

# Manufacturing Analytics: Driving a Successful Digital Transformation

## White Paper

### Introduction

Manufacturing generates huge amounts of data. For decades, the data have been captured in process historians, quality systems, MES, LIMS and other systems. It has been presented through a myriad of often indecipherable charts, points, lines and graphs to process engineers and operators, who struggled to convert that “information” into meaningful action and who optimistically hoped that they would spot any issues before they turned into major problems. This has often led to and been compounded by an apathetic culture of acceptance that has evolved in many organizations. It is an acceptance that product will sometimes be off-spec; an acceptance that there will always be downtime; an acceptance that the manufacturing process might not always be safe; and perhaps worst of all, an acceptance that there is not much that can be done to prevent those things from happening.

Manufacturing analytics promises – and delivers – a better approach. The combination of data together with analytics unlocks the stored potential of the data by transforming it into actionable information that can then be leveraged across the organization to guide the operational decisions that improve performance. Manufacturing analytics also serve as the foundation for a manufacturer’s digital transformation, and ultimately its ability to drive success through competitive excellence.

The payoff of a successful digital transformation project, utilizing manufacturing analytics, is worth considerably more than the resource and time investments it will take. As a manufacturer utilizes the data produced by existing equipment and infrastructures in new ways to improve process efficiencies, safety, avoid unnecessary shutdowns, and move the organization to new competitive levels, the value will quickly become evident.

### The Challenge

But as manufacturers across the world rush to transform into digitally centric organizations, most efforts will fail to achieve success, with industry analysts estimating as many as 85% of digital transformation projects will fail. Those failures, in turn, often leave the organization distrustful of related efforts and create an unwillingness to try again.

This disproportionately high failure rate often reflects a lack of understanding about the steps required to achieve successful digital transformation. Failed cases are too often typified of two things; one, a vendor promising – and two, the willingness of a manufacturing organization to accept – an ‘easy button’ technology or approach. Placing the technology at the starting point of this type of transformation project, almost always guarantees a project’s failure.

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### Steps to Success

Success requires a measured and invested approach by a manufacturing organization. The three steps to a successful digital transformation are:

Step 1: Identifying the problem(s) to be solved.

Step 2: Acknowledging and planning for the human side of change.

Step 3: Ensuring that the technology chosen is fit-for-purpose related to the identified problems and an organization's capabilities.

### Step 1: Identifying the problem

For an organization to succeed in its effort to adopt a fully digital approach, it is vital to first have a full, in-depth and agreed-upon understanding of what problems need to be solved. The willingness to identify and understand the problems – including those the company might not be aware of – is the cornerstone to any successful digital transformation program.

To do so well first requires a fresh look at the organization and its processes. This can be especially true for long-established facilities, where a common challenge is that existing problems have been happening for such a long time that they have come to be viewed as standard operating states. For example, a large manufacturer with an unplanned shutdown hitting one critical unit every 8-10 months for more than 20 years. To outside observers, this would have been clearly identified as a "problem". From the perspective of existing plant personnel, however, it was viewed as "normal" because of the combination of the number of times it had happened and the length of time over which it occurred. Other examples of this type of blind acceptance include "acceptable" levels of waste or rework in a process. "We only have x% of rework; for this process, that's normal".

The process of stepping back, reviewing the status quo and ultimately asking the right questions will help to identify the problem(s) that need to be solved, thereby surfacing the overall goal(s) of the organization's digital transformation.

The use of manufacturing analytics with the data associated with these non-normal events can then be used to help identify the underlying causes and potential long-term solutions.

Organizations that start with the problem first, consistently find that the technologies best suited to help solve those problems present themselves quite logically and naturally, at a later stage.

A note of caution at this stage: the identification of problems within the organization needs to be done with solution-focused mind-set, rather than one of blame. This approach encourages people to consider there may be a better way of doing things. Executives and engineers alike must be willing to acknowledge that there are existing problems that need to be resolved and avoid casting blame when they are found. This might sound simple, but it requires a company culture that is ready to accept that not everything has been 100% right, 100% of the time.

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### Step 2: The human side of change

In conjunction with identifying the problem(s), manufacturing organizations must assess and address digital transformation from an expertise and cultural perspective as well. In a world where very few like the idea of change, it's important to ask and understand:

1. What changes are people going to see and experience as part of this digital transformation effort?
2. Are they prepared and willing to embrace the use of new approaches, techniques and technologies?
3. Is management prepared and willing to invest the time, energy and resources necessary to digitally transform the company?

This “people part” is, in fact, usually the most challenging of any company's digital transformation journey. The people impacted by and responsible for using any related new technology or service need to understand the rationale and benefits. Having that baseline of understanding increases the chances that the new approaches or technologies are embraced and used to full potential. That, in turn, improves the likelihood any new approach will be sustainable past the initial roll-out and becomes the de facto new standard work process. That makes keeping people informed and engaged throughout the process – from ideation and planning to implementation – the number one key to a successful outcome.

An internal team should be designated to guide the entire program at all points of the journey – from problem identification and who is impacted by them to exploring the analytics best suited to solve those problems. This might mean restructuring the organization's personnel so that the people chosen to drive digital transformation can focus entirely on that transition. It is unrealistic to expect digital transformation success if the new responsibilities – that require dedicated focus to achieve meaningful results – are to be performed on top of existing duties.

