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DIGITAL TRANSFORMS PHYSICAL

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Digital Transformations: Scale or Fail

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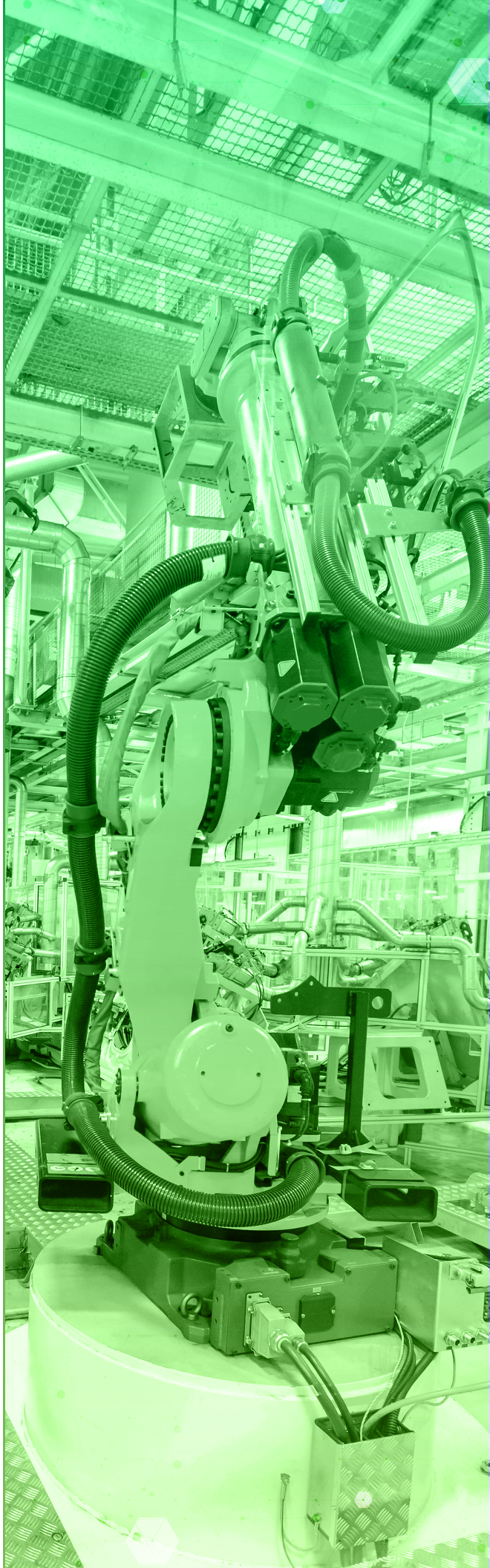
To escape pilot purgatory and achieve value at scale, manufacturers must adopt a value-centric problem-solving approach.

WHITE PAPER



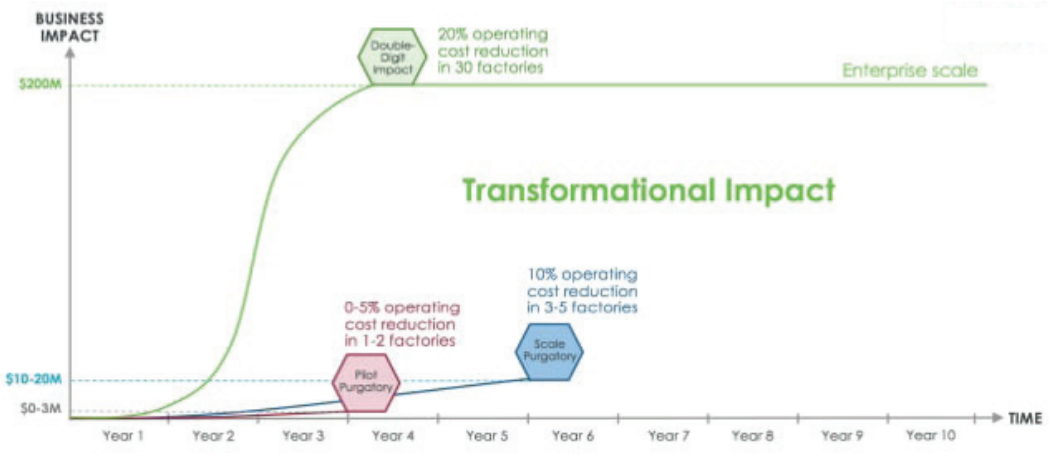
Digital transformation and Industry 4.0 programs are on most CxOs' top strategic planning lists. The reason why is that the value of these programs is undeniable. In fact, 90% of industrial companies are investing in digital factories and over 70% consider digital manufacturing at the top of their operations strategy agenda.

