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DIGITAL PERFORMANCE MANAGEMENT:

THE NEXT FRONTIER FOR A LEAN, AGILE AND CONNECTED MANUFACTURING OPERATION

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The COVID-19 crisis came in the midst of Industry 4.0 – the industry terminology for the last decade of digital enablement. COVID-19 made crystal clear that the ability to be agile and resilient is a *need to have*, and companies that were already on the digital transformation journey, investing in technologies that would aid in this resilience and agility, were better able to excel in a pandemic-impacted world. Now every manufacturing organization is looking to accelerate, or double down on digital transformation.

This report will focus on one tool for manufacturers in the digital transformation tool kit: **Digital Performance Management**. It will dive into current continuous improvement and operational excellence efforts that are still analog in nature, stifling substantial increased productivity, and outline how DPM can act as a data equalizer within an organization, accelerating and democratizing the problem- solving process for the digital age. It will identify the most pressing problems in the factories as well as inhibitors to their effective solving. (Hint – you can't expect a smashing success without change management.)

Finally, this report will go in depth with **James Zhang**, *VP of Market Development for* **PTC**, as he details what DPM can mean to manufacturers, including a connection from the top floor to the shop floor, an end to the reliance assumptions of skill and expertise, and double-digit productivity increases.

Introduction

In a 2017 report, "*Making it in America: Revitalizing US Manufacturing,*[1]" McKinsey sounded the alarm about the future of the US Manufacturing industry as it had experienced two decades of decline, especially in small to medium-sized enterprises. But, with the alarm came areas for hope to turn things around, including Industry 4.0 technologies that incorporate data and analytics, augmented reality (AR), and machine to human interfaces to save time on decision-making.

The three years after that warning bell showed an openness and willingness on the part of manufacturers to listen, plan, and in many cases *invest* in these new technologies, under the umbrella of digital transformation (DX). This was considered a key strategy to increasing competitive advantage while also increasing customer satisfaction through solving customer pain points, over-delivering on customer expectations, finding efficiencies on the shop floor and improving throughput. However, this investment in digital transformation was hardly across the board, and companies that did not start the journey found themselves sorely behind the curve as 2020 reared its head.

The advent of COVID-19 upended the pre-pandemic status-quo. Companies that had already begun digital transformation found themselves better equipped to handle the constantly changing economy and deal with fluctuating supply and demand issues, as they looked to move from the pilot phase to enterprise-wide transformation. Manufacturers that had not begun to implement DX felt the sting in terms of their lack of agility and resiliency in the face of the pandemic and rushed to get pilots in place. Previously, selling the idea of DX to upper management – as well as the factory operators – was a tough slog, but COVID-19 forced manufacturers to not only cross into DX territory, but to run a marathon inside it. DX is an enabler to maximize throughput while keeping CAPEX and OPEX as low as possible, which is exactly what was needed during the pandemic.

According to The Manufacturer, **more than 2/3 (67%)** of manufacturers have **accelerated their digital transformation initiatives** in the face of the pandemic. And **92%** say that their most significant business imperative is **improving operational efficiency**.

Continuous Improvement – Stuck in an 80s Mindset

While DX has continued to evolve the availability and use of improved technology, the industry is still static when it comes to continuous improvement (CI).

At its heart, CI aims to cut out process inefficiencies and increase flexibility and performance. What is surprising is that while the technology has increasingly sped up to where we are digitally today, the acts of maximizing performance of the enterprise are still stuck in analog methods and showing diminishing returns over time. These challenges in the state of *lean* today can be summarized in three points:

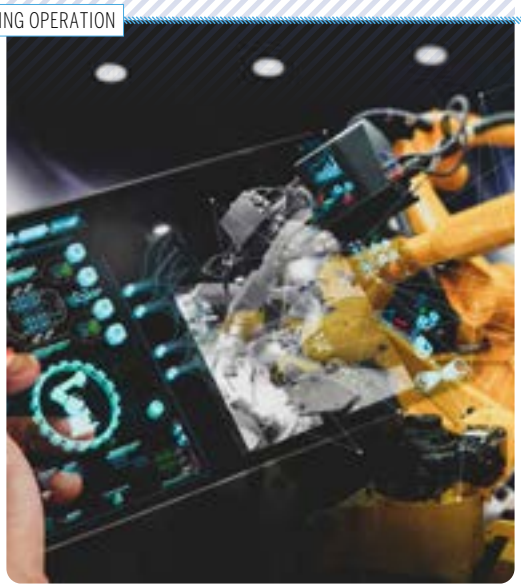
1. The system is human-centric and fragile, depending on the assumption that people are taking the correct actions in time *and* have the right expertise for each problem.
2. Methods of problem solving are still manual, i.e. you may see "sticky notes" around the shop floor!
3. The data is hard to access, unstructured, and disorganized, sometimes requiring weeks to collect and analyze; by then, new issues may have arisen.

