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***Reaping the technology harvest***

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## **A meal 2.5 million years in the making**

There's a common belief that our society has become too preoccupied with food.

You certainly get that impression from the Food Trends report that Google published last week.

Judging by the terms that Americans are typing into Google – we're about to be hit with a wave of cheese curds, vegan donuts and daikon radish.

We have seen the future: and it's rainbow bagels.

Some people would look at this report and weep for the decay of civilisation.

I'm going to tell you that it's a triumph.

We live in a society where the average person goes about their day in the certainty that there'll be enough to eat.

We have the time to Google food – because we are not engaged full time in the business of getting it.

So we are set apart from most of the 100 billion or so people who have lived before us.

Just reflect for a moment on the millions of years of progress in agricultural technology that every rainbow bagel represents!

2.5 million years ago, we entered the Stone Age when we picked up rocks and made our very first tools to kill and cut up meat.

That was the Toolmaking Revolution.

10,000 years ago, we established the very first settlements and began to build civilisations – with all the trappings of architecture, literature and the beginnings of science. We could do it because we worked out how to farm.

That was the Agricultural Revolution.

250 years ago, we saw a massive acceleration in technological progress and industrial output, with the steam engine, the cotton gin and the factory system.

It was possible because better farming technologies had freed up workers from the land.

And that was the Industrial Revolution.

60 years ago, the world's agricultural output began to skyrocket, through a combination of new wheat and rice cultivars and the spread of mineral fertilizers, pesticides and irrigation.

We doubled the global production of cereal crops. We tripled the value of the global food trade. We lifted billions of people from hunger, disease and early death.

And that was the Green Revolution.

Today we can't sit in a café for twenty minutes without whipping out a smartphone. And that's the ICT Revolution – the pay-off on *two and half million years* of human development.

### **The coming agricultural technology boom**

So what will the great revolution of our time mean for what we eat, how we grow it, and who gets access?

Clearly, the world wants to know. Just follow the money!

In 2014, the global venture capital investment in agricultural technologies topped US\$2.3 billion.<sup>i</sup>

In 2015, it doubled – to \$4.6 billion.

The growth is startling – but the logic is both simple, and sound.

Globally, food production today is a 5 trillion dollar industry – that's 5 trillion US dollars – representing no less than ten per cent of global consumer spending.<sup>ii</sup>

Come 2030, there won't just be 1 billion *additional* consumers to feed – there will be double the number of consumers with fussy middle-class tastes.

A global middle class of 4.9 billion people adds up to a very big grocery list indeed.

So the demand for more and better food is immense. The market for better ways of growing it is booming. And the ICT Revolution is spinning out those solutions in spades.

Let me offer you just a taste.

### **Smart farming for a strong future**

In Tasmania, they grow oysters. And oysters have a nasty habit of carrying deadly bacteria. When it rains, the run-off from the land can contaminate the farms.

So the regulators stop the harvest when it rains.

Simple – *too* simple.

Just because you've got rainfall in a given area, that doesn't mean there'll necessarily be run-off to a particular oyster farm – and every time we halt the harvest, the farmer cops a five figure loss.

So what if we put sensors in the water to measure the salinity – and thereby gauge the *actual* level of run-off, and the risk?

What if we only closed the oyster farms when we could show it was required?

We would cut the waste, protect the consumer and boost the industry – and there's a company in Tasmania named The Yield working hard to bring it about.

Shift to New South Wales where, amongst other things, they grow apples. And it's not an easy business.

There's increasing pressure from imports. There's the sensitivity of the orchards to heat stress and severe weather events. And there's the

sensitivity of the consumer to any apple that isn't perfectly round, perfectly coloured and perfectly crisp.

So how do you grow more perfect apples?

The University of Sydney has a solution – a field robot called 'The Shrimp', with 16 sensors, a camera and a laser imaging system. It passes through the orchard, detecting individual features like flowers and fruit, and collecting data on the properties of the soil.

So the farmer can map the yield against the growing conditions – and use that information to maximize next year's crop.

One more – a company named Agersens in Victoria, rolling out the "virtual fence" based on licensed CSIRO technology.

Picture a cow with a collar around its neck – a solar powered collar, with Wi-Fi and a GPS locator.

The farmer decides where the cows ought to stay and plugs the coordinates into an app.

When the cow strays out of bounds, the collar delivers a strong sound and a mild shock to nudge it back the other way.

So farmers save money on fences. They can limit the impact of fencing on native animals and local ecosystems. They can even muster the cattle via the smartphone app! And they can gather a wealth of data on the behaviour of the herd at the same time.

### **Serving up opportunity... at home and abroad**

That's a very small sample of the technologies coming onto the market today to help farmers harness complex data, minimise input costs and cope with the vagaries of climate and markets.

It is the reality of farming today.

The \$5 trillion question for us is how big the opportunities might be for Australia.

If we think beyond increasing yield in tonnes per hectare, the second way to boost farm income is to increase the dollar value per tonne.

Fussy consumers will pay for quality, safety and provenance.

Sensors, data, robots and crop science can help us to improve quality.

Advanced logistics and monitoring can help us to maintain safety throughout the supply chain.

When it comes to provenance, advanced tracking technologies can help Australian exporters establish powdered-milk origins from cow to can, and oyster origins all the way from Tasmania to Romania.

The third way to boost farm income in Australia is to farm more land. But we know there are hard limits to the land we can farm.

ATSE research suggests that the land and water resources available for cultivation in southern Australia are almost fully developed.

Looking north, it's unlikely that new developments can add more than 5 per cent to the current cropped and irrigated land area.

Today, Australian farms contribute about one per cent of the world's food and fibre output. It's a critical one per cent, no question.

And by all means, let's use the available land as efficiently and sustainably as we can, to boost both the yield and the dollar return.

But it still leaves ninety-nine per cent of the output grown somewhere else.

Which is an opportunity to think laterally, to think beyond the Australian farm gate crops themselves. To seize the opportunity to help the rest of the world in *their* pursuit of increased yield.

We have genuine competitive strength not just in agricultural research, but in many of the fields now converging in the Agtech sector: from robotics, to analytics, to genetics.

So why not profit from that expertise and win investment at the same time in local research, local skills and local startups?

We've done it with mining technology, on the back of the resources boom.

We made this country the global testbed for some of the most advanced extraction technologies in the world. The strengths we demonstrated at home are now in demand overseas.

So let's chase the opportunity in agriculture, at scale.

Let's make the ICT Revolution the best and most transformative yet.

And let's make Australia's part in the story a very proud one.

**THANK YOU**

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<sup>i</sup> Agfunder, *AgTech Investing Report: Year in Review 2015*, 16 February 2016.  
<https://research01.agfunder.com/2015/AgFunder-AgTech-Investing-Report-2015.pdf>.

<sup>ii</sup> McKinsey, *Global agriculture's many opportunities*, 2015.  
<http://www.mckinsey.com/industries/private-equity-and-principal-investors/our-insights/global-agricultures-many-opportunities>.