However, many manufacturers are still in scale purgatory; they are unable to rapidly capitalize on pilots that could deliver transformational outcomes if they were scaled across the production network in a timely manner. According to McKinsey, companies run on average eight digital transformation-related projects, but less than a third are implemented at scale[1]. Research from Gartner, LNS, and recent status reports by PTC show that only about 25% of manufacturers are expected to be in the scale stage of digital initiatives[2].

The Economy of Speed and Scale

- A manufacturer with $1 billion in impactable operating costs across 30 factories facing pilot purgatory recognizes a less than 5% cost reduction in one or two factories, saving less than $3 million in three years.
- A similar manufacturer succumbed to scale purgatory generates a 10% cost reduction in three to five factories saving no more than $10-20 million in five years.
- Another similar manufacturer realized a double-digit cost reduction impact in all 30 of its factories and saved $200 million in only three years.

Figure 1



As a result of scale purgatory, companies fail to achieve the necessary impact, speed, and scale that deliver double-digit business value. As seen in a previous Journal article, "Finally, Double-digit I4.0 Impact at Scale", the companies that unlock transformational value with speed and scale can potentially realize 10 to 100 times more financial impact than those that are stuck in pilot or scale purgatory.

PTC and Microsoft have had the benefit of working with thousands of clients and what we've learned from them is that the majority of stalled initiatives share common themes at the convergence of operational excellence and digital technology. Among these themes are:

1. Very few companies can convert their data into insights required to identify, prioritize, and focus resources on the most critical production constraints.
2. Only a few manufacturers have confidence in identifying the most financially impactful corrective actions to remediate issues.
3. It is difficult to measure the financial impact of corrective actions. Therefore, technology, rather than financial impact, is mistakenly the focus of the transformation program.
4. Companies rely on fragmented systems with point functionality to solve a single issue in a single place; therefore, they lack a scalable architecture.

To bypass scale purgatory and achieve double-digit value with speed, manufacturers must form their I4.0 programs around the four core elements of successful transformation:

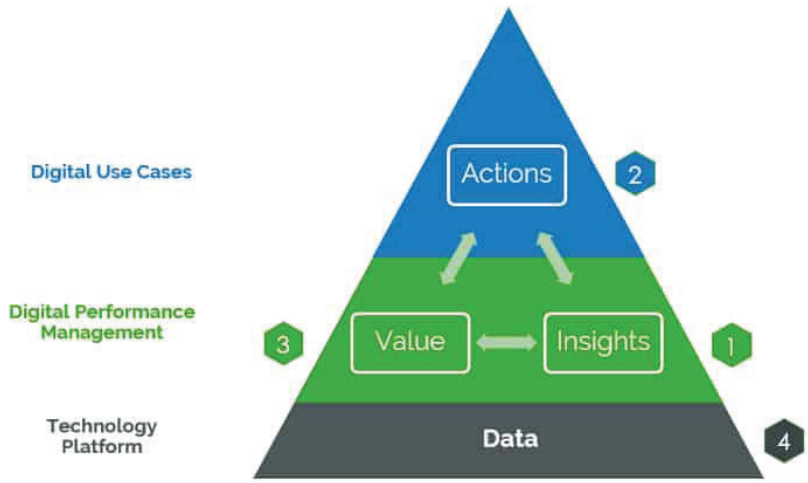
Key Transformational Elements

Figure 2

These four elements are part of a concept we are pioneering called Digital Performance Management, a unique systematic closed-loop performance management approach that can help manufacturers identify, prioritize, analyze, and validate the top opportunities for financial improvement. This best-practice approach empowered by scalable technologies ensures standardized problem-solving and resolution across the enterprise. This article will highlight how a standardized performance management approach on top of a scalable technology platform can make way for actionable investments that improve production efficiency by at least five-20%, or four-16 hours in an 80-hour week.