In the following pages, this report will outline why there is a need to upend the status quo and the opportunities for change, including:

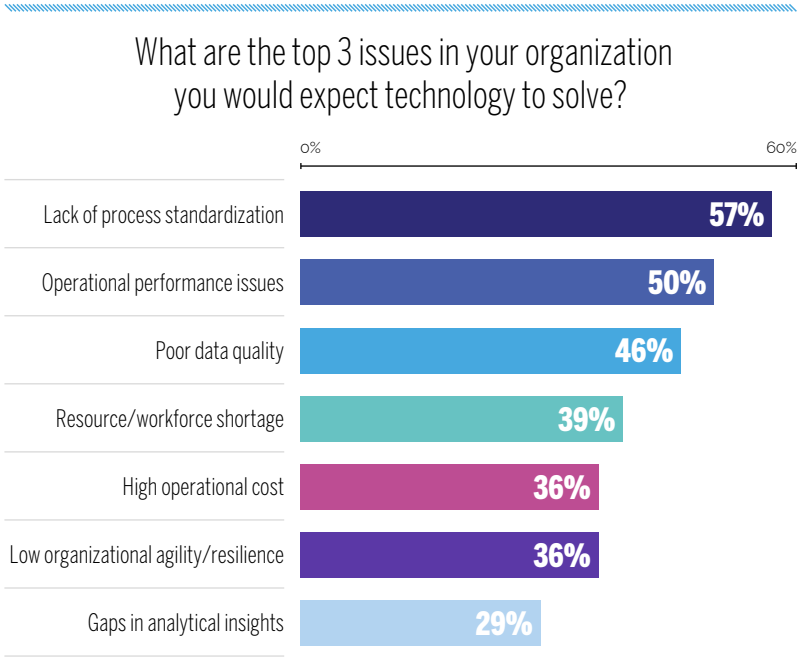
- ✓ limitations in current technology utilized
- ✓ limitations on identifying bottlenecks
- ✓ a division between the decision-makers and the decision-enablers

Footnote 1: https://www.mckinsey.com/featured-insights/americas/making-it-in-america-revitalizing-us-manufacturing

The **Digital Revolution** *in* ***Manufacturing***



According to SSON's 2020 State of the Shared Services Industry Survey, when asked, "What are the top 3 issues in your organization you would expect technology to solve?" the responses from manufacturers were indicative of the issues spurring the digital revolution:



The first three responses – lack of process standardization, operational performance issues and poor data quality, are all connected; when one is sub-par, fracture points will appear in every other. Continuous improvement can only do so much in productivity gains when the technology itself is an inhibitor to success. What is needed is a system that brings data, performance and process standardization together, connecting the top floor and the shop floor, democratizing the data, and enabling every person in the chain of command to make decisions based on the same information, in real time.

While 2021 is still in the thick of Industry 4.0, an integral piece of the digital puzzle has come into use with the ability to tie all the pieces of the puzzle together through **Digital Performance Management:** a closed-loop management system that can help manufacturers identify, analyze and prioritize the most pressing problems, while moinitoring and measuring the performance improvements out of problem solving.

What is Digital Performance Management (DPM)

Digital Performance Management simultaneously ties people, products, processes, and places together to provide a single source of truth from the top floor to the shop floor and across the enterprise, enhancing capability and optimization. With DPM, operations will spend less time maintaining systems and more time using and improving them; and people at every level will spend less time finding problems and more time solving and preventing them. People are empowered, processes are accelerated, products are improved, and places are optimized – all around peak performance.

DPM provides the real-time reinforcement to prioritize, analyze, implement, monitor and repeat problem solving. Acting as a closed loop management system, change management is embedded in the solution to drive improvement, visibility, and ultimately customer value and accountability.

