in agriculture.

First, here (Figure 1) is an update to a table Steve Mathews showed [Session 2, this *Proceedings*]. This is an Australian version of the table (it does not include hunting!), and is more recent. In the Food Agility Cooperative Research Centre (CRC), we are trying to answer open questions about how to move agriculture up this table in Figure 1, out of the red into the green. An important difference between this table and the one Steve Mathews showed is that the lowest six rows of this table are labelled 'Asset intensive industries', and the four rows at

This paper has been prepared from a transcript and the Powerpoint slides of the presentation.


Figure 1. Australia Industry Digitisation Index, 2016 or latest data, based on a set of metrics to assess digitisation of assets (6 metrics), labour (5 metrics) and usage (26 metrics).
*Sources:* Australian Bureau of Statistics, Appstore/iTunes, ASX300 annual reports, Australian Dept of Immigration & Border Protection, Facebook, Google Play Store, LinkedIn, Twitter, McKinsey analysis.

the top are labelled 'Knowledge intensive industries' (which is where I'm from – finance and insurance). The first open question is: What does it take to move agriculture into the group labelled 'knowledge intensive industries'?

## Barriers to adoption in digital agriculture

Stuart Higgins spoke earlier about MAD – mobile acquired data – and already today we have seen many great examples of mobile use. It is often claimed that connectivity in the rural areas is a barrier to digital adoption in agriculture. But there are new solutions (in Australia, mesh networking data systems and so on) that don't rely on the Internet as much. Here's an example from Uganda with bananas. In Uganda the average consumption of bananas is the highest in the world: people eat something like 0.7 kg of banana per head per day. A program called 'YouReport' enabled a network of around 200,000 Ugandans to report on the prevalence of a banana disease. This level of participation has enabled the YouReport people to map out the prevalence of that disease (Figure 2) in

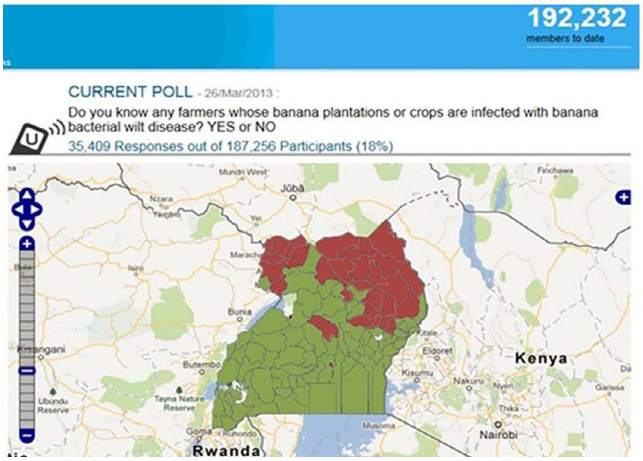


Figure 2. Detecting and mitigating disease in bananas, a staple food in Uganda, has been achieved by use of mobile phone technology.

order to be able to control it. More importantly, the example shows first that Uganda has 'jumped over' copper and moved straight into mobiles; and also that mobiles are allowing people to be educated about ways to minimise and mitigate that particular disease. This is an example of using MAD.

Nevertheless, there are two key barriers to adoption of digital technology, other than the Internet and connectivity. One of them is very technical, and one of them is very deeply human, and I think these are sometimes forgotten.

The technical barrier is the absence of reliable underpinning information systems that enable services to be 'scaled' and repurposed for different situations ('use-cases'). The human barrier is a current lack of mature approaches to iterative co-design and market validation which focus on delivering value to the consumer of technical services to maximise service adoption.

## Technical barrier: bridging the digital divide

The framework in Figure 3 helps my team fill out the picture and the opportunity in digital agriculture. It arose out of a lot of industry consultation, which looked simply at two demand drivers and two supply drivers. On the left of the diagram you see 'Produce the right thing', which is essentially a digital feedback system: feedback tells people in the supply chain what to produce and how much to produce. Digital technology has a significant role to play in that. The right thing for the brand may be nutritional and other provenance or food safety characteristics of food products in the hands of consumers (top right-hand side of diagram) – authentication (whether provenance or safety) can be enabled by attaching a digital story to the produt as a feed forward system.

The bottom half of Figure 3 refers to two supply drivers that have been mentioned already today. One is access to finance (essentially, reduction of risk and uncertainty, and how data can be used as evidence of sustainable farming practice to reduce premiums on finance and capital and insurance and so on).

