

Operational Excellence....built on....Operational Intelligence

A Food processing company, with multiple plants across North America, required help with a digital approach to drive manufacturing improvements and efficiency.

The core of this is often referred to as Operational Intelligence, however, as shown in Figure 1, it also impacts multiple other areas.

The current state varied by plant with isolated pockets of good work. Obstacles included lack of funding at the plant level and lack of operational resources.

Working closely with Operations and Process Engineering we put in place a coordinated approach to utilise real-time information across all assets, feeding dashboards, alerts, and driving fact-based decision making at all levels (operators, management, engineers).

This resulted in improved Operational Excellence: better Overall Equipment Effectiveness (OEE), higher quality levels, increased throughput, and reduced wastage.

Approach

The approach for this program was based around the fundamentals of Industry 4.0 (Figure 2) and led to the creation of our proprietary Industry 4.0 Maturity Model (Figure 3).

Our Industry 4.0 Maturity Model looks holistically across six categories and twenty-eight attributes to identify the current situation, and then with our expertise helps to define the actions to move forward and generate business improvement.

As with any maturity model the targets for improvement will vary by plant and by company. For example, Supply Chain may be a lower priority for some, a higher priority for others.

We started with the identification of strategic goals, by doing this upfront it helps to clarify areas of focus for reviewing the current state and then building the strategy.



Figure 1 - Scope



Figure 2 - Industry 4.0

The areas of focus in this case were:

- Leadership & People
- Data & Information
- Operational Excellence
- Tools & Technology

The current state of each of these were reviewed at a corporate level and by plant. This highlighted the disparate uses of data, lack of consistency and various opportunities for improvement.

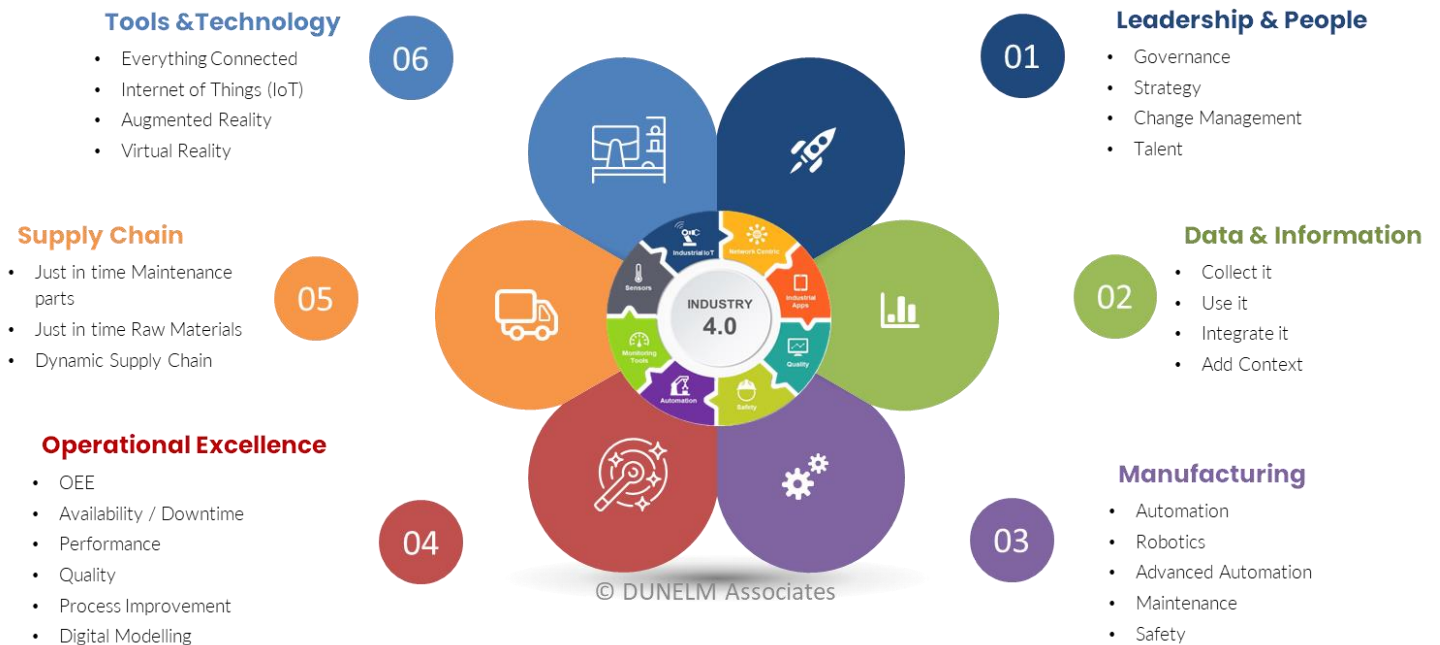


Figure 3 - Industry 4.0 Maturity Model

This analysis provided a foundation to define the strategy and build out a solid multi-year program of improvement across the plants. As part of this foundational work, we defined the purpose, vision and strategy statements shown in Figure 4 that were used to shape and guide the program as it was developed.

