FINAL REPORT: Engagement of Red Meat Processors in the Digital Economy.

PROJECT CODE:	2017-1026
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1.0   EXECUTIVE SUMMARY

The original scope of this project was to investigate Artificial Intelligence solutions to Animal Health issues within the red meat processing industry. This was to include in-depth case studies, business case analyses and financial modelling. Upon further engagement with the client, a process for defining artificial intelligence assisted with identifying the core purpose of the original scope of work. According to the respected Gartner Hype cycle, which maps emerging technologies and their life-stage, artificial intelligence and its associated technologies was deemed too immature a field to be providing genuine solutions to current issues within a plant environment.

A framework as shown in the figure below was proposed.
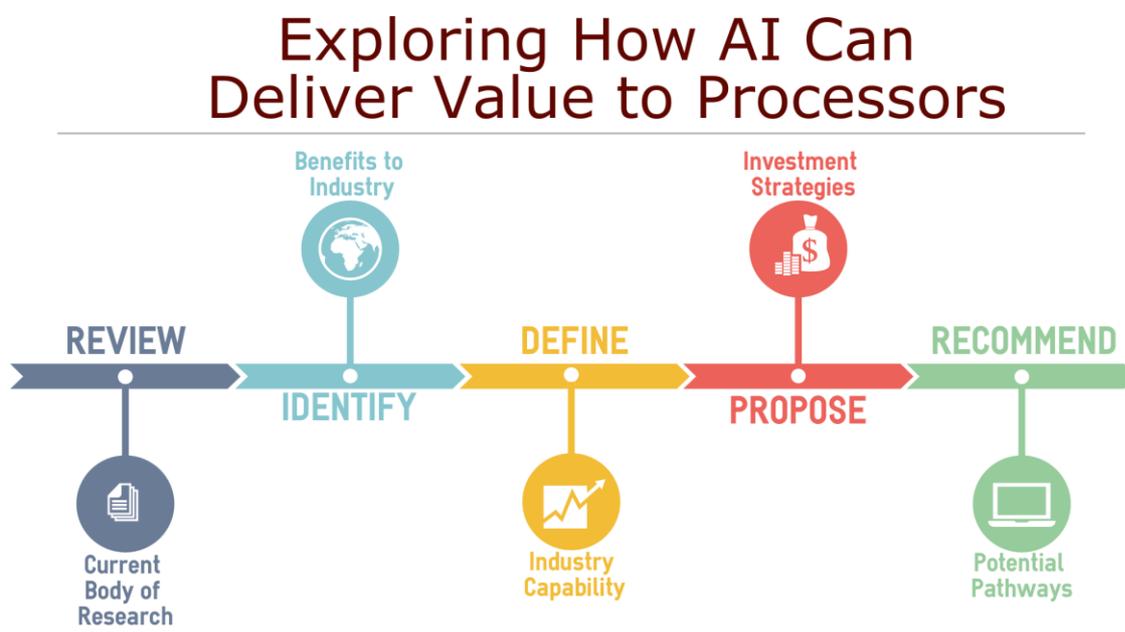
Figure 1: Re-scoping the initial proposition

After presenting several potential case studies in the third milestone, and using an ideation process to guide the identifying of the real issue at hand (engagement of processors in the digital economy), it was clear that completing another project on case studies would be an ineffective strategy to effect change industry wide. What was required was an industry-wide digital strategy, of which such projects were informed by a cohesive and spearheaded strategy to help industry move towards participating in the digital economy.

On a scale of ease vs. impact, the Industrial Internet of Things demonstrated the most feasibility and viability as an entry-point to engagement of industry; most plants have significant capacity and 'things' in which to connect, the cost of connectivity has dramatically reduced, the potential of generating benefits is significant (only 1% of total devices worldwide are assumed to be connected at present).

However, any change initiative in technological disruption must be underpinned by a digital strategy. This is the significant limitation of this project; the lack of a spearheaded strategy to guide industry decisions. The use of case studies must be done under the guidance of a cohesive digital strategy; all initiatives outside of this approach will be ineffective to industry benefit as a whole, and it is anticipated that groups, including the consumer, will begin to 'hack' their own solution, as is already being

evidenced in certain areas in Australia through emerging co-op and accelerator business models. Based on this rationale, the following recommendations are made:

1. Prior to any engagement with industry is undertaken, that a Digital Strategy be formed following the guidelines outlined in this report
2. A framework that uses Design Led Innovation to guide the discovery process is recommended to successfully engage with processors in finding easy, low-cost solutions to their issues
3. An action plan that packages the digital change initiative as an actual product be formed, aligning to the overarching vision and mission of the wider digital strategy
4. Key groups be identified in an engagement strategy
5. A communication plan, as part of a wider change management plan, be formed
6. An ecosystem of service providers be mapped in order to optimize capability of the change initiative
7. Scoping of all current funding and business models, including those undertaken by SMEs, be conducted; applicability and hybrids be mapped as potential propositions to incumbents
8. What funding models AMPC is able to adopt in order to support industry initiatives (e.g. AMPC accelerator, AMPC hackathon, AMPC incubator etc.)
9. Data governance be mapped out within the digital strategy, including the effect on industry and the supply chain once data begins to become a commodity

2.0   INTRODUCTION

The original scope of this project was to investigate Artificial Intelligence solutions to Animal Health issues within the red meat processing industry. This was to include in-depth case studies, business case analyses and financial modelling. Upon further engagement with the client, a process for defining artificial intelligence assisted with identifying the core purpose of the original scope of work.