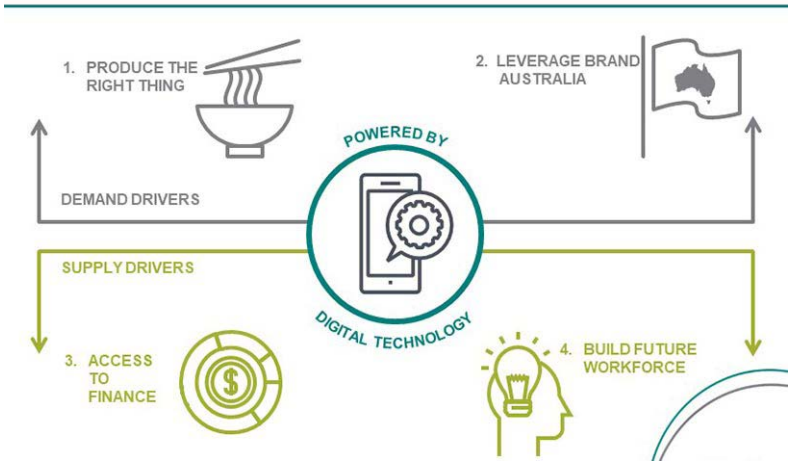


Figure 3. Four challenges for impact.

And the other supply driver is people – so the input side is dollars and people – and there are various types of digital services that can increase the digital adoption and digital education.

The first thing that I noticed, as an outsider to the system, is that the agri-food industries and digital technology have only recently come together to try and bridge the digital divide. That is why we now have a plethora of discussions, including this conference, linking digital technology and data to agriculture.

In my view, there have been good reasons for that delay. One reason is that we are on a journey to better educate technology providers about the reality of particular industries, and of those it seems that agriculture is the most complex and the most volatile.

Farmers seem, to me, to be the ultimate entrepreneurs. They make decisions based on very little forward information (maybe many of you in the audience take that situation for granted), whereas other sectors are much more predictable and much more controlled. For them, digital technology is a lot easier. Therefore part of our mission is to educate the technology providers, to give them a more nuanced and sophisticated view of the agricultural sector.

To 'scale' and develop services, agriculture can take lessons from highly mature sectors. We need apps that are reliable; we need stable and robust measurement systems; and at the moment we don't have those. We have very fragmented measurement systems and we have silos up and down the supply chain, and things called 'tombs' where some of the data that has been collected is just sitting unused, as someone mentioned earlier – no-one is doing anything with it, even though it is potentially useful.

And so my team has been promoting the notion of data in circulation (Figure 4), by building use-cases (example situations) and proofs-of-concept (evidence) that allow and demonstrate the value of data – if we can only break down the silo.

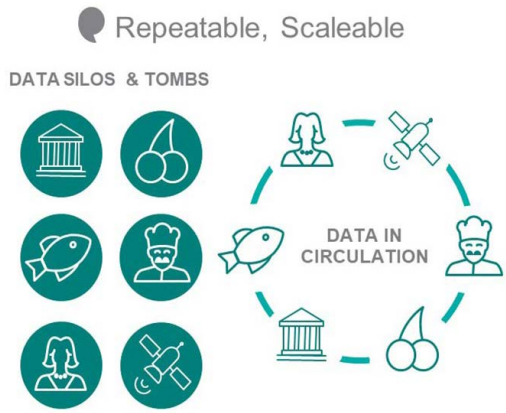


Figure 4. Stable and trustworthy measurement systems matter.

We ask: What does a service looks like that tells a grazier about the quality of the meat from the viewpoint of a meat processor or the viewpoint of an end-consumer? We want to be able to produce those types of proofs-of-concept.

Importantly, this also underpins scale. In terms of technology, 'scale' means how you extend and repeat to cater for many millions of users. That is what is required. It is also important to be able to 'repurpose' or adapt the uses to which data is put. If we can create systems that meet a need for many users, then we have a chance of driving an adequate return on investment to attract further investment in the underpinning measurement infrastructure.

Through analytics and predictive analytics we already have really good use-cases and commercial systems that are demonstrating the value of providing Internet of Things or sensor-based data to growers, to help them make better decisions, or predict disease outbreaks, and so on. That same data can be repurposed as a service, as an app for a food safety regulator. There is an urgent need to demonstrate and capitalise the investment in and development of such systems with our partners.

