Final Report

AMPC
AUSTRALIAN MEAT PROCESSOR CORPORATION

Industry 4-0

Digital Transformation Program - Industry 4-0 (Stage 1)

Project Code
2021-1093

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Published by
AMPC

Date Submitted
06/01/2024

Date Published
06/01/2024

Contents

1.0 Executive Summary

The Industry 4-0 project was undertaken by John Dee to take advantage of the recent rapid advancements in technology. Substantial progress was able to be derived through attention to enterprise architecture design and integration of available cutting-edge technology. Project objectives were both technical and non-technical.

While the starting point was ‘functional’, opportunities existed for maximising productivity and efficiency. There were also opportunities to make John Dee more agile and able to act on innovation opportunities quickly, and in a co-ordinated way. At its core, the Industry 4-0 project involved re-architecting the entire technology system using best practice principles to achieve business outcomes. If there is a single critical success factor, it is internal and external customer focus. This is both focused on immediate issues and the ability to enhance service delivery in the future. Gains have been made across:

- Enterprise Data Security
- Connectivity
- Recoverability
- Resistance to Cyber Threat
- System Resilience and Recoverability
- Interoperability and Interface Compatibility
- Platform Consistency
- Data Process Automation
- Data Integrity
- IT and Industrial Control Integration
- Insights and Business Intelligence
- Data Availability for Contract Processing Partners
- Integration with Contract Processing Partners
- Maintainability and Consistency
- Enterprise Standard Operational Processes and Documentation

The project has been extremely successful and involved the complete replacement of all production IT systems and related data assets. This included livestock, slaughter, production, inventory, order management, QA and compliance, labels, logistics/dispatch, shipping, and QC. Additional to business systems, physical work involved kilometres of fibre and ethernet cabling being certified, replaced, or newly established, and internal server hardware was replaced with an onsite failover architecture across all servers and switches. Robust security architecture was at the core of the Industry 4-0 design. New functionality such as cloud enabled integrations and resources also bring new risks and increase an organisation's ‘attack surface’. Cyber-attack recovery was a consideration in the design and resilience to such events has been ‘designed in’.

New PCs with the current Microsoft desktop software were part of the transformation which enabled the latest version of all applications to run efficiently, and enabled services such as video conferencing. Multiple cloud systems are integrated which required solutions to poor internet connectivity available at that time. High speed (600MB/600MB) primary services allow integrations between internal and external systems, and fast Internet access for the John Dee team.

New data assets have been created such as a contract processing partner data resource. As an example of what has been enabled through the changes undertaken, contract processing partner data availability across their internal value chain: from cattle delivery to carton exit has been significantly enhanced.

Major learnings from the project include:

- A planned enterprise architecture helps avoid ad-hoc solutions that cause long term issues.
- Enterprise grade IT resources are required both internally and externally.
- Major opportunities exist to increase profitability through technology and measurement / intelligence.
- If an issue exists, both people (training / monitoring / control) and processes / technology are required.
- Cloud services (infrastructure, applications, platforms) represent both opportunities and risks.
- Documentation and training are critical to success, but prone to being deprioritised.
- Change Management should be a primary focus. Small changes to processes can have large effects.
- A right-sized project methodology should be implemented more generally.
- Significant gains can be made through centralised collaboration on projects.
- Business cases are important and should include all costs internal labour and costs avoided.
- Risk management should have primacy. It drives non-obvious prioritisation which can avoid outages.
- Exceptions and variation drive most work. Identify as many exceptions as possible during analysis.
- The better the analysis and requirements, the lower the change impact. Spend time getting this right.
- The opportunity to seriously assess and revise processes can yield significant gains.
- Fast, secure Internet with diverse paths makes many things possible that otherwise are not.

The following observations are offered based on interactions during this project both internally and externally. These project observations / outcomes are relevant to the industry more broadly. A change in thinking may be warranted to allow processors to move quickly to take advantage of technology opportunities. Viewing IT as a source of strategic competitive advantage, rather than necessary cost, is the starting point. There are some unique challenges in the industry, but they are not unique to meat processing. Rather, they are the same challenges as any raw materials manufacturer and in fact many manufacturers more generally. An example is the critical nature of the IT system / industrial control system interfaces and communication. These challenges are the same in many industries from utility management to any automated manufacturing environment. It is often said that "*Meat processing is different!*"; it isn't different. It is the same and as challenging as every raw materials serial manufacturing business.

It is possible that apparent attitudes to IT are due to the relatively manual nature of processing in the past. IT is still in its relative infancy in meat processing compared to many other industries. Custom solutions were built in the past due to lack of availability of industry specific solutions. Undertaking complex digital transformations such as the one undertaken during this project by John Dee, is extremely difficult for all but the largest processors. John Dee's IT team has grown during this period. The team now includes individuals with enterprise experience as well as some less very capable but less experienced staff. In addition, contractors and software providers have been selected based on their scale and experience on large sites, not just specialisation in processing.