The project's scope changed from a case-study focus to providing a framework of an industry-wide digital strategy, of which such case-study projects may be guided by a cohesive and spearheaded strategy to help industry move towards participating in the digital economy.

This project's vision has been reframed as "Engagement of Red Meat Processors in the Digital Economy", and includes a desktop review of work conducted, rationale for the imperative and function of a digital strategy, a high-level overview on Design Led Innovation as a framework for guiding industry engagement, potential uses cases for IoT and a high-level commentary on emerging, disruptive business models, of which its effects should be considered within the digital strategy.

Nine key recommendations are made following the discussion section.

3.0   PROJECT OBJECTIVES

The initial rationale for the project was to investigate applicability of Artificial Intelligence (AI) and sensing technologies in the area of Animal Health. Using a Design Led Innovation framework, the question "What is the problem that we are trying to solve" assisted in reframing the scope of work to define AI, identify a need to align this body of work to AMPC's Digital Strategy, identify the possible mechanisms to establish and maintain traction for change in industry engagement, and emerging disruptive business models that may be a result of disruptive technologies such as AI.

The objective of this project is to propose a more spearheaded approach to assisting industry engagement in disruptive technologies. AI in animal health may still possibly be a relevant and important topic in which to investigate, however all research and initiatives will be more impactful when done in a coordinated manner under the guise of an industry-wide Digital Strategy. The outline of this proposal will include the following:

- Summary of desktop research and work so far
- Commentary on the imperative of an overarching Digital Strategy
- Background to proposed framework of Design Led Innovation
- Commentary on potential use cases for the Internet of Things
- Strategies required for traction with incumbent organisations
- Potential emerging business models

It is not the intent of this project to provide total solutions to industry; an important part of sustainable engagement are the principles of change management, which include creating awareness and desire through communication of knowledge. Engagement with a well-considered ecosystem of partners from the technical industry will enable transfer of knowledge to industry, and alignment of technical solutions to core issues will give a greater chance of sustainable engagement.

4.0 METHODOLOGY

A methodology similar to Action-Learning was applied to this project. As stated, the original project scope required refining, and strategic alignment to an overarching rationale was lacking. Continual engagement with the Program Manager ensured optimal re-scoping to AMPC's requirements for both current and future strategic imperatives. Following the initial re-scoping, a plan to engage with processors in AI case studies (approximately 12) was proposed. However, upon reflection through a strategic lens, it was concluded that if the problem was not purely adoption of technical solutions by incumbents in industry, but also lack of industry engagement to any solution, then a more strategically focused solution was required; one that also considered the digital strategy of the industry.

Following a new desktop review and research into the ecosystem required to support industry change in technology, it was determined that IoT was the most cost-efficient and beneficial solution to begin engaging with incumbents on an industry-wide basis.

A leading IoT specialist was engaged to provide scoping for potential industry engagement workshops. Creator Global is a Melbourne-based Product Strategy, Design and Manufacturing Agency that works with leading global companies and brands in design strategy and development of products, with specific expertise in emerging technology and connected product solutions. Creator consulting services cover four key product development stages from innovation and design thinking, through to prototyping, manufacturing and connected device monitoring and insights.

Their understanding of a design-led approach is imperative for the successful implementation of future IoT change projects. New technologies require a low-cost, rapid-prototyping approach, particularly when effecting change in legacy industries.

Reflected in this report are various blocks that contribute to the ideal state of engagement and traction; these blocks and their relationship with each other are demonstrated in the following diagram:

Strategy
Framework
Process

Mechanism	Action Plan	Tool

5.0 DISCUSSION

5.1 Desktop Review

Trying to determine the market size for the Internet of Things has been compared to trying to find out the market size for plastics in the 1940s, as at the time it was hard to imagine that plastics would end up in everything we use. However, by 2020 it is estimated that the rate of adoption of IoT will be 5x faster than that of telephony and electricity. There is no point in using statistics such as total number of smart objects connected in the future, or the amount of value generated by IoT; these projected data do not have relevance to the engagement of IoT in the meat industry, simply because the statistic that influences traction within the industry is adoption of IoT, not value generated. Adoption of IoT directly influences the industry, whereas value generated may include groups outside of industry, such as consumers, and devices connected may include items such as mobile phones, motion trackers and GPS devices, which again are not directly relevant to this discussion.