Additionally, digital transformation requires the organization to be honest about the expertise that is required at all levels. For example:

1. Are leaders willing to step up and drive the transformation forward?
2. Are operators and process engineers willing and able to approach things differently, and problem-solve in new ways?
3. Is management willing to change success metrics for employees to reward decisions that may have short-term negative impacts in order to achieve long-term transformation goals?

If there are gaps, they need to be acknowledged and proactively addressed before transitioning to the technology selection process.

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### Step 3: Choosing the technology

Having identified the problem(s) and planned for the human side of change, an organization should be able to narrow the field in terms of selecting the appropriate technology to meet its needs. Identifying and choosing the right technology(ies) becomes infinitely easier when an organization knows what it is trying to achieve with its digital transformation efforts and the problems being solved. And while each organization and their problems are unique, there are three common technology challenges that must be addressed by every manufacturing organization preparing for digital transformation: Connectivity, Scalability and Sustainability.

#### Connectivity:

Any new software considered should access and leverage data from existing technology infrastructure through industry-standard connectivity technologies (e.g., OLEDB, ODBC, OPC, ADO.NET). Additionally, any new software or technology should not require any specialty programming to adjust the underlying code for each data source that is added. As the digital journey progresses, it should be a simple matter to add new sources of data with the industry-standard connectivity tools for further analyses and insights.

#### Scalability:

When considering scalability, think in terms of both horizontal and vertical scalability as both are important.

- **Horizontal:** The manufacturing analytics needs to be easily extended across different lines within a plant as well as across multiple plants within a manufacturing organization in such a manner that all operations can advantage themselves with the learnings, operational best practices and problem solving.
- **Vertical:** Any manufacturing analytics technology chosen should be accessible to and used by all levels of a manufacturing organization, from operators and plant managers to upper level executives, with operational guidance outputs specific to their role driven from the same data.

Scalability inhibitors include the requirement for IT involvement to make simple adjustments to analytics-driven dashboards, deep analytics expertise, and data manipulation (e.g., cleansing, moving) to name a few.

#### Sustainable Technology:

In addition to solving the problems and challenges of right now, it's important to take a step back and think about the sustainability of the software solution; can it solve the problems/challenges of today and tomorrow? The software's ability to be effective long term can be judged on a few common factors including:

- Does not require specialized coding.
- User-managed system (not an expert-only technology)

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- Requires limited IT involvement subsequent to establishing the initial data source connections.
- Based on foundational analytics that are easily understood by all user levels and easily changed to evolve application of the analytics as initial use brings process into control.
- Enables users to easily expand and apply analytics to new process areas.
- Analytics visualizations that are easily understood and deliver immediate clarity regarding how analytics-driven changes impact processes.

A sustainable analytics technology will drive long-term value for the organization beyond a single pilot.

A few questions to guide the overall technology selection process include:

- Are the analytics well documented and characterized, and are they appropriate for the problem(s) the organization is trying to solve?
- Is the technology commercially available, and likely to be so (and supported) in the future?
  - Is the technology secure?

## Achieving Competitive Excellence

Organizations that have been successful starting and sustaining their digital transformation, utilizing manufacturing analytics, tend to refer to their efforts in terms of 'journeys'. Each is an effort that is implemented, revisited, and refined continuously, cycle after cycle. Every review/revision cycle equips a manufacturing organization with key learnings to identify new process improvements, hone best practices, and deliver competitive market advantages. Successful digital transformations continue to evolve as they scale across organizations and become self-sustaining operational paradigms.

Digitally transformed manufacturers can compete at a completely different level in the market by anticipating and pro-actively addressing problems and customer needs. In turn, this new approach enables organizations to compete in a way that other (non-digitalized) companies simply cannot. This competitive excellence is a natural outflow of successful digital transformation and manufacturing analytics efforts.

As an example, manufacturers in the industrial gas sector are currently being driven by their customers to move beyond ship-to-specification. Instead they are now requiring those suppliers to deliver an analytics-centric, fit-for-use view of incoming product. Increasingly, industrial gas companies that can leverage data and analytics to provide that "manufacturing analytics fingerprint" of product that enables them to ship-to-control are the ones better positioned to maintain and expand business with their customers. This customer-centric approach allows them to start with the needs of the customer, and marshal data and analytics that can help them best deliver on those customer needs. They are the ones achieving competitive excellence and changing the market landscape in their favor as a result.

## Conclusion

Ultimately, the successful journey to digital transformation is not an easy one. It requires manufacturers to break from a business-as-usual approach to one that starts with identifying the problem(s) that need to be solved; engaging their organizations at the start of the process and actively enabling the human side of the change required for success; and only then looking across the technology landscape at software and solutions best positioned to help their people solve those problems.

There are no shortcuts. But there is a path that makes the journey less arduous, more predictable, and most likely to end in success with the ability to best anticipate and meet customer and market needs.

## Top Tips

Top tips for making a digital transformation project a success:

- Identify a dedicated team to drive the digital transformation
- Identify problems that need to be solved
- Involve all levels of the organization at the start of the process
- Encourage a solution-focused company culture
- Use manufacturing analytics to achieve an in-depth understanding of processes
- Choose an appropriate technology that can solve those problems
- Keep improving processes and practices
- Roll out across the organization
- Recognize digital transformation as an ongoing process

For further advice about manufacturing analytics and driving a successful digital transformation, contact the experts at Northwest Analytics Inc., at [nwa@nwasoft.com](mailto:nwa@nwasoft.com).



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