Succession planning and risk management principles need to be applied to minimise disruption when, for whatever reason, employees change. While having 'coverage' for leave is well understood for production, meat processing IT teams appear to generally have very high dependency on individuals. Depth is important which might be a combination of cross-training, hardware / software / managed services vendor engagement and resourcing. IT is specialised; everyone doesn't do everything. In fact, most people in IT are very specialised due to the level of detail. Some risk can be minimised by supplier support / contract management; however, many plant-specific processes simply need coverage (multiple resources cross-trained).

Despite the size of the companies in the meat industry in financial terms, IT teams often seem to be very small. They also often seem to lack basic IT operational experience and skills. Many people appear to have been 'trained on site' having been in another part of the plant. This was a solution to the immediate problem, however, it carries risk due to lack of base skills as learned in a formal IT related tertiary qualification, or those defined in frameworks such as ITIL, an operational management framework. The result is sub-optimal results for the business in the long run. IT is underpinned by not only specific operational processes, but also engineering project management knowledge equivalent. Projects are not just schedules / Gannt charts. These are but one deliverable of a project. An important aspect for all large projects is complete project briefs including the scope, business case and cost estimates.

One of the major challenges of IT in meat processing is the assumption that large projects such as digital transformations, or any large project for that matter, can be undertaken with no additional resourcing internally. This assumes either that IT resources are not fully utilised on regular break / fix, operational, process improvements, and maintenance tasks, or that they will simply work 'as required'. IT Project Teams should be separate from support teams if anything other than routine work is undertaken. Realistic available project time should be the basis of availability when considering all operational requirements in addition to break/fix. It should be possible for a processor's IT team members to take leave, including sick leave, without receiving phone calls. Team coverage and enterprise grade documentation is critical to long term success.

Increases in functionality brings increased complexity and requirements for knowledge in the IT team. The variation in processor technology choices (hardware, software platforms and devices) make a standard solution difficult. It is also the case that there is a higher degree of knowledge required by IT of industrial control technology and hardware in manufacturing due to integration requirements. The John Dee experience is that there are significant gains possible for processors with technology and process change. Improvements in agility, profitability, business risk visibility and reductions production outage time are all achievable.

2.0 Introduction

John Dee Warwick (JDW) is a fourth-generation processing business that has grown over more than 80 years. It was one of the original Australian firms to break into the fickle Japanese market in the nineteen eighties. The business pedigree has secured an enormous amount of experience and knowledge while providing leadership and inspiration to its community and region. John Dee is still the largest employer within 80km with 600 employees.

The economic impact on the local economy, and number of jobs underpinned by John Dee is difficult to estimate. A report commissioned by AMPC in 2020 estimated the industry underpins 2.8 FTE jobs per FTE job in processing. This can't be accurately applied locally but suffice to say John Dee is responsible for the livelihoods of many local people directly and indirectly. [1] In their follow up report in 2022, the authors note:

> *The very significant flow on impact of the sector with the regional economy, reflected in the fact that whilst direct employment fell by around 5,000 workers over the full period analysed nearly 23,000 FTE jobs were lost in flow-on impacts.* [2]

[1] S.G. Helibron Pty Ltd (2020), Socio-economic benefit of red meat processing. AMPC https://www.ampc.com.au/research-development/product-process-integrity/evaluating-the-socio-economic-benefit-of-the-red-meat-processing-industry-in-regional-australia-2019

[2] S.G. Helibron Pty Ltd (2022), Socio-economic benefit of red meat processing. AMPC https://www.ampc.com.au/research-development/product-process-integrity/evaluating-the-socio-economic-benefit-of-the-red-meat-processing-industry-in-regional-australia-2021

Experience, relevance, competitiveness and value can be diminished value if technological advance are not pursued in a timely manner. Existing IT systems with ageing infrastructure gave limited ability to extract potential value through development and integration. John Dee could see new opportunities, or productivity gains were possible but needed extensible interfaces with the ability to integrate many disparate data sources including machine / industrial hardware data. This is the role of Industry 4-0.

Abattoirs with real time data collection, intelligent information exchanges, and smart management systems supported by infrastructure that fully services both office and mobile, may have a greater ability to remain resilient into the future. Without this project, JDW would have struggled to realize value and adapt quickly to changes such as the integration of robotic palletisation, automated trim management and a new Automated Sort and Retrieval System (ASRS). This project sets JDW on its Industry 4-0 pathway. Moreover, it allowed a range of improved and integrated services, some of which have not been successfully deployed before by a red meat processor.

While the industrial control system was not in scope for this research per se, the highly flexible architecture has enables a path to tight integration to PLC and other industrial hardware. Improved connectivity between the IT system and machine interfaces will allow vastly improved data collection for decision making in the future.

3.0 Project Objectives

The Industry 4-0 project had a range of technical and non-technical improvement objectives which would be achieved through both changes in approach, and technology.

High level objectives as specified in the research agreement were narrow and focused.