What has been coined the Internet of Everything brings together impact in the following groups:

1. People
   - Connecting people in more relevant, valuable ways
2. Process
   - Delivering the right information to the right person at the right time
3. Things
   - Physical devices and objects connected to the internet and each other for intelligent decision making
4. Data
   - Leveraging data into more useful information for decision making
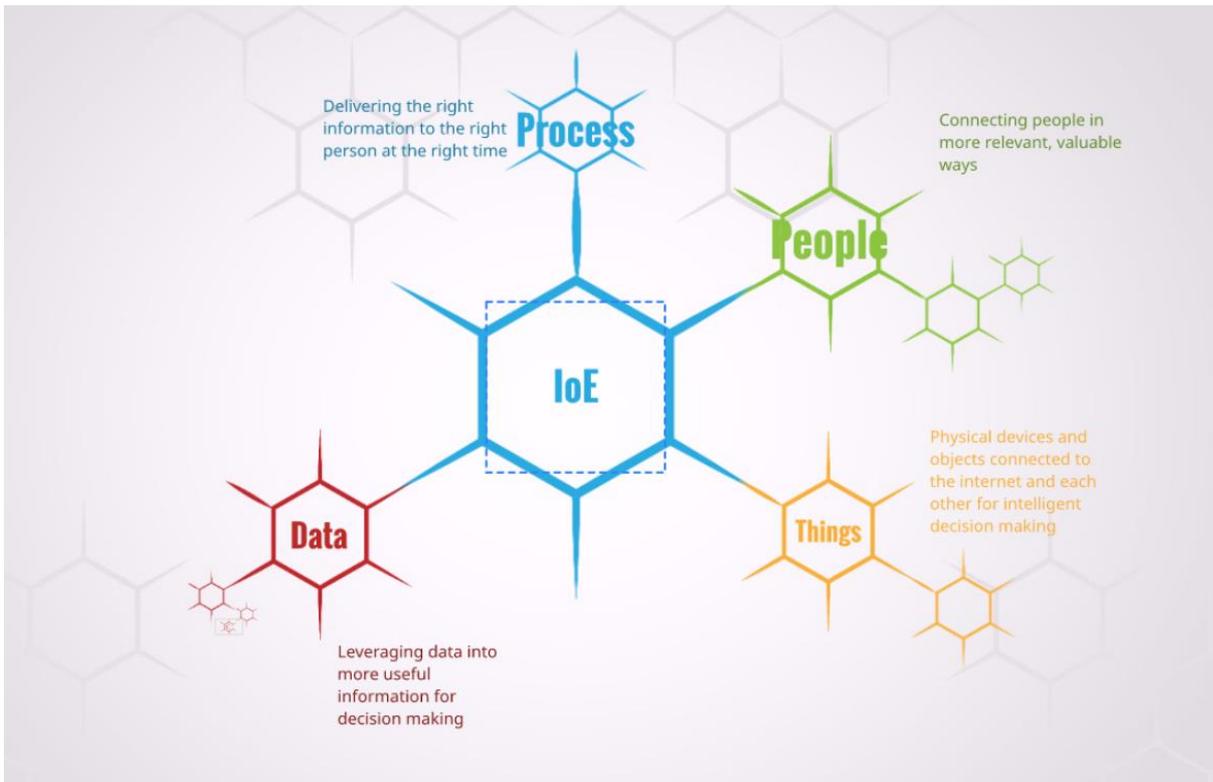
Figure 2: The Internet of Everything. Source: Greenleaf

This is relevant as any effort in developing the Internet of Things must take into consideration its part in the Internet of Everything; data, process and people being equally important to things. Furthermore, as part of a successful engagement strategy, it must be noted that IoT is not a panacea and any program for engagement must take into account its current and future state of process efficiency, people engagement and management, and data analysis and management.
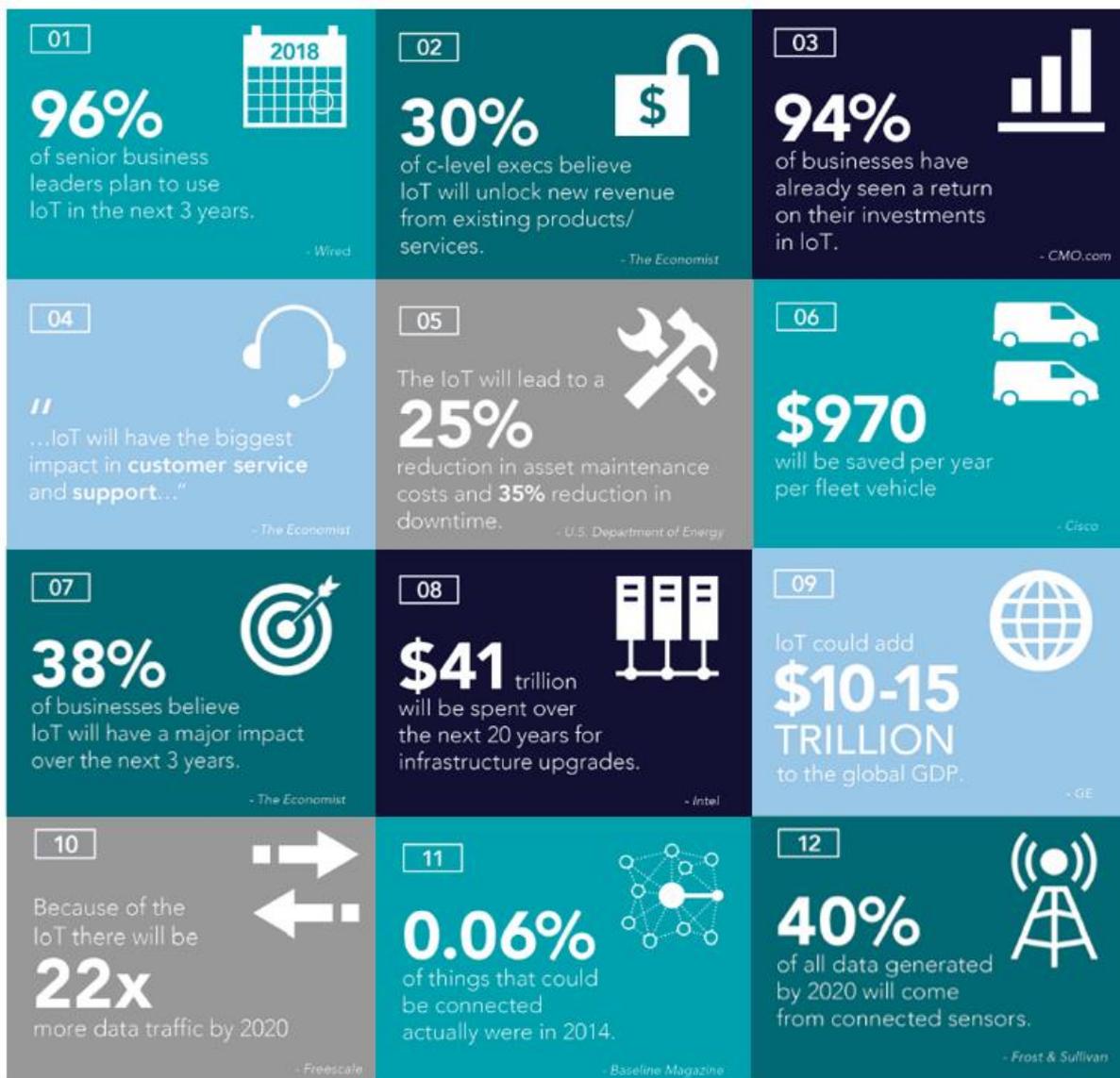
Figure 3: The significance of IoT globally. Source: THINXSTRA