Let us say we have been able to achieve this in agriculture, and now we have a flood of data. I'm not talking now about statistical sampling, but about data flows and what they make possible. The world now has much more data amenable to being handled by machine-learning and predictive analytics. We can measure variables in the environment that we have never been able to measure before, and more reliably. So whether it's PAR (photosynthetically active radiation), or leaf wetness, or UV, or temperature, or whatever it is in the environment, we can measure it, and we can put that in a very localised situation and we can understand what the conditions will be for a crop on this side of the hill versus the other side. Moreover, we can predict frost and other types of challenges for farmers, ahead of time, if we basically predict the local climate relative to the wide area data. There is a lot of thinking yet to be done but we are starting to see applications of this (e.g. Figure 5).

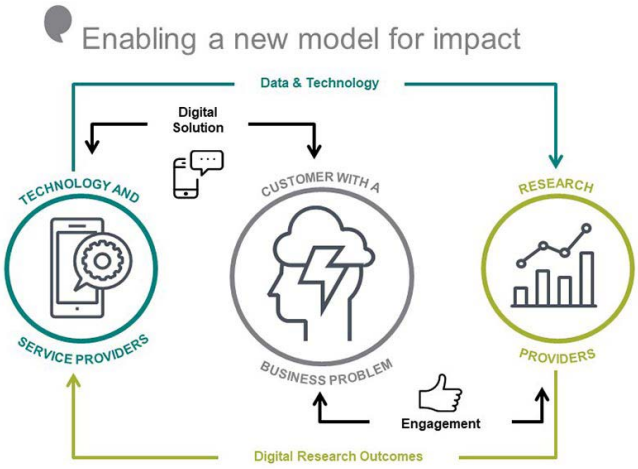


Figure 5. Making agile data science real.

Figure 6 tries to represent the agriculture–digital technology ecosystem. We believe that people sometimes take a very narrow supply-chain view. By contrast, if our CRC is developing one of these systems we would want to know how it is viewed by a producer, a processor, a retailer ... and, importantly, what happens if out of the same data system a farmer wants to provide their data to an insurer or a banker to reduce the cost of their capital and their insurance, in order to prove that they have sustainable practices. That's a different service.

An agronomy provider, an agronomy consultant, for example, can be provided a service with the same information, but perhaps from many farms. Then being able to advise and consult at a distance from the farm becomes more relevant.

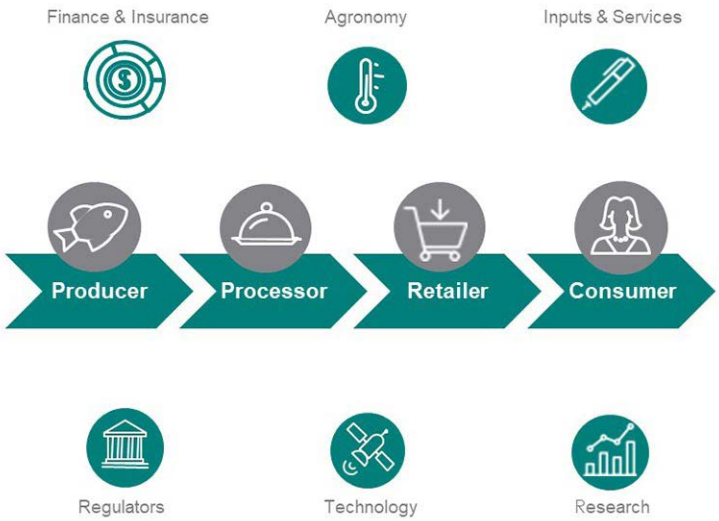


Figure 6. Attracting ecosystem investment: repurpose!

Input providers, service providers including agricultural chemical companies and so on, can provide better information, and better more targeted services, to the sector.

Research as a service: what does that look like? We have already discussed today the challenges with data and data privacy and sharing data. But what if we are able to incentivise farmers (who, we think, should maintain control of their data) to share their data with researchers so that the data can then be developed and effectively turned into an algorithm and deployed within days onto an application that a farmer can then use and validate?

The idea is that farmers and technology providers and safety regulators and others can use digital applications that are variations built on one fundamental system, for multiple purposes. Being able to repurpose that system means thinking of it not as a technology but as a service – and then central to a service must be the customer (Figure 5). Whenever I think of service I think of a little triangle: Who was that service for? Are we providing a service to a banker? Are we providing a service to a grower? What are the decisions that we want to support?