The Value Pyramid: Leveraging Data for Action

Figure 3



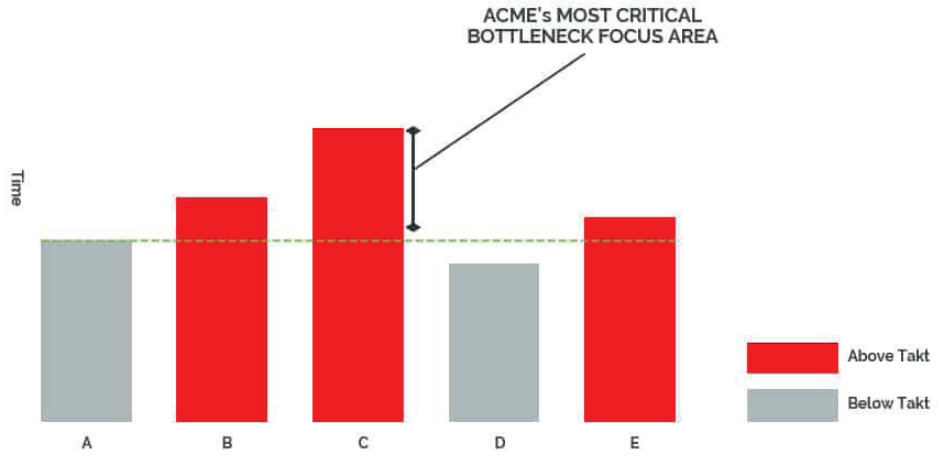
1. Identify the Greatest Opportunities

A) Determine Biggest Constraints

Many manufacturers are adopting digital technologies to improve their operations, yet most fail to determine WHERE to best focus and prioritize their transformation efforts. The common pitfall is to implement use cases on all lines and/or all machines in a factory without pausing to prioritize the bottleneck processes that reduce the capacity of the entire value chain.

Fictional Case: Process "C" is the Bottleneck

Figure 4



It is only when resources resolve true bottlenecks that production efficiency can be improved. Consider a fictional company, ACME, with the following operations where process C is the bottleneck.

- If ACME dedicates resources to improving process A, throughput will increase. This might seem like a success, but inventory will accumulate when parts arrive at process C. This equates to a waste of company resources and limited value.
- If ACME dedicates resources to improve process D, this would be inconsequential since this process is already below takt time, running at a speed that already matches customer demand. This too would equate to a waste of company resources and limited value.
- Only when ACME dedicates resources to improve the bottleneck process C can ACME improve the efficiency of the entire end-to-end process and ensure that value is achieved and that valuable company resources are used optimally.

The manual nature of identifying bottlenecks and their relative priority to one another makes it very challenging to identify opportunities. Experienced manufacturersML might know their first bottleneck but usually have very limited knowledge of the second and the third and their impact on operations.

With a standardized performance management approach leveraging the Industrial Internet of Things (IIoT), manufacturers can automatically collect and analyze the takt time and cycle time, dynamically identifying priority bottlenecks across their work centers, lines, and factories even as bottlenecks evolve. This helps manufacturers always know where the biggest problems are, ensuring they are continuously solving the right problems at the right place and right time.