Realise and implement a JDW industry 4-0 vision and strategy via:

- New Systems implementation and integration
- Modification to existing Systems
- Training of all users (internal and external)
- Overlay of JDW's evolving Innovation Management System, which the Industry 4-0 provides valuable insights into, to evaluate new ideas and demonstrate the benefits/outcomes of any innovation ideas implemented.
- Final reports (confidential and public) demonstrating the system installed (design and suppliers), the typical data developed, insights from the data, and the Innovation Management System overlay.

The specific areas effected are outlined in section 5.

4.0 Methodology

The methodology used for this project is identified below:

- Step 1 – Conclude final design/supply discussions with providers and place orders.
- Step 2 – Implement new systems and update existing systems.
- Step 3 – Dry commissioning of systems (without any plant interruptions)
- Step 4 – Forced ‘hard cut’ to new systems. (no parallel operation possible)
- Step 5 - Turn off old systems (and monitor).
- Step 6 – Extensive monitoring, troubleshooting, uptime management period.
- Step 7 – Final report and recommendations

All highlighted steps above are completed but with Step 6 obviously ongoing monitoring is taking place.

5.0 Project Outcomes

Beyond the core ‘system changeout’, the project was leveraged to provide infrastructure to many business improvement projects. Projects include commercial grade enterprise architecture, documentation to enterprise standards, quality data design and implementation of a range of integration projects which were not specified in the project.

Some very large projects such as ASRS integration, robotic palletisation integration and integration of an automated x-ray based trim management solution have been made possible by the Industry 4-0 project. The new systems have also made it possible to solve some old problems. One example is an existing automated lidding machine which has 4 magazines. Using the industrial interface devices in the new system, integration to the production system was made possible. This machine previously had 1000 mappings of product codes to lids which were manually maintained, and required changing whenever there was a product specification update. This is now integrated and able to be updated automatically from the production system database without operator intervention.

System uptime is a key measure of success and 3 years on, a worthwhile metric to review. John Dee’s IT system has had around 99.6% availability over the past year. While there have been the common issues experienced of printer hardware, and other typical device type failures, stability and recoverability of the core systems has been excellent. Most of the downtime experienced has been a result of power related events, not IT system failures.

5.1 Information and Analytics

The project focused on deep integration between business applications, elimination of data duplication and in particular ‘double keying’ where values were manually entered more than once. Creation of a rich reporting environment for decision support was also a focus. The intent was to make a path to machine learning feedback loops which will allow capture and analysis of IoT and other machine data for analysis in the future. The project represents a 'step change' in John Dee's capability. It has enhanced the ability to analyse trends and manage risk. New systems allow faster reaction to both the constantly changing export manufacturing environment, and faster and more organised assessment of new opportunities that become visible.

5.2 Production System

Innova, from food processing software and hardware giant Marel (Iceland) was chosen as the new production system and is an end-to-end production solution. The functionality start at animal arrival at site, through slaughter all the way to order fulfilment including inventory management. Innova holds inventory detail records with only summary data held by the finance system. The system was chosen as vendor partner for the production system after analysis of requirements, a market scan and closer assessment of various options. A new slaughter system was developed for Innova which had not previous delivered to any Australian customer. This brought with it significant challenges as well as benefits.

There were many complex tasks during the project. A very large number of processes needed change. Circumstances beyond John Dee’s control created the requirement for a ‘hard cut’ rather than paralleling

the systems. This added complexity and risk. Marel addressed migration through accurate (as possible) functional requirements flowing to processes such as product specification migration, labelling and complex issues such as PLC hardware interfacing for routing and tracking of product through the entire system. Everything that records data on or tracks product from arrival at yards to packing and delivering to customers was changed.

5.3 Shipping and Forward Order System

BSM, a cloud based software provider, was chosen as the shipping and forward order system. Forward orders are kept out of the finance system to reduce finance's load. ERP systems are not generally designed to deal with orders where both quantities and goods change, as well as dates. BSM had functionality to deal with this issue. They provided John Dee with forward order (contract) requirements and allowed improvements in foreign exchange processes and risk management. BSM is integrated with both Innova and JIWA, the finance system.

5.4 ERP (Finance) System

JIWA, John Dee's finance system, was reviewed at the beginning of the project. It required a major upgrade to enable integration. After serious investigation of alternate ERP options, it was concluded that this was a risk that we could avoid in the short term. This part of the project was probably the smoothest and the upgrade process was relatively smooth including new integration work. The current version included substantial improvements in business intelligence capabilities through integration with John Dee new data warehouse and tools.

5.5 Integration

The system design specified data to only exist once across the systems through integration and replication. This enables, for example, the same product description fields in the product specification to populate the export documents as required. Re-keying information that exists in the system was to be designed out. Data fields used across systems are synchronized and choices were made on which system 'owned' the data and was the master in the data relationship. For example, where orders would be created, which system would have the master customer record, etc.