Purpose
 Provide **production information and analytics** to power **Operational Intelligence** and help deliver **Operational Excellence**.

Vision
Every component that needs to be measured on every production line is **connected to PI**, and **every person** (who needs it) has the **tools and training** to analyse the information and help deliver Operational Excellence.

Strategy
 Clear **Plant level Ownership, Standardisation** of tools, infrastructure and training, overseen by cross company **Governance**, driven by plant and company needs.

Figure 4 - The Vision

Strategy and Roadmap

A program of this magnitude has many facets and divides into multiple sub-projects spread over a number of years. It is important to note that the speed of implementation across your plants will be dictated by many factors including, but not limited to, current level of knowledge, equipment, skills, and resource availability. It may be necessary to go slower than you would like in order to deliver the best results.

In its simplest form the strategy is shown in Figure 5 and builds from alignment through to automated and autonomous working.

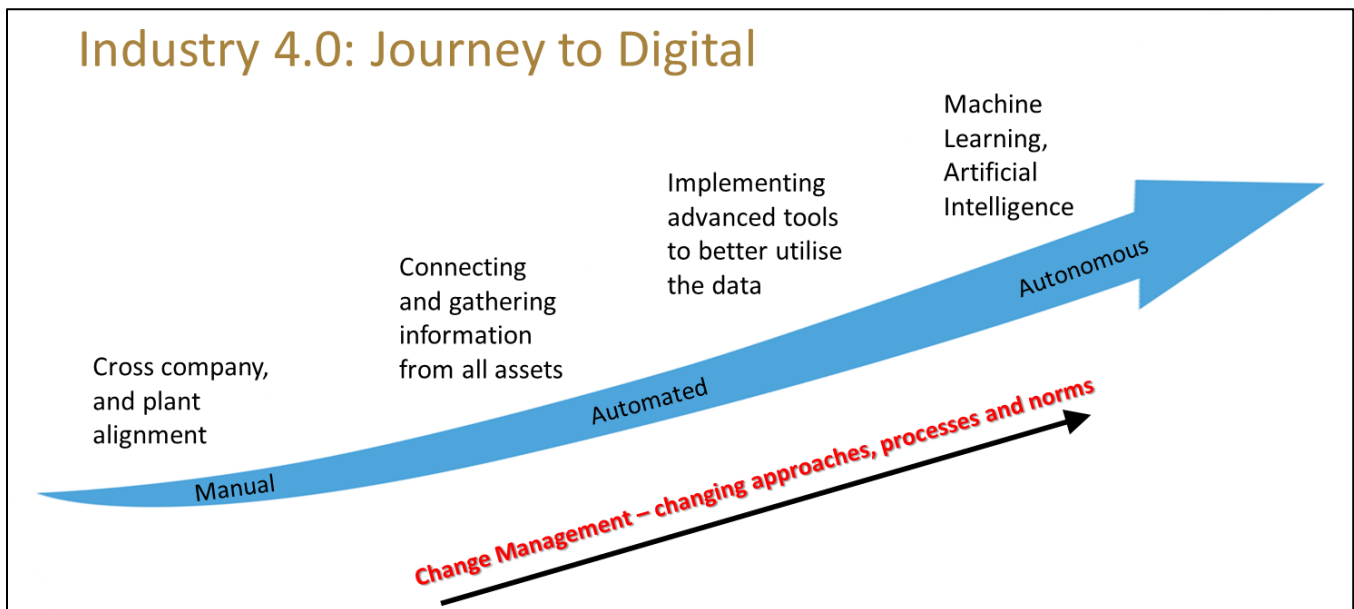


Figure 5 - Journey to Digital

The key stages of the program are shown below:

- 1. Current State analysis**
- 2. Startup & Approval**
 - a. Built a cohesive Industry 4.0 strategy for all plants
 - b. Gained multi-million \$ funding at the corporate level
 - c. Formed a small central team to coordinate the program and assist the plants
 - d. Identified vendor support required to be successful
- 3. Alignment, Buy-in & Change Management**
 - a. Built strong alliances with key plant management and staff
 - b. Empowered plant engineers to identify and implement opportunities and improvements
 - c. Change Management - throughout the program there was a strong focus on Change Management and getting buy-in at the Operator level, which then led to cultural change
- 4. Governance**
 - a. Developed clear governance model and plant level roles and responsibilities
 - b. Implemented enterprise wide governance, ownership, and training, supported by an agreed enterprise architecture
 - c. Plant ownership – while the central team coordinated the program it was essential for success that the plants retained ownership
- 5. Projects**
 - a. Foundational training and skills development, including data based decision making
 - b. Foundational tools – industrial data historian and associated tools
 - c. Consistent Dashboards & Alerts across all facilities
 - d. Statistical Process Control (SPC)
 - e. Advanced tools
 - f. New technology research – centrally researched and piloted new approaches such as IIoT, AI/ML, AR etc.

Figure 6 on the next page provides a graphical summary of key aspects of the approach.

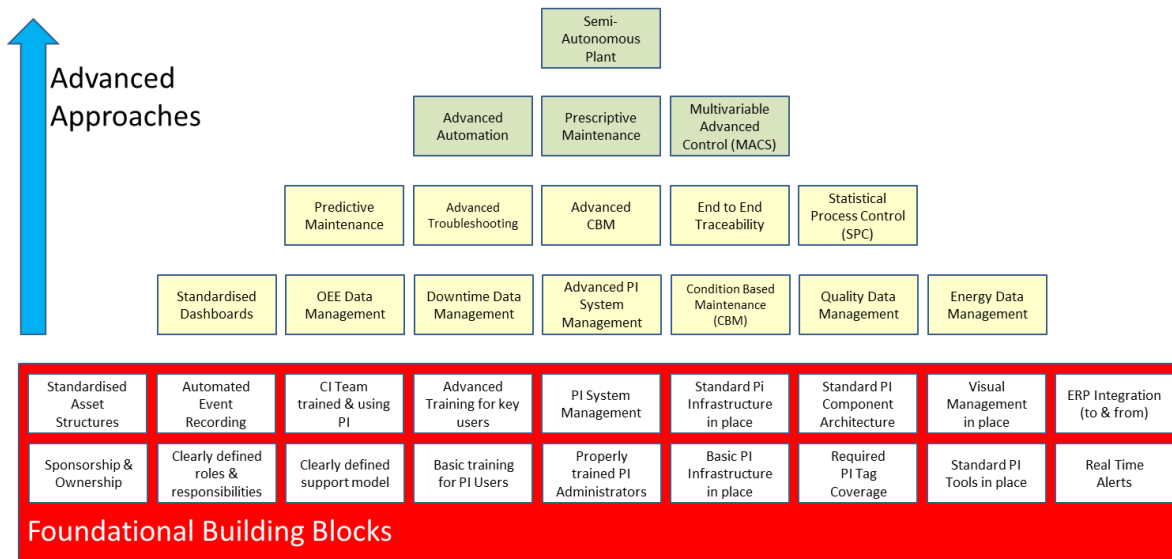


Figure 6 - Operational Intelligence Roadmap

Results

The results varied by plant, with many small wins plus some major ones, including manufacturing capacity and throughput increases. Furthermore, the increased capacity avoided the need for a significant capital investment to extend one or more of the plants.

It should be stressed that the results below were a team effort that needed the skill and expertise of many people across many locations, at all levels, to be successful.

- Increased first time saleable by 7.1%, 10% throughput increase, 2.2% recovery increase, Manufacturing Overall Equipment Effectiveness (OEE) from 77% to 81%.
- Resulting in capacity increase of \$1m+ per year.
- Raw material savings of \$300k per year through better monitoring and control of usage.
- Reduced downtime and improved downtime management (improved OEE).
- 30% improvement in product changeover process.
- Energy Management savings of \$1m per annum, and reduction in water usage.
- Operator accountability and process standardization.
- Automation of center-lining by stock keeping unit (SKU).

Summary

A coordinated strategic approach, enabled by central leadership and funding, allowed the plants to achieve considerably more than they had previously when driving it standalone.

The approach based around Industry 4.0 principles provided a holistic structure to build the program and to deliver substantial results.