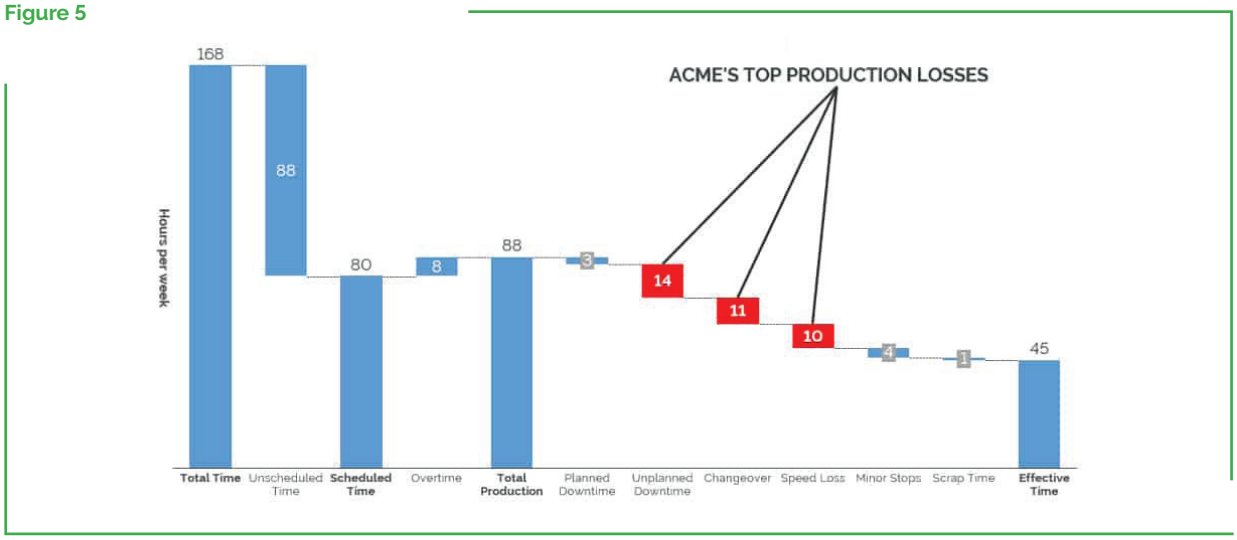
B) Determine Biggest Production Losses

The next hurdle is identifying, analyzing, and prioritizing top opportunities for eliminating production losses. While many manufactures turn to traditional tools like OEE reporting for some of this analysis, few have been able to confirm their desired throughput improvements.

As a result, front-line operators and managers are unable to clearly understand the magnitude of production losses throughout their processes. On top of this, valuable resources end up pursuing improvements on non-impactful processes. This equates to minimal impact and increased risk through lack of prioritization on true production constraints.

Using Time to Identify Opportunities

Figure 5



Gaining a full picture of both machine efficiency and labor productivity in real-time and over a period of time is now possible. This complete picture enables manufacturers to identify the most impactful opportunities by moving away from percentage-based measurement to a well-known unit of measure – the common hour.

Standardizing all performance losses to time—as opposed to ratios of availability, performance, and quality—spotlights the relative importance of different production losses. This approach helps teams conduct a granular and consistent analysis that can be directly converted to financial impact since operations leaders can instantly recognize the value of an hour, whether by increased revenue, reduced operating costs, or both.

Consider the same company ACME with the following operations in Figure 5. In this scenario, we can see that the top 3 production losses for ACME are unplanned downtime, changeover time, and speed losses.

Focusing efforts on other production losses like minor stops and scrap can have value, but it would be very limited. Only by focusing on the top production losses can ACME achieve transformational value.

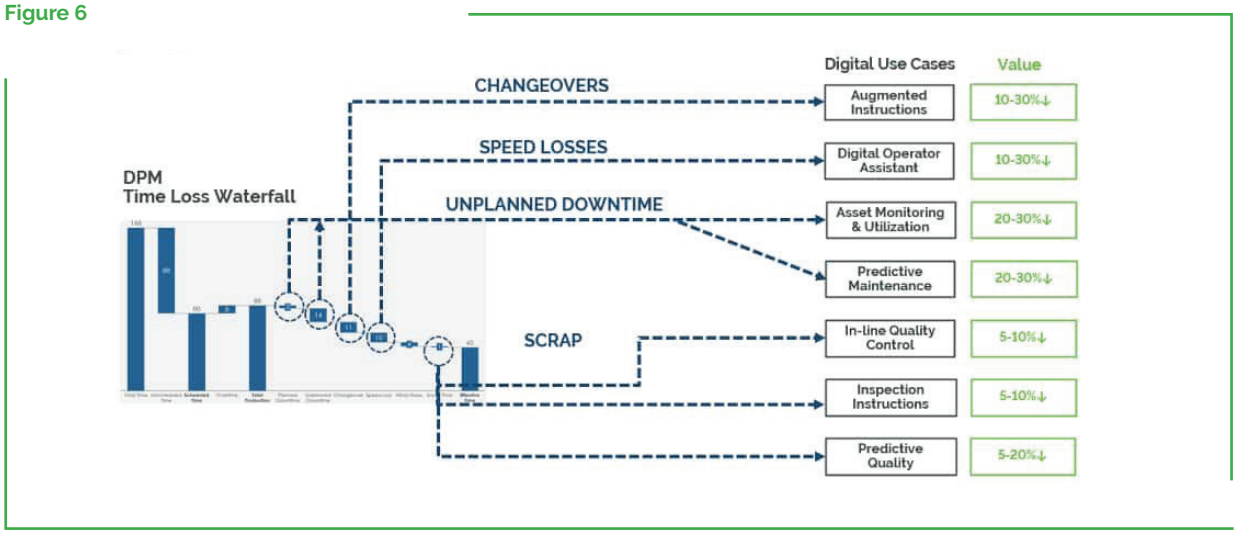
2. Implement the Most Valuable Use Cases