The above figure demonstrates the significance and growth of the Internet of Things. Many of these points have implications for a wider digital strategy; the very question of whether businesses are in the right industry with the advent of this kind of connectivity must be asked. For processors, it may not be a question of totally changing industries, however, it cannot be denied that the implications for gathering and connecting data are significant.

The business case for IoT is supported by the following factors:

99% of things in the world are still not connected

Cost of sensors	Cost of bandwidth	Cost of processing	Cost of cloud storage
/2x	/40x	/60x	/17x
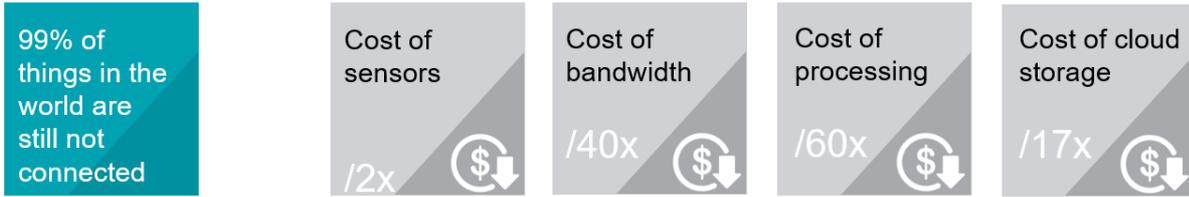
Figure 4: The business drivers for using IoT now. Source: THINXSTRA

The cost of physical requirements for an IoT solution are reducing, as are the other factors required including infrastructure, data processing and storage. What is required now is a focus on aligning to a spearheaded approach within an overarching digital strategy, using framework and process to engage processors in order to define what problem IoT is solving within industry.

Cost estimates of "things", as first referenced in Figure 2: The Internet of Everything. Source: Greenleaf, can be further drilled down to in the figure below.

WHAT IS A THING?

Example of IoT device: GPS tracker

Cost estimate:

Device: as low as $20
Connectivity: ~$5/year
Platform: ~$1/year

SENSORS
▪ Movement, ...
▪ Temperature, ...
▪ Geolocation, ...

SOFTWARE
▪ App for single device
▪ IoT platform for multiple devices

CONNECTIVITY
MODULE & ANTENNA
▪ Up to 50km in rural areas and 5km in the city

BATTERY POWERED
▪ Up to 10 years battery life using standard battery

Figure 5: Cost estimate of running a 'thing' and its capabilities

The running and installation costs of these devices, some of which are already installed in plants (e.g. gas monitoring, temperature sensing) are minimal compared to typical capital works costs for new projects, plant and equipment.

5.2   A simple explanation of IoT and possible relevance to the meat industry

THE VIRTUOUS CYCLE OF IOT
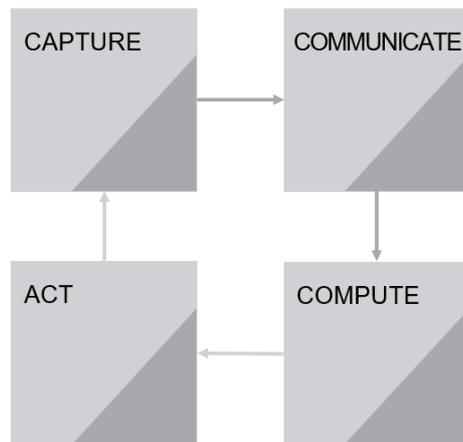
Figure 6: How IoT benefits industries

The above cycle of capturing information, communicating it, computing it in order to act on a particular issue. The majority of 'things' within a plant are not connected. The ability to collect data from every section of the plant through sensing and measuring, sending that data through for interpretation and monitoring is the beginning of optimizing processes for many industrial legacy industries. The next stage is automating processes and actions from analysis of data. Most legacy companies are still analyzing data manually, through some form of database that is not connected directly to the senders of that information (e.g. through excel or access); automating that data would optimize processes by saving time. In addition, a more accurate sense of data would be received due to reduction in human error and reduction in time taken to receive information.