Source: "Walking the Digital Gemba from the Front Line to the Bottom Line," *PTC*

DPM Opportunity #1 – *Bottling Up the* **Bottlenecks**

> **Bottleneck** *(n)* - One process in a chain of processes, such that its limited capacity reduces the capacity of the whole chain. The results of having a bottleneck are stalls in production, supply overstock, pressure from customers, and low employee morale.
>
> - Wikipedia

What is the root cause of today's bottlenecks?

The cause of a bottleneck can be anything from suboptimial machine performance (process), low skilled workers (people), products complexity (products), or even a suboptimal plant layout (places).

In today's factories, due to the complexities of products and processes, sometimes a lack of labor skills, and more than ever the faster pace of production environments, the problems need to be solved in time to meet the quality, cost, and delivery requirements. However, it is very common that there are too many problems; the operations team might know the first and the second, but they do not know the myriad additional problems which might have even more impact on performance.

Every bottleneck can be complex and more critically, the bottleneck is dynamic, meaning that in one shift the bottleneck could be on machine A while during the next shift the bottleneck may be on machine B. You have to solve the most pressing one when and where it happens.

Therefore, it is very common that 100 people are working on 100 problems, that limited resources are invested in the problems that are *not* mission critical, and therefore the performance improvement is not delievered in a sustainable manner.

What can resolve the bottleneck?

A single version of truth, where everyone on the shop floor knows and is aligned on the most pressing problems of the moment, solving those problems, and then all moving to the next most pressing problems in tandem, one challenge at a time.

Data Democratization

There are natural barriers to streamlining processes and performance at any company, but especially with manufacturers. When you have a siloed model with a top floor and a shop floor, coupled with siloed data not only between the vertical hierarchy but also between every horizontal department, there are going to be communication breakdowns leading to periods of bottlenecks that can last for days or longer. By the time one problem is solved, four more have sprung up that require equal attention. In today's hyper-competitive economy, where a brief delay in production can mean life or death for a manufacturer, solving the bottleneck challenge should be at the top of the to-do list.

Digital Performance Management eliminates this challenge by collecting all the data so that everyone within the hierarchy is working on a single source of truth. Regardless of personal experience, expertise or bias, the data cannot be manipulated – it is what it is, regardless of the lens someone is looking through. James Zhang, VP of Market Development for PTC explains, "DPM provides the insight operators and executives need at the moment they need it. It puts the insight where it makes the most impact. This is the game-changing piece of DPM."

> **"It puts the insight where it makes the most impact. This is the game-changing piece of DPM."**
>
> **James Zhang**, VP, Market Development, **PTC**

Too Many Priorities, Limited Resources

At any given moment, challenges arise across the shop floors at all factories. Without a standardizing system, where data is fed across the entirety of the floor, every employee is going to do what they think is the most important thing at any given moment. DPM allows workers to utilize *the same data* in real time, across the floor and from the top down, letting all workers get a sense of the most impactful problems to work on, and the opportunities with the most potential. Instead of 100 people working on 100 different problems at the same time, those same 100 people will all know to work on the same top three problems that matter the most, delivering added value to the business.

Three Other Digital Applications Changing Manufacturing

Predictive Maintenance:

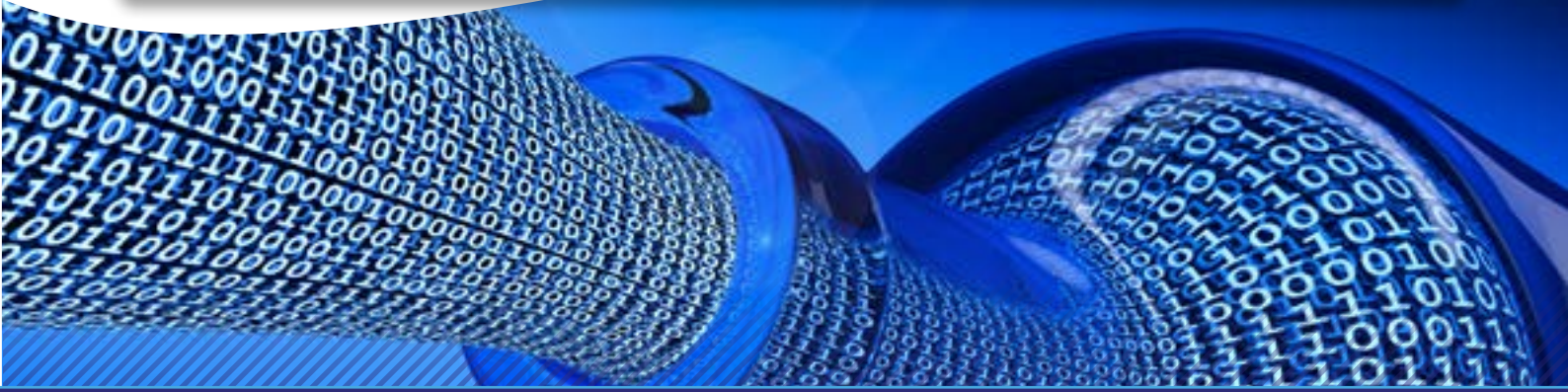
Installing monitoring equipment to determine actual equipment condition to pre-determine servicing needs.