Once top priorities are identified, another common obstacle is determining the most valuable digital use cases to implement to improve efficiency. The first challenge is the abundance of options, which makes identifying use cases like finding a needle in a haystack. Impactful use cases include but are not limited to asset monitoring, condition-based maintenance, predictive quality, and augmented work instructions. Any of these can be impactful, but how can one company focus on the best one?

Sometimes, companies are successful at deploying Use Case A across Site A. In order to scale, their reasoning is to implement the same use case A across the rest of their sites. This approach would be successful if all the sites in a production network were identical. In reality, each facility is different, has different bottlenecks, production losses and talent—even when the manufacturing processes are similar. Applying a consistent use case across different facilities is a great way to leave value on the table. How can a company implement the most impactful use case that best fits each unique environment?

Using Production Losses as a Guide

Figure 6



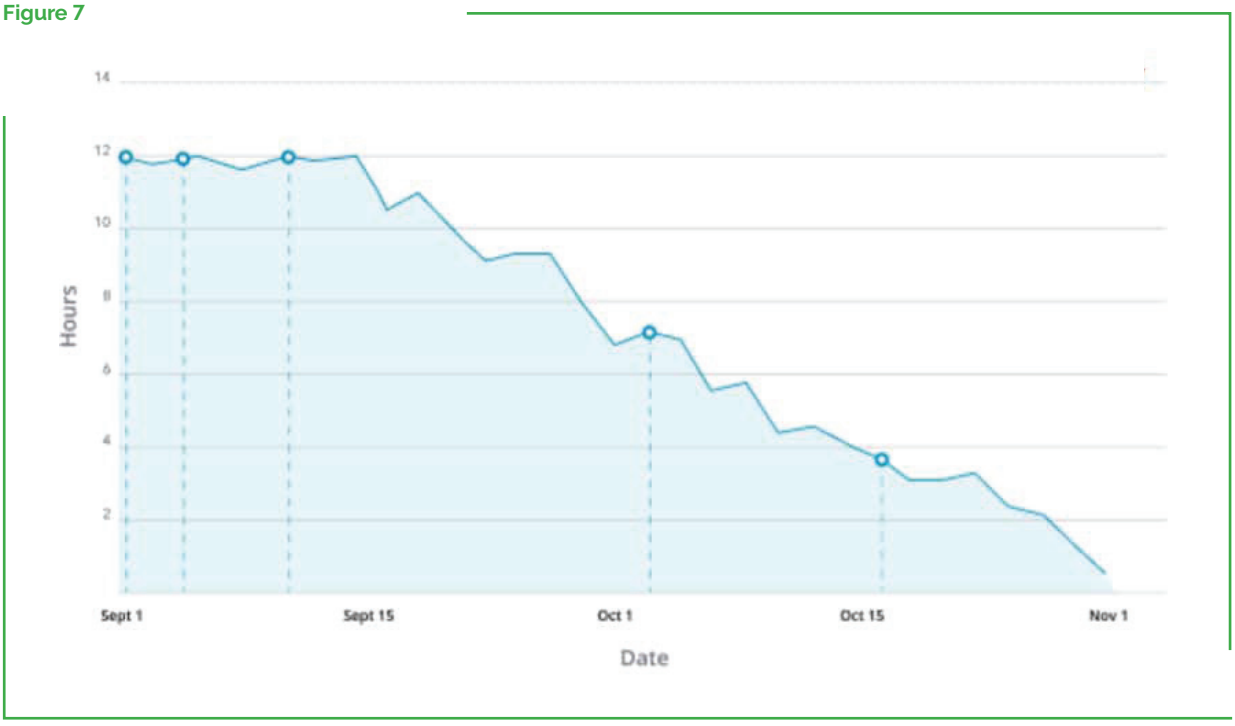
As show in Figure 6, an enterprise performance management approach solves these problems by serving as a guide to digital use cases. This provides recommendations on the most likely opportunities to regain lost production hours by mapping each production loss to a set of viable use cases. Therefore, transformation is guaranteed to be value-centered rather than technology-centered, deflecting one of the key traps to scale purgatory. Finally, this approach encourages tailoring of use cases to specific sites with heterogeneous problems and heterogeneous use cases. Indeed, once an enterprise problem-solving layer is in place, local problems require local use cases.