John Dee now has very high levels of integration. This includes between the production system and industrial hardware (diverters, scanners, palletising robot, Dematic ASRS, PLCs), BSM, JIWA and other systems. These are synchronised to the new data warehouse. There are many other examples of integration which have allowed John Dee to create improved processes and make efficiency gains. In

fact, the new system has allowed John Dee to onboard many new contract processing partners very quickly and with very low friction.

5.6 Internet Connectivity

John Dee's remoteness created barriers to obtaining commercial grade internet services. Telstra quoted $500,000 to run fibre to John Dee in 2020. A service was located which utilised the fibre communications backbone on the electricity distribution network. The new service is 600MB up and down; very fast. John Dee's previous internet was 50mb down and 20mb up. In 2023, due to copper / ISDN phase out, Telstra substantially revised their pricing. John Dee has since also been possible to install an NBN fibre ethernet connection which is utilised for telephone SIP trunks. This is a 100mb/100mb service. It was eventually installed for $80,000, however the monthly cost is the same as the 600mb/600mb service. John Dee's experience highlights the difficulty with communications infrastructure for regional processors, but also that there are solutions available that may not be obvious.

5.7 IT Hardware and Software

Aging server infrastructure at John Dee, and unsupported operating systems created a major system risk. All server infrastructure was replaced with state of the art high-availability systems. The systems are generations ahead of the previous infrastructure with remarkable speed and scalability advantages. There are a range of fail-safe measures built into the new platform.

5.8 IT System Continuity and Resilience (Business Continuity)

One of the key focuses was reliability and recoverability the underlying systems. The concept of RPO and RTO underlies this and is explained below:

RPO – Recovery Point Objective | This refers to how much data you will lose. (eg: last backup)

RTO – Recovery Time Objective | This refers to how long you will be down.

The intended RPO of the new system is zero (0) as all data is replicated to a second site on our plant in real-time. It is written simultaneously to 2 systems which are connected via fibre. In the event of a catastrophic failure of a server (virtual machine) or hardware, less than 1 minute delay is experienced. While this does not prevent an outage in a site wide power event, it deals with most failures and was validated in production when one of the 2 sites went offline due to a hardware failure. Not one email was received in the IT helpdesk when this happened. In the case that data is deleted, or similar issue, 15

minute snapshots are taken of all servers so this is the maximum loss in the case where no other action is possible.
The network is complex with 90 wireless access points, 40 switches and 30 servers which carry voice, PLC, security camera and IP phone traffic including walkaround / site mobile phones. Ten to fifteen years ago the new hardware, security and recovery technology would have been cost prohibitive.
Advancements and cost reductions of commercial IT options have been rapid. Moore's Law seems to continue to hold true.

The Innova system is centralised, and no data is stored on PCs or devices. If a workstation at a process location fails (such as key export label application station, or one of the key kill floor stations) it can be replaced with a spare and reloaded quickly. John Dee has focused on elimination of IT system downtime to the degree that this is technically possible. Both business continuity and disaster recovery were key to the design of the new systems.

5.9 Physical Network

An audit of cabling and fibre, installed over many years, was commissioned. All points were tested for compliance to standards. Defective cable runs were rectified, or in many cases, upgraded / replaced. The new design required thousands of metres of new high spec ethernet and fibre optic cabling. This included upgrades of the existing server room and implementation of failover' systems which required the building of a fibre connected backup server room to support the new infrastructure. The result of this is both improved performance and increased levels of business continuity. A reliable and well documented physical layer is vital to enable the Industry 4-0 vision to be realised.

In terms of non-technical objectives, examples are improvements in recoverability, business continuity, documentation and training, project management and IT operations management methodologies. Examples of technical improvements range from data cabling consistency through to customer data access development, cyber-attack resilience and enterprise architecture. A range of subsequent projects would not have been possible but for the foundations laid by the Industry 4-0 project.

5.10 Contract Processing Customer Access to Data

One of the largest, and most important projects within the Industry 4-0 program was the implementation of a customer data access interface. This was a very complex technical undertaking and took 3 years to complete. It involved:

- Detailed design of the overall architecture.

- Completing the internal data abstraction
- Leveraging internal data warehouse processes.
- Replication of the production data
- Abstraction of the highly normalised production database
- Design and development of a secure access method
- Documentation of the offering
- Implementation of a secure access method and general security architecture.
- Development of technical documentation and access tools

Installation and commissioning is completed. All new systems are live and John Dee is moving ahead by leveraging the new technology capabilities. The advanced data warehouse design allows the provision of real-time data internally without affecting the production system and the provision of near real-time data to our contract processing customers.