Digital Labor Productivity:

Lower operating costs, increased production output, improved quality of production and enhanced worker safety. Requires significant up-front investment.

Digital Quality Management:

Like DPM, takes all the KPIs currently analyzed into one digital source of truth to improve quality and reduce errors.



DPM Opportunity #2: *The Hidden Capacity*

What is the Hidden Capacity? It is the top-line return that Digital Performance Management can offer manufacturers.

According to the latest Federal Reserve Report, manufacturers are running, on average, at only 65% capacity[2]. Many are running at as low as 50% capacity. Those that are best in class may operate as high as 85% capacity. What that means is that *there is the potential to improve capacity anywhere from 1-20%*.

In years past, these percentages were acceptable, even celebrated. In addition, when companies did see productivity gains, these were usually due to increased automation, or machinery or increased labor to get maximum throughput. This CAPEX and OPEX investment is not where manufacturers want to put their hard-earned capital in today's economy, however.

So how do manufacturers reveal this hidden capacity?

DPM is the all-seeing, all-knowing connector. It aggregates data in order to understand real-time trends on the factory floor and across the business. This real-time, single source of truth across the organization can unlock untapped potential across all business lines, up and down the value chain. When everyone has eyes on the data – and cannot change it or manipulate it based on their own experience or biases – the potential for unlocking innovation, productivity and efficiency is endless.

What are the key capabilities that DPM can assist to unlock this additional capacity?

1. **Having 100 people focusing on the top 3 problems**, (see page 4.)
2. **Taking the power of problem analysis from 10 process /continuous improvement engineers to 100 frontline workers**. Traditionally, operators focus on doing the jobs while process engineers should perform the data analysis to analyze the problems, figure out the root cause and develop countermeasures then ask operators to solve the problem. Now, this performance analysis is digtalized by DPM and is done automatically. Frontline workers are empowered by the analysis and able to solve the problems when and where they happen.
3. **Change management**. DPM enables a self monitoring, self measured process, whereby the operator knows the performance improvement caused by his/her problem solving in real time. Fundamentally, it enforces and motivates the frontline workers to continuously solve the most pressing problem and deliver sustainable performance improvement.

BONUS OPPORTUNITY

DPM Opportunity #3: Navigating the Digital Transformation Journey

Digital transformation is a complex journey. Enterprise scale transformation is not spontaneous. Imagine that you are deploying 5+ technologies across 100 plants in your production network, where each technology can have 10-20 applications. You cannot take a scattered approach any more, meaning trying 10 applications in 10 different factories and figuring out which works and which does not work.

This old scattershot approach has been proved a failure. Instead, a *laser focused* approach is needed now, meaning picking one or two applications which can have the most impact in performance. This would be followed by quickly scaling them out across the production network while scaling up into more use cases. The question is what applications the companies can – and should - focus on. DPM tells companies where the bottleneck is, what are the root causes of the bottleneck, and what technology application can be applied to solve the bottleneck problem.

Per the World Economic Forum, Digital Performance Management is recognized by experts and technology adoption leaders as a must have. This use case underpins assurance of value both directly and through additional use cases.

Footnote 2: https://www.federalreserve.gov/releases/g17/current/default.htm

Unpacking Digital Performance Management

An Interview with **James Zhang**, VP, Market Development, **PTC**

These questions and responses have been edited for brevity and clarity.

Heather King: The global economy is at an interesting moment and manufacturing in particular is looking at exciting opportunities to transform. Where do you see the biggest opportunity?

