



EBOOK

# Turning Your Workforce into Your Competitive Advantage



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# Introduction

Despite the continued disruption of supply chains and prolonged impact of the pandemic, manufacturing is building back at an unimagined pace. Based on the Oxford Economic Model (OEM), Deloitte anticipated a GDP growth in manufacturing of 4.1% for 2022.<sup>1</sup>

This quick and strong recovery, coupled with a positive growth trajectory, promises big opportunities for manufacturers to build new capabilities, acquire new technologies, and expand their markets even beyond their pre-pandemic status. Global spending on digital transformation in the manufacturing sector reached more than \$550 billion in 2022, accounting for 30% of total investment in digital transformation across all economic sectors. This level of investment saw a 17.6% increase compared to the 2021 level and signals continued interest in adopting digital tools to optimize processes and improve overall operations.<sup>2</sup>

However, optimism is held in caution due to ongoing economic uncertainties and a competitive labor market. Additionally, despite almost a decade of digital transformation experience and massive investment in digitization efforts, the manufacturing industry still struggles with fully utilizing digital tools and realizing their promised benefits.

To come out of this turbulent period a winner, manufacturing companies must shift to a new work paradigm that brings together resilience, flexibility, and productivity. As leaders look not only to defend their operations against crises but to build adaptability and innovations into their competitive advantages, they must adopt a different mindset to digital transformation that can help speed up adoption, maximize utilization, and unlock continuous improvements.

<sup>1</sup> Paul Wellener, Kate Hardin and David Beckoff, "2022 manufacturing industry outlook," Deloitte, accessed March 16, 2022

<sup>2</sup> International Data Corporation, "Worldwide Digital Transformation Investments Forecast to Reach \$1.8 Trillion in 2022, According to New IDC Spending Guide," [Press Release]. Accessed October 17, 2022

# The Manufacturing World is Changing

CHAPTER ONE

The COVID-19 pandemic in 2020 has left a significant mark on the manufacturing industry, ushering in a period of disruption in both production and distribution. To catch up with changing demands and economic situations, organizations are under immense pressure to explore radically new ways of producing and capturing value.

Manufacturing in a changing world also means dealing with the changes in workers' habit and expectations. As the world quickly pivoted to new working conditions and a prolonged labor shortage, the manufacturing industry is also facing new challenges on the workforce front.

# Mounting pressure on productivity to offset inflation and fluctuation

## Inflation pressure

In The National Association of Manufacturers (NAM) Q2 2022 Manufacturers' Outlook Survey, The top sources of inflation for manufacturers were increased raw material prices (97.2% of respondents), freight and transportation costs (83.9%), wages and salaries (79.5%) and energy costs (55.9%).<sup>3</sup>

More than three-quarters of manufacturers indicated that rising material costs were a top business challenge, putting it in a tied position with workforce challenges and slightly below supply chain worries. 40.4% said that inflationary pressures were worse today than six months ago. In addition, 53.7% of respondents noted that higher prices were making it harder to compete and remain profitable.<sup>4</sup>

59.3% of manufacturing leaders surveyed by NAM believed inflationary pressures would make a recession more likely in the next 12 months.

<sup>3-5</sup> National Association of Manufacturers, "2022 2nd Quarter Manufacturers' Outlook Survey." Accessed October 18, 2022

<sup>6</sup> Mutikani Lucia, "U.S. manufacturing nearly brakes; price pressures abating," Reuters. Accessed October 17, 2022

Despite the extraordinary actions taken by the Federal Open Market Committee to cool inflationary pressures in the U.S. economy, including aggressive rate hikes and reducing the size of the Federal Reserve's balance sheet, more than 52% felt that the Fed could not prevent a recession in 2022 or over 2023, signaling the strong impact of economic headwinds on manufacturing in the near future.<sup>5</sup>

Already, U.S. manufacturing activity grew at its slowest pace in nearly 2.5 years in September as the number of new orders decreased under aggressive pressure of inflation. The Institute for Supply Management (ISM) survey earlier this month also showed a measure of manufacturing employment dropped last month for the fourth time this year, while the manufacturing PMI dropped to 50.9 this month, the lowest reading since May 2020, from 52.8 in August.<sup>6</sup>

This number signals that companies are expecting lower demand in the near future and actively preparing for contraction of incoming orders.

## Productivity and efficiency pressure

With fluctuations in material costs and expected slips in demand, increasing productivity and efficiency will help manufacturers protect their bottom lines and even build sustainable competitive advantages in 2023. Improved productivity will directly reduce the cost of production and ease the pressure on price, helping manufacturers glide through this high-inflation period with minimum disruptions to both their business and operations. In the long run, growth in productivity is the key to boosting employees' morale, driving quality in production, and laying the foundation for outpacing competitors when the economy gets out of the high-inflation period and becomes ready again for expansion and growth.

Productivity improvements usually come from two elements: an **agile system** and **employee autonomy**.

- **On agility**

The lack of agility is one of the enduring challenges we have seen with traditional manufacturing systems. The root cause of this problem is the rigid nature of system structure and dated architecture that does not allow for cross-site communication and data transfer. Under pressing needs for accurate and complete data in real time, the manufacturing technology landscape will be driven by innovation efforts to eliminate silos to ensure uninterrupted data flow, availability, and timeliness.

- **On employee autonomy**

The other side of the equation is employee autonomy, or the ability of engineers and operators to make decisions and take actions based on the data supplied. Contrary to popular belief, technology will not replace the role of humans in daily operations, but rather empower them with faster speed and more complete background data to make decisions. Technological empowerment will translate into better problem-solving, faster speed of adoption/implementation, and consistent performance. As digital transformation continues to accelerate, the ability to utilize, customize, and own the tech stack will translate into a giant leap in terms of productivity.

Digital transformation, unfortunately, has failed to deliver the productivity boost that it promised despite almost a decade of being the hottest the trend in manufacturing. According to a McKinsey survey, 70% of companies reported that they don't reach their stated goal for digital transformation.<sup>7</sup> Only 18% of companies rated their use of digital tools as "very effective" in another survey by *Forbes*. Overall, 84% of companies failed at digital transformation and ended up with expensive system investment with very limited use.<sup>8</sup>

<sup>7</sup> Michael Bucy et. al., "The 'how' of transformation," McKinsey. Accessed October 17, 2022

<sup>8</sup> Bruce Rogers, "Why 84% Of Companies Fail At Digital Transformation," *Forbes*. Accessed October 17, 2022



## Digital transformation is simply missing the mark for manufacturing companies

There is a disconnect between the decision-maker and the people who will actually implement and run the digital tools. When you think of digital transformation, the common image that comes to mind (thanks to Hollywood's imagination and popularization) is that of a pristine lab with robots running around and people holding clipboards and supervising the machines.

However, the reality on the shop floor is very different. Frontline operations consists of a mix of new tech and legacy systems that require frontline workers to remain very hands-on with their tasks. To bring about the much-needed productivity boost, digital tools need to empower frontline workers to gain better understanding of the operations and come up with creative solutions to their daily challenges.

Technology deployment detached from frontline operations and operators is the main reason why digital transformation has been stagnant despite the huge amount of money invested in it.

Bringing about a significant productivity boost and gaining a sustainable competitive advantage in 2023 and beyond requires a new work paradigm that marries worker empowerment and technological advancements in perfect harmony.



# A doubled-edged workforce challenge

## Manufacturing is losing its critical workers