## Overcoming the human barrier to digital adoption

Lastly I want to speak about deliberate innovation. This is a concept that our CRC is starting to experiment with. It is old things made new. We have borrowed concepts used in software design over many years, and also from what – in the international development world – is called 'participatory design'.

We are saying that a common big challenge is that often people do not frame a problem correctly, and then they build or find a tool that they think is going to provide the solution ... but they have not thought enough. Our approach is, in a very facilitated expert way, to gain a better understanding about the problem that needs to be solved. We do this by bringing together, in the one facilitated workshop, a banker, a regulator, a grower, a researcher, a technologist and so on (Figure 7). This is not an inward-looking focus group of people in the


Figure 7. Deliberate innovation.

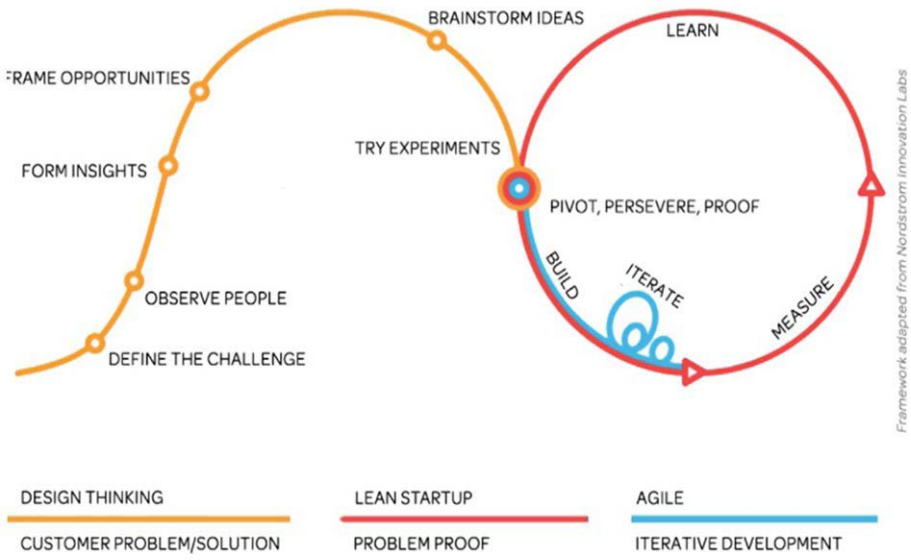


Figure 8. Customer/problem discovery and proof.

industry. Instead it is a very external reference. I think this is relatively novel and is something that the industry will benefit from – and it helps me to cross the digital divide I mentioned before, in a very experiential way.

Of course the other pattern to this is not just the framing of the problem and challenge, but also very a human thing about motivation. We've done a number of these workshops with good success, ending with the participants saying, in effect: "We understand the problem; we want to work together; we all have a different interest in this project and once we launch the project in a conventional agile model, we can then iterate it" (Figure 8). Rather than validating this with peers and so on, this is about market validation, and it's very well-known and very well understood.

What we want to do is put these things together, learn from the entrepreneur community and the start-up community, and actually apply it – not in an offhand way in agriculture, but using a professional and systematic approach which recognises the importance of diversity and trying to challenge and challenge and challenge until you intimately understand the problem that you're trying to solve.

To finish, Figure 9 illustrates the example I gave earlier about repurposing data for both growers and regulators. You can look up that use-case (about oyster-growing) if you go to the Yields website (http://theyield.com/post/barilla-bay).

I would like to add that I was very inspired by the Sir John Crawford Memorial Address last night and I think that digital agriculture can really underpin that notion of nutrition-sensitive and climate-smart agriculture.


Figure 9. An oyster-grower's example of data repurposed for a range of potential uses.

Mike was named in the Knowledge Nation 100 as Australia's chief evangelist for 'big data' and the Internet of Things (IoT) and appointed Australia's first Industry Professor of IoT at UTS. He is currently the CEO of the Knowledge Economy Institute, an IoT innovation hub, and leads the Food Agility Cooperative Research Centre to empower Australia's food industry to grow its comparative advantage through service innovation. Mike is a co-founder and Director of the Internet of Things Alliance Australia. Mike's pioneering efforts in fintech and e-research led to the global success of SIRCA and the founding of big data company RoZetta, e-research service provider Intersect Australia, and co-founding of Capital Markets CRC and AgTech business, The Yield.