James Zhang: The biggest opportunity is how you can use the digital data, the real-time insights to inform and influence the people, machines and the process behavior. There are huge opportunities to make manufacturing operations a closed-loop, self-management improvement system in the factories.

HK: And this is the heart of Digital Performance Management?

JZ: Yes. Because all the knowledge is in the system you are able to standardize and scale it across the production network. This is a challenge in the traditional analog system. Because this work depends on people's knowledge and experience, the operational excellence is based on the assumption that everyone doing the job has a similar experience and will follow the same procedures, and that they have access to the information and data they need. But, as often in the real world, none of these assumptions actually hold. Maybe some have 80% and some have 20%. That's why it's so hard to guide this across the whole production network.

HK: You mentioned the current analog system – does DPM bring forth a new era in continuous improvement?

JZ: DPM is really the next iteration of operational excellence. If we look at the history and evolution of lean, from Henry Ford to Toyota to today's lean concepts, I do believe the next evolution of the management system, the system on the shop floor, is the convergence with digital. The biggest driver in digital, and the promise of DPM, is how Information Technology and Operations Technology will combine.

HK: What do you see as the biggest inhibitors for change at this moment for manufacturers?

JK: Three things present the biggest internal challenges: 1. Change management. 2. Lack of expertise. 3. Data integrity and data governance. These are things you have to put in the epicenter of your transformation program.

HK: What would prevent an organization from utilizing DPM?

JZ: I think there are a couple of things. The first is the mindset change. Current management process favor reporting tool and people say let us start with collecting data from all machines and IT systems. But DPM is a closed loop problem solving tool. It focuses on the bottleneck, it gives frontline worker actionable insights where and when the most pressing problem occurs, and it monitors the performance improvement out of problem solving continuously. Furthermore, it has to be a standardized system across the production network. This is not only a new tool, but a new approach to manage operations and adopt technologies.

The second is that organizational buy-in is not an easy job. Evolving the operating system to the next level changes everyone's job. To get everyone's buy-in, you need to get people excited, including the frontline workers, middle management and top level executives.

The third is lack of digital leadership. This is really important because the promise of DPM is huge. But you really need the top-level buy-in and you need a change agent who knows both sides of the issue, knows the change management necessary, and knows digital and operations.

Conclusion

The Manufacturing industry is at a crossroads. While the C-Suite has shown an openness to investments in Industry 4.0 technologies, this is only the beginning of what is necessary for the floors to work at optimal efficiency and capacity.

The next frontier is the utilization of Digital Performance Management – a closed-loop management system that not only identifies, analyzes and prioritizes the most pressing problems, but democratizes the decision-making process and opens up a new era of operational excellence.

How?

Eliminating Bottlenecks

DPM works in real time with the *same data* so the entire decision tree is aligned on the most critical issues to solve first.

Revealing the Hidden Capacity

The real-time, single source of truth across the organization means there can be no personal bias that interferes with differently-interpreted data. The data is the same for everyone. This can unlock innovation, productivity and efficiency.

Addressing Change Management

As frontline workers can see the fruits of their labor through the real time data, they are able to self-monitor and measure. As this will typically mean improvement, they are self-motivated to continuously improve through the data that DPM provides.

Despite the exciting potential DPM offers, if organizations cannot change their old-school mindset, gain company-wide (including the factory) buy-in, and have digital leadership from the very top, investment in Digital Performance Management will be an empty one.

About PTC

PTC enables global manufacturers to realize double-digit impact with software solutions that enable them to accelerate product and service innovation, improve operational efficiency, and increase workforce productivity. In combination with an extensive partner network, PTC provides customers flexibility in how its technology can be deployed to drive digital transformation – on premises, in the cloud, or via its pure SaaS platform. At PTC we don't just imagine a better world, we enable it.

ABOUT THE SHARED SERVICES & OUTSOURCING NETWORK (SSON)

The Shared Services & Outsourcing Network (SSON) is the largest and most established community of shared services and outsourcing professionals in the world, with over 180,000 members. Established in 1999, SSON recognised the revolution in support services as it was happening, and realised that a forum was needed through which practitioners could connect with each other on a regional and global basis. SSON is a one-stop shop for shared services professionals, offering industry-leading events, training and certification, market studies, reports, benchmarking, research and analytics, surveys, and more.