5.3   Ecosystem of stakeholders

Within the industry lie several stakeholders, most notably incumbents, start-ups, co-ops, service providers and consultants. The processing industry will rely on a range of relationships and groups outside of industry in order to effectively implement solutions relevant to industry.

ECOSYSTEM
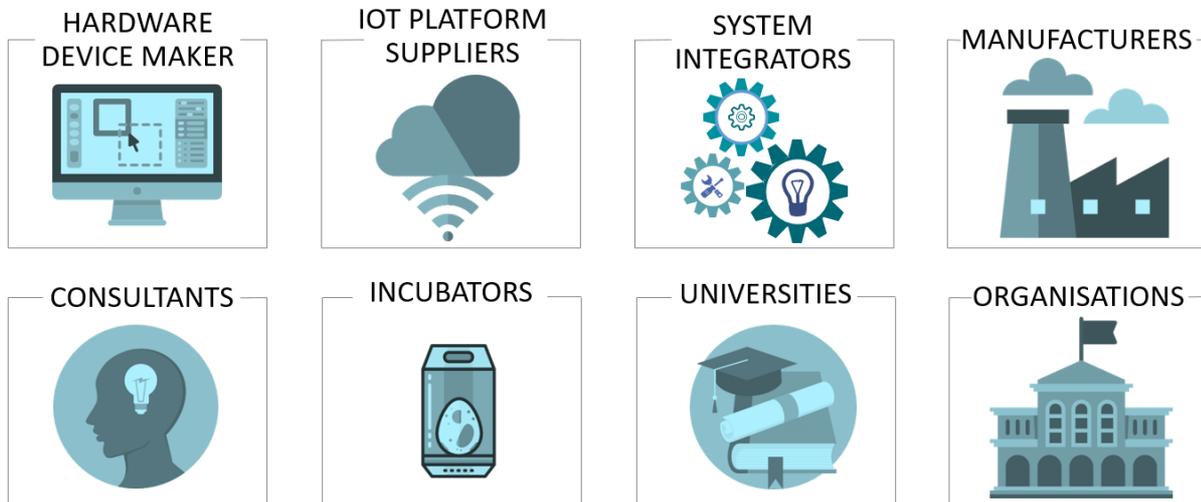
Figure 7: Considering a total ecosystem of partners in an IoT solution. Source: THINXSTRA

It is recommended that the ecosystem be carefully considered when undertaking future IoT engagement projects, as the industry is rapidly growing and some service providers' capability may be lacking to provide in-depth, tailored solutions that genuinely assist industry. A focus on the benefit for industry must be maintained, and projects undertaken with the end in mind according to each organisation's digital strategy.

Different stakeholders within the industry will have different drivers; understanding where to position these organisations within the digital ecosystem must be addressed in exploring which capabilities, skills and technologies are available in the processing ecosystem an align these to the industry's strategic ambition. Different approaches will reflect those capabilities and drivers. For example, Figure 8: An example of how an accelerator program can be used within a Design Led Innovation Framework, shows just one approach that can be applied to an incumbent organisation; this approach enables a low-cost way to test an idea that upon successful completion of a minimum viable product, may be subsumed into the parent organisation.
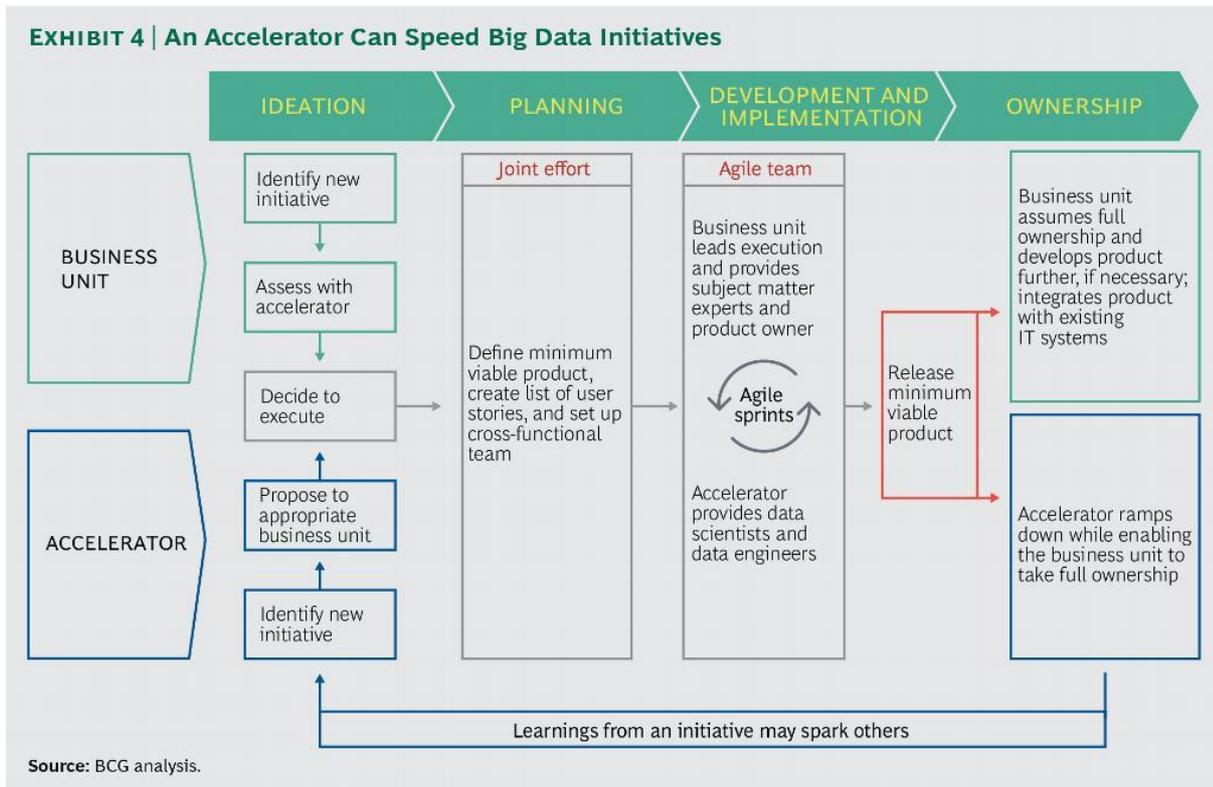
EXHIBIT 4 | An Accelerator Can Speed Big Data Initiatives