3. Measure the Value of Investments

Once use cases are deployed and corrective actions are taken, manufacturers struggle to track their status and measure their corresponding operational and financial impact. While current approaches like OEE can indicate performance trends, these conventional approaches fail to quantify how much a specific corrective action improved overall performance. As a result, operators, improvement engineers, and plant managers have limited visibility in evaluating the success of their improvements.

Time Loss Trend Tracks Impact of Improvement Initiatives

Figure 7



By leveraging a standardized digital performance management approach, manufacturers can gain closed-loop traceability of corrective actions and the corresponding business impact. With this universal digital approach, management can set a financial target on hours rather than percentages and know precisely where they are in achieving that outcome.

Measuring the value of implemented use cases with time saved as a unit is finally possible. This tracking allows management to monetize this saved time in different ways- It would enable an operations executive to say: "I will reduce unplanned downtime by 10 hours and those new hours will be converted to additional volume, resulting in $X additional revenue and margin or perhaps $Y in overtime cost reduction".

4. Build a Scalable Technology Foundation

The traditional industrial software stack consists of fragmented systems with point functionality solving a single issue in a single place. Implementing one-off integrations strains resources and limits the ability to source relevant data. These systems are not adjustable or responsive for tomorrow's customer demands or next month's materials shortage, among other countless unforeseen events. Manufacturers using this approach will never achieve flexibility and agility at scale.

With value planned and proven, manufacturers will want to quickly roll out multiple digital use cases to subsequent sites. The answer is a combination of standard best-practice processes in a SaaS solution and a flexible and secure technology platform, which together can unlock efficiency improvements across a global production network. Indeed, technology platforms that leverage the cloud are more accustomed to handling a sophisticated workload across sites, users, and use cases. The cloud's scalable infrastructure increasingly places it on the roadmap for I4.0 projects, an approach that 58% of industrial companies agree with[3]. The flexibility of the technology platform is integral to scaling solutions and use cases that scale across multiple sites.

While the fourth industrial revolution presents immense potential for business value across the enterprise, a majority of manufacturers brave enough to seize the opportunity have succumbed to scale purgatory. Establishing the four core elements of successful transformation enables manufacturers to break free of scale purgatory and deliver against business goals to reduce operational costs, support revenue growth, and increase asset efficiency.

Manufacturers who take a financial-impact-first perspective, prioritize use cases based on the biggest constraints, link production losses to corresponding use cases, and measure the value of their interventions while building a strong technological foundation inclusive of cloud capabilities and a scalable architecture will achieve double-digit impact at scale. These are the companies that will outpace their competitors and realize the potential of I4.0.

[1]'Digital Manufacturing – escaping pilot purgatory' https://www. mckinsey.com/~/media/mckinsey/business%20functions/operations/our%20 insights/how%20 digital%20manufacturing%20 can%20escape%20pilot%20purgatory/digital-manufacturingescaping-pilot-purgatory.pdf

[2]'Gartner. Predicts 2019: Industrie 4.0 in Advanced Manufacturing Is Driving Digital Differentiation Through Data Innovation. March 2019. https://www. gartner.com/en/documents/3904281/ predicts2019-industrie4-0-in-advancedmanufacturing-is; LNS Research. Understanding Industrial Transformation Today: Digital Readiness is the Foundation for Success. December 2018. https://www. lnsresearch.com/ research-library/ research-articles/ IX-digital-readiness

[3]'The State of Digital Transformation' https://www.ptc.com/en/ resources/iiot/white-paper/ state-of-industrial-digital-transformation

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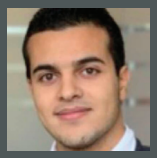

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The Manufacturing Leadership Council is the world's first member-driven, business leadership network dedicated to helping senior industry executives identify the opportunities created by transformational digital technologies in the operation, organization, and leadership of manufacturing enterprises as they pursue their journeys to Manufacturing 4.0.

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