The overall Industry 4-0 project has addressed the following areas during its life:

System	Objective	Status
Security Architecture	Replacement	Completed. New internal and external security framework.
Physical Cabling (Fibre / CAT6)	Audit + Upgrade	Completed. Most replaced. Substantial new work.
Switch Fabric	Replacement	Completely new switch design. No single failure point.
Production Planning	Replacement	Completed
Livestock Management	Replacement	Completed
Grid Costing	Replacement	Completed. Custom application development.
Kill Floor and Grading	Replacement	Completed. Replace all stations, scanners & system.
Boning Room and Packaging	Replacement	Complete. New scales and system.
Specification Management	Replacement	Completed. New code system (4 revised to 6 digit).
Industrial Component Integration	Integration	Completed. ASRS, diverters, scanners, x-ray, other.
Inventory Management	Replacement	Completed. New DCUs, integration of ASRS system.
Order Fulfilment	Replacement	Completed.
Export Compliance	Replacement	Technology components replaced including labels.
PC and Server Infrastructure	Replacement	Completed. Server infrastructure: no single failure point.
Internet	Upgrade	Completed. 20x faster; QLD gov. story on John Dee.
Information and Analytics	Upgrade	In continuous improvement; Microsoft PowerBI, SSRS
Customer Reporting	Upgrade	Replacement of scripted reporting with SQL Server SSRS subscription, Customer Interface
Project Management and Documentation	New	All projects now documented in a system; IT and data architecture, applications, switch fabric and network
Innovation Management System	New	In testing with management buy-in on process.

6.0 Discussion

The project, like the processing industry, is all about data. This is true right through the value chain: breeding, grading, basic processing, value add, shipping. Expectations have increased over time for the ability to provide granular data that allows more rapid response to changes or unanticipated situations. Risk is far easier to manage with better data which is received in a timely manner. The Industry 4-0 project has allowed John Dee to rapidly move into a more proactive position with many exciting possibilities going forward.

Overall, the project has been on time and on budget, however this has not been easy to pull apart. The increase capabilities of the new system have allowed a range significant related projects to be undertaken, which while not core to the original project, have leveraged this project and contributed to the large gains possible during recent times. The requirement, due to licensing issues, for the system to be 'hard-cut' with no parallel operation to the old system possible, made it very a very difficult task with unavoidable risk. The project was not without issues, as expected, but the plant was able to operate and progressively regain and surpass all previous functionality.

One of the most important advances is the availability of data in the new enterprise architecture. Low cost systems such as Microsoft SQL Server Reporting Services, and low cost tools such as Power BI have allowed John Dee to leverage new data and serve it to end users in useful formats. Applications in the previous system that were in use have been replaced by embedded functions. Previous reporting is so far improved it is not even comparable.

At this stage, the project has morphed into a continuous improvement plan with around 40 projects currently in progress that are IT related. There have been a range of improvements possible with the new system, leaving the underlying and previous comments on components aside. Some examples follow:

6.1 Contractor Data API

The contractor processor interface is the first offering of its kind in the industry as far as we can ascertain. This allows programmatic access for contract processors. It enables them to access their data with a short delay allowing for replication and other data movement. The interface include lot/bodies which includes grading information and other available kill and bone data, packs which includes all carton information, order/order lines which includes all related information on order to dispatch and also product specifications.

Customers are able to store these locally, and also integrate as required with their internal systems. This interface will replace current XML file transfers to some customers which are both custom, difficult to maintain and troubleshoot, and subject to greater security risks. Smaller contract processors will have another method supplied which provides very detailed data on their cattle and products produced, without the need for programming.

Some of the data screens available are:

- Slaughter and Grading
- Boning runs
- Carton production and inventory
- Orders
- Specifications

6.2 Increased Collaboration

From an organisation that 'got by' on email and phone calls, significant steps have been taken very quickly to leverage the collaboration capabilities of Microsoft Teams.

6.2.1 Contract Processor Report Archive

All contractor reports sent out are copied to a Teams folder to allow anyone at John Dee to check a report if there's an issue reported. Issues can happen and it was previously difficult to both confirm the report was sent and to resend it. All internal reports sent are also copied to a separate folder. This enables far simpler troubleshooting where, for example, it's immediately possible to see if the email was sent by verifying a copy in the folder. This previously required scouring logs as these emails number in the hundreds per week and 'fill mailboxes' but this solution avoids this issue. Any production system user can assist a customer who has a report query.

6.2.2 IT Small Project Hub

Implementation of Spiceworks service desk software early in the project has greatly assisted with incident management, but there was no real project management in IT at all at that time, and maintenance and engineering, despite dealing with complex projects, use Excel for everything. The maintenance and engineering manager has taken to Microsoft Project for large projects and Teams for small projects. Teams Planner / Tasks was being used by IT for small projects but lacked some functionality. JIRA was subsequently deployed with some customisation.

JIRA lacks task scheduling capabilities, but John Dee has been able to connect it to Microsoft Project via a software bridge for scheduling which is working extremely well.

The development of a basic PMO function to give directors and senior managers a view of IT project priorities and costs. These capabilities were not available prior to the Industry 4-0 project.

In addition, a ticket system was introduced to allow IT to respond to internal and external customer who have non-project issues. Sample PowerBI monthly report below. Both the ticketing system, and the project management capabilities have not only allowed a very large number of tasks to be coordinated and completed, but also greatly improved the ability of IT to provide the executive and board with an easily digestible and coherent view of activity and priorities. The implementation of a right sized project approach has increased visibility allowing better prioritisation, and reduced errors.

6.2.3 Documentation Hub

Tight integration with OneNote has allowed centralisation and vastly better accessibility of documentation. It allows free text or any embedded content. It also allows full documents to be embedded if needed. Authorship is tracked and version control is available with rollback possible across the Microsoft365 platform. Growing complexity, even if well planned and organised, required diligent documentation and updating in the case of change.

6.2.4 General Improvement in Capability

Other projects are now proposed with the newly stable base. One example is a recent discussion with a RFID solution provider introduced by AMPC. Our data warehouse and other project focussed on ensuring there are not ‘spreadsheets’ of data, allow us to contemplate how we can use traceability to improve yield insights and also supply supplier quality data. A custom grid costing system has been developed, as has a contractor processor charge system. Currently a workflow-based specification management system is being developed. Automation of customer order inputs and production run / boning instructions have been possible with the new enterprise architecture. These are newly developed capabilities.

6.3 Innovation Management

A long-term project is to implement an innovation management system, as well as the improved PMO functions that have been implemented. The intention is to embed business case and formal risk / return on investment ratings to possible projects. Some projects are operational imperatives, and there is little choice, but there are significant discretionary projects which can benefit from a more formal process and genuine business case and risk based prioritisation.

The following diagram explains the innovation / idea management process in general.

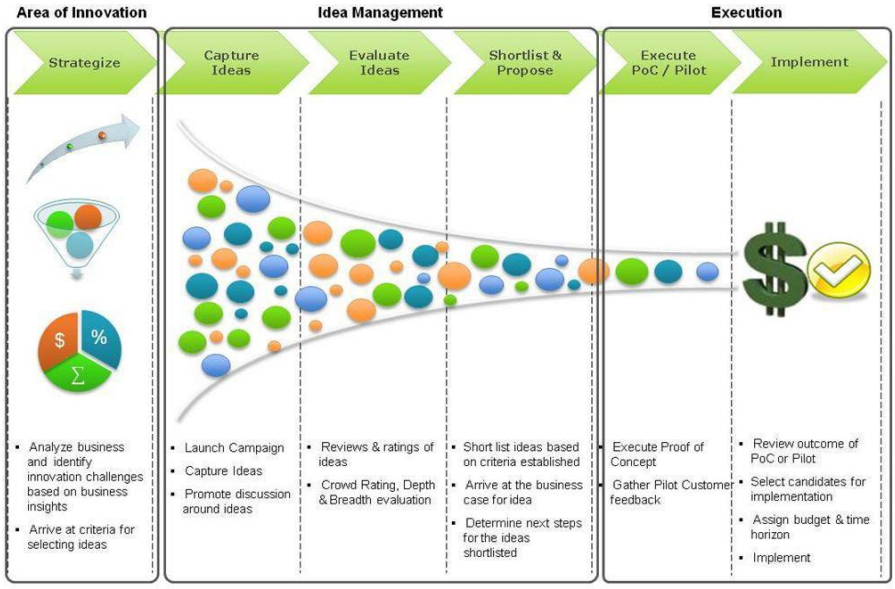


Figure 1 - Universiti Tehnologi Malaysia slidepack Chapter 4 – Innovation - https://slideplayer.com/slide/12295806/

A 'gating process' can help with decision support. Stage Gate is a well-known product development process that requires a go/no-go decision at multiple set points. Implementation of this type of process can assist with investment decisions and review processes which maybe be best ceased.