Figure 8: An example of how an accelerator program can be used within a Design Led Innovation Framework

6.0 DIGITAL STRATEGY

Any effort to transform an organisation significantly requires a commitment from all levels of an organisation. Identifying the value proposition will underpin successful and sustainable change that is relevant to industry. Without a well-considered action plan that addresses change at the core, including the value proposition, its people, processes and technologies that are critical to the business, any change initiative will be a short-term response and will not assist the organisation to remain relevant in a digital age. Four key phases exist when considering a digital strategy for incumbent organisations:

1. Identify where value is currently, and where it is moving to
2. Design a transformation program with the processors in mind
3. Identify the ecosystem of partners through which to support the change
4. Identify the main risks for the transformation in order to maximize traction

With these phases in mind, a suggested high-level action plan is proposed:

Figure 9: Driving the digital agenda on an enterprise level

6.1 Discover, Decide, Disrupt

Embracing the nature of digital disruption is essential for incumbent organisations. The last ten years has seen many examples of successful corporations that were disrupted by digital approaches, simply because they were focusing on meeting their existing customers' needs. Western Union could have been PayPal, Kodak could have been Fuji Xerox and Instagram. These examples were not only disrupted by technology, but also by emerging business models.

Having a disciplined framework through which to view opportunities and problems. This may be done in conjunction with existing market forces information, and through a Design Led Innovation lens. Any analysis should be based on an understanding of the impact of digital changes on the future industry.

Analysing how the value of products and services are increased through digitization using connectivity and data may be one way incumbents can explore their offering in the digital economy. Another angle may be to analyse practices digital innovators are doing, within and outside of their industry.

Creative thinking in this exploring stage is critical to support analytical thinking. Hackathons are a good example of how creative thinking can assist senior leadership teams of incumbent organisations. GE is an example of an incumbent industry that used these tools to evolve its value offering to the digital age, going so far as to predict 15-20 percent of value of their current activity will be created in the industrial internet (Annunziata, 2015). AMPC is perfectly positioned as an industry body to help businesses rethink the value they offer to their customers beyond products, including efficiency, productivity, through the lens of everything "as a service."

6.2 Design for Engagement

Any enterprise-level change must be driven from the top down. IoT initiatives, and digital transformation, must have the right team of people driving the change and consistently

communicating the "whys" of the initiative; this may include the CEO, chair of the board, and notable representatives and leaders of industry. The appointment of a Chief Digital Officer may be suitable, as skill in and knowledge of digital strategy is important. The leadership group for this effort must consider the input for all stakeholders of the organisation (incumbents, SMEs, program manager representation, multiple function representation) as it will require an unprecedented coordination across all levels of the enterprise. A balance between visionary representation and those who have a deep understanding of the mechanics of the industry is important. The group leading the initiative does not have to be large, as long as it considers the input of all functions within the organisation. Another idea may be to form a Digital Taskforce for industry as a forward-facing body for change and engagement.

6.3   Deliver Transformation

Engaging stakeholders is a critical part of the process. Making industry groups and businesses aware of the need for change, and the benefits of a shared vision, is crucial to establishing and maintaining traction. This is where a uniform communication plan can be of benefit. If all parties are aware of the vision and why it is necessary for moving industry forward in the digital age, more alignment will occur. A tact might be to brand the digital strategy as a product itself. There have been several examples of enterprise-level change initiatives within the meat industry that would have benefitted from better branding. How this is communicated is a significant part of digitally reinventing the organisation, and may reveal ways in which the industry itself can capitalize on bringing itself into the digital economy.

Funding models for delivering transformative projects may need to reflect the requirement that resource allocation may look differently for digital transformation efforts. The CEOs for both industry bodies and incumbents may need to behave more like venture capitalists, recognizing that not all projects will provide short-term benefits; furthermore, relevant KPIs must be considered, as using traditional metrics such as ROI do not accurately measure digital engagement or digital channels.

6.4   Drive Digital Cohesion

Forming a quick succession of high-ease and low-impact activities to establish engagement is critical to the early stages of any transformation process, especially at an enterprise level. Engaging with a specialist who has technological knowledge and understands the importance of fast payback through economic modelling is critical to effectively driving any change initiative. Clear criteria to evaluate potential payoffs within a plant environment requires a design-led approach to understand the big-hitter priorities on which to focus, followed by an assessment of projected benefits, the time required to capture them, assumptions, required investment and the impact on the overall digital transformation journey for industry. Initiatives must be sequenced in light of the entire industry's vision as opposed to ad hoc initiatives that may undermine the benefits of scale.

7.0   DESIGN LED INNOVATION

Design Led Innovation focuses on the implementation of design practices as a management capability that drives radical innovation and business model design in organisations. Design Led Innovation is an increasingly widespread approach that drives global competitiveness through deep customer understanding. Answering the question "what problem are we trying to solve?" places the lens on the

customer, be they external or internal. Design Led Innovation is based on five core innovation principles:

- Clarity of purpose
- Becoming the market
- Being the disruptor
- Integrated business models
- Ownership of the change experience

Using a Design Led Innovation framework may help industry partners to:

- Align their company strategy and business models
- Enhance and redefine their approach to innovation
- Remain competitive in a rapidly changing environment

The emergence of IoT technologies and connected devices is providing new ways and strategic opportunities for companies to engage with customers. Now and in the future, physical objects, such as an engine, a manufacturing plant, or transport equipment can be equipped with sensors that measure physical characteristics. This shift will cause disruption threatening existing business models and create opportunity for companies who have leaders with vision.

It is highly recommended to engage with a design-led innovation specialist in the IoT industry to assist in engaging processors in the initial stages of the change project. Greenleaf have engaged Creator Global in proposing a scoping workshop as a starting point in which to engage incumbent processors.

The objective of a scoping workshop would be to provide a strategy direction for IoT and emerging technology within the meat processing industry. The Creator explore process provides a staged innovation methodology that will result in a relevant product / service offering for stakeholders. This includes:

- Discovery and research relevant to the meat industry
- Two day strategy workshop using design thinking

Following the workshop, should AMPC's digital strategy require further product development, Creator can assist with;

- Developing an IoT product business plan and solution framework for the meat industry
- Developing the 'why' behind how IoT may be relevant

8.0   USE CASES FOR IOT

The purpose of this project is to provide a spearheaded approach to gaining traction in digital transformation in meat processing in Australia. Therefore, it is important to acknowledge that case studies and commentary on them is relevant only to the context of the individual organisation; using the question "what problem are we trying to solve" gives different answers for different operational contexts and will vary from plant to plant. The catch cry for the agriculture industry and digital transformation is that data may now be tracked "from paddock to plate". However, whilst this may be true, many incumbent organisations lack the infrastructure and processes to support such efficiencies throughout the supply chain.

There are benefits to implementing IoT solutions within a plant environment, particularly as meat processing is a cost and labour intensive industry with low margins. Key benefits of employing IoT include:

- Automating processes
- Providing instant data feedback
- Condition monitoring
- Automatic grading and weighing
- Proof of provenance and food security
- Temperature sensing
- Leakage sensing
- Environmental management
- Information flow throughout vertical supply chains to better manage operations
- Immediate feedback through whole of plant operating system

Equipment manufacturer Marel have mapped a case study for beef processing in a plant environment as shown below.