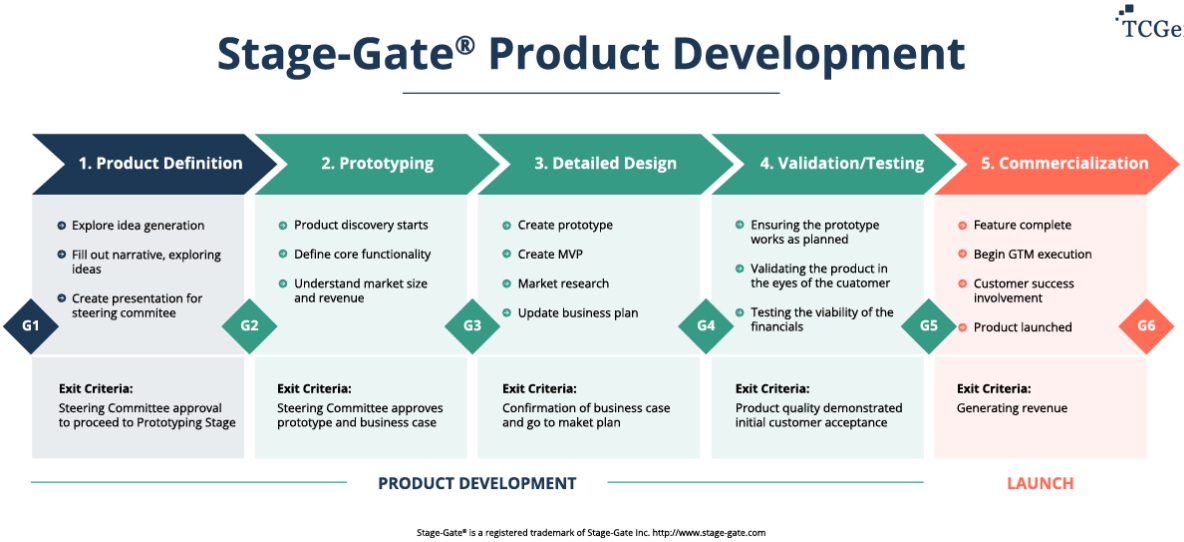
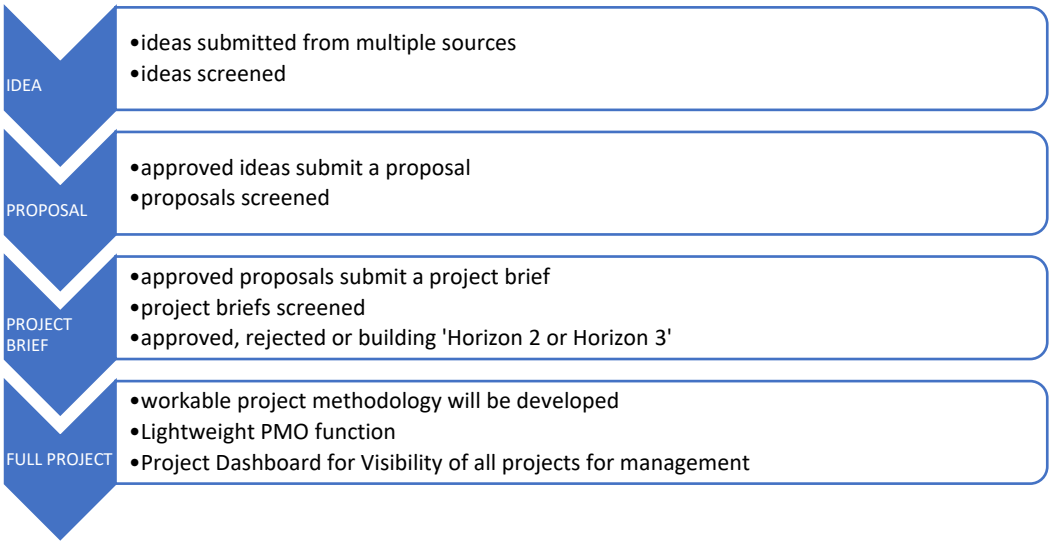


Figure 2 - Stage Gate Process https://www.tcgen.com/product-development/stage-gate-product-development/.

The general intended process is as follows:



Ideas are gathered, but they need to be somehow classified for no further action, or action now / in the medium term / some time in the future. Something similar to the McKinsey Three Horizons of Growth Framework could be used to classify them. This model does receive some criticism[3], but the principle allows near, medium and long term projects to be recorded and classified. This could be driven by investment requirements, or future requirements. Either way, product/projects can be moved between horizons as required.

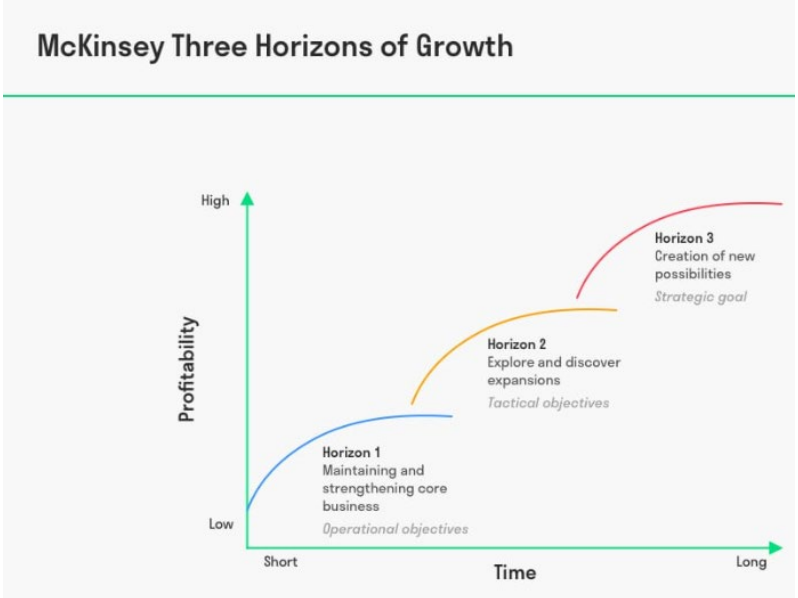


Figure 3 - Mulder, P. (2019). McKinsey Three Horizons of Growth. Retrieved [insert date] from Toolshero: https://www.toolshero.com/strategy/mckinsey-three-horizons-of-growth/

[3] McKinsey's Three Horizons Model Defined Innovation for Years. Here's Why It No Longer Applies. (hbr.org)
https://hbr.org/2019/02/mckinseys-three-horizons-model-defined-innovation-for-years-heres-why-it-no-longer-applies

The approval of a new idea would generate request for a proposal where costs would need to be estimated including internal costs with the information requested to proceed. eg:

- Project Proposal Title
- Background / Introduction
- What does the project involve
- What problem does it solve
- Have any alternatives been considered
- Why should we do it (justification)
    - increased revenue
    - decreased costs
    - operational imperative
    - competitive advantage
    - etc
- The schedule – how long will it take
- The budget – how much will it cost
- The Timing - when would we do it and how much would it cost)
- Who would do it (internal or external resources, submitter contribution, etc)
- How could we measure success – quantification of benefits to track
- Recommendation (by the reviewers)

Successful proposals would then be asked for a full project brief which includes scope, resourcing, budget and schedule outline. Templates should be right-sized to complexity of the project. If it's an expensive project, it should have enough information for the reviewers to make the decision whether to approve expenditure and resource use. Collection of data is simple via a SharePoint list or Form.

6.4 General comments

There are a range of long-term projects that have been made possible by the Industry 4-0 project. They range from quite practical extensions to capabilities such as integration with the new ASRS system and robotic palletiser. Such projects are underpinned by central capture of reference data, so it can be accessed for any required purpose. A well planned enterprise architecture which centralises and simplifies complex data is allowing access and integration to existing applications, and enabling new projects. In addition, there is high value for the implementation of historic and predictive analytics. Maintenance of the data can be assigned to subject matter expert where reference data, rather than transactional data is required, with read access to all who require it and have permission to access it.

This report contains a few examples of improved capability gained through the Industry 4-0 project. While there are still significant gains to be made, and many projects in progress or planned, the result of the project overall is a significant step forward in John Dees capabilities and customer offering. John Dee is confident that more industry firsts can be achieved through leveraging the new architecture and functionality.

7.0 Conclusions / Recommendations

The Industry 4-0 project involved everyone across the plant, either directly or indirectly. Every electronic production process was changed, and it was necessary to change many physical processes due to the new systems. The typically very small team knowledge worker team size is a major challenge in the processing industry overall. With high reliance and increasing focus on technology and data, the project approach is key to success.

A dedicated project team is required, as well as co-ordination of a range of expert contractors, to be able to make a large digital transformation. One key challenge is that people who are needed for such a project often 'have a full-time job already'. Detailed planning is required, and resourcing considered, to allow required internal staff to be released from day-to-day duties for project task completion. Spending time developing a clear enterprise architecture is key, as is ensuring thorough discovery and requirements capture are attended to.

Leading edge technology within the John Dee Industry 4-0 project provided many opportunities for improvement. A strong recommendation is to reduce throughput while the new system is commissioned, and gradually increase as confidence is built. Anything that can be run in parallel should be. It's quite often the case that it is not practical to run in parallel due to single device interfaces such as PLCs or other industrial devices. The value of testing cannot be understated. A granular roll-back plan should also be considered in case of unforeseen issues.

Some key recommendations are:

- Use a business case approach to project investment decisions which include less obvious things like downtime avoided (across the plant) and true costs of grossed up internal wages and other internal costs;
- Invest in people and training;
- Build a realistic test environment and keep it after go-live so all upgrades can be tested;
- Scale up operational and program / project management processes;
- Invest in the best technology that is available and affordable based on realistic business cases;
- Focus on risk management to find the largest gains for prioritisation;
- Implement appropriate methodologies for IT operations management such as ITIL concepts.
- Develop and implement a right-sized project management methodology. (PMBOK or Prince2 for example)
- Employ specialist business analysts for requirements gathering and specifications.

Having goals linked not only to elimination of downtime using technology, but to leveraging the system for actionable insights is key. Considerations for future research and development could include:

- Developing recommendations for IT team structures for the processing industry;
- Developing reference frameworks for design of IT systems;
- Developing recommended pathways for IT education in meat processing;
- Developing project methodology and business case development material, and offering training;
- Developing an Industry 4-0 / Digital Transformation Roadmap for processors.

John Dee has totally changed its technology architecture and made large gains as a result. This has allowed improved service to customer, improved efficiency and improved agility. The integration of two major industrial technology improvements (ASRS and Xray Trimline automation), as well as replacement of the plant phone systems and camera systems in the same time period was only possible due to the foundations built by the project. There are many possible improvements in the future.

Due to the Industry 4-0 project, John Dee is well placed to continue to innovate and take advantage of any new opportunities. The support of AMPC and industry was greatly appreciated.

8.0 Bibliography

Figures:

9.0 Appendices

N/A

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