Beef processing
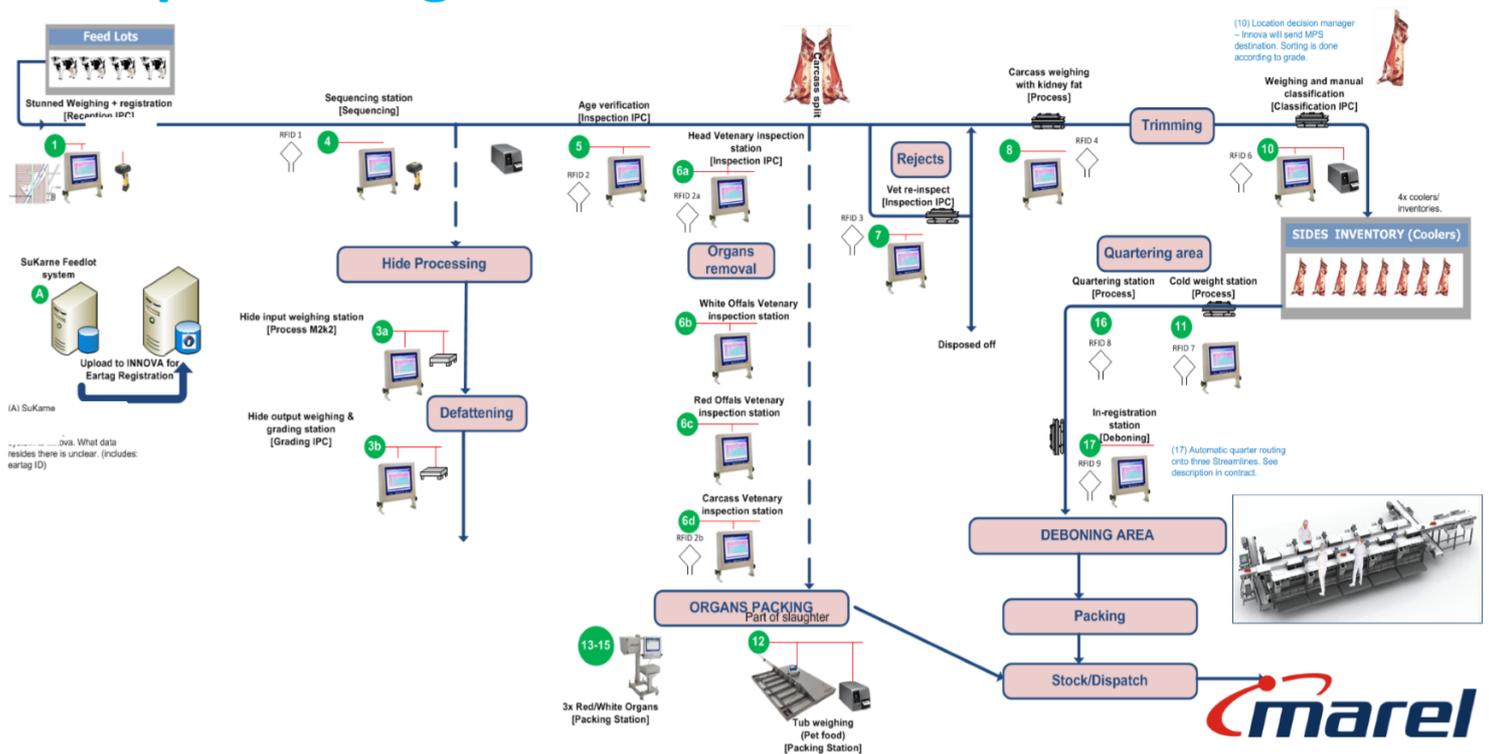
Figure 10: Marel process map for IoT solution in beef processing plant

However, whilst there are emerging use cases for IoT within a plant environment, these solutions are not 'plug and play'; their relevance will depend on the context of the particular plant and its variations, such as whether it is an incumbent organisation, a start-up, has highly developed technology or is a mix of different physical plant environments under the guise of one large company. Kodak is an excellent example of a company that should have maintained market share, yet the company's downfall was not due to being myopic in technology; the company identified the disruptive forces that was affecting its industry at the time. The issue was that Kodak misread the impact the business model would have on its industry. Hence this project's emphasis on providing a design-led innovation framework in which to guide processors on the next journey as the world moves from incumbent industries through to the fourth industrial revolution, IoT being the most significant.

9.0   STRATEGIES REQUIRED FOR TRACTION

Using the wider Digital Strategy as a strategic guideline, there are other items that need to be considered before forming an action plan. These include:

- Change Management Plan
- Business Models
- Funding Models
- Engagement Plan

When workshopping the Digital Strategy, several models for delivery including a specialized Accelerator Program, the emerging Co-Op funding model, hackathons and other crowdfunding (e.g. Kickstarter) models must be considered. An in-depth discussion of these is outside of the scope of this report, however, the Agriculture Industry is already seeing different groups 'hack' their own solution to industry problems. For example, an emergent movement that has been described as a 'war on the privatization of data' in agriculture is currently in play where the extraction and aggregation of data is becoming itself a business model; this is exactly the issue described in the Kodak example above. The implication for farmers in this example is that some corporations are monopolizing data before farmers are able to realise the value of their data.

Several alternate models or pathways have been proposed to counter this, including a hybrid model of crowdfunding and co-op as demonstrated by the 'Ag Bot' project; an incubator co-op and variations of this (currently the co-op sector in Australia is worth approximately $30b with $148b in assets); the Data Co-op Council, which is the first organisation in Australia trying to put a headwind into interoperability through the lens of social, legal and cultural; and a purest incubator model, which includes direct accountability to members through 'sweat equity' and 'crowd sweat'. Currently the legislative field that governs these models spans 7 legislations in the state and federal arenas, with no change to the Corporations Act since 1991. However, as momentum continues to grow, legislation and those who advise around data governance and funding of alternative business models such as co-ops will become more involved responding to practical change and groups 'hacking' their own solution to industry issues.

Whilst this may not directly affect large industry and incumbents for the time being, it is these very clues that industry must heed in order to remain relevant and best serve industry needs.

10.0 CONCLUSIONS/RECOMMENDATIONS

Use cases and business models reflecting these are important, however must be done in partnership with processors under the guidance of a Digital Strategy. It is recommended that:

1. Prior to any engagement with industry is undertaken, that a Digital Strategy be formed following the guidelines outlined in this report
2. A framework that uses Design Led Innovation to guide the discovery process is recommended to successfully engage with processors in finding easy, low-cost solutions to their issues
3. An action plan that packages the digital change initiative as an actual product be formed, aligning to the overarching vision and mission of the wider digital strategy
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7. Scoping of all current funding and business models, including those undertaken by SMEs, be conducted; applicability and hybrids be mapped as potential propositions to incumbents
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9. Data governance be mapped out within the digital strategy, including the effect on industry and the supply chain once data begins to become a commodity

11.0 BIBLIOGRAPHY

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12.0 TABLE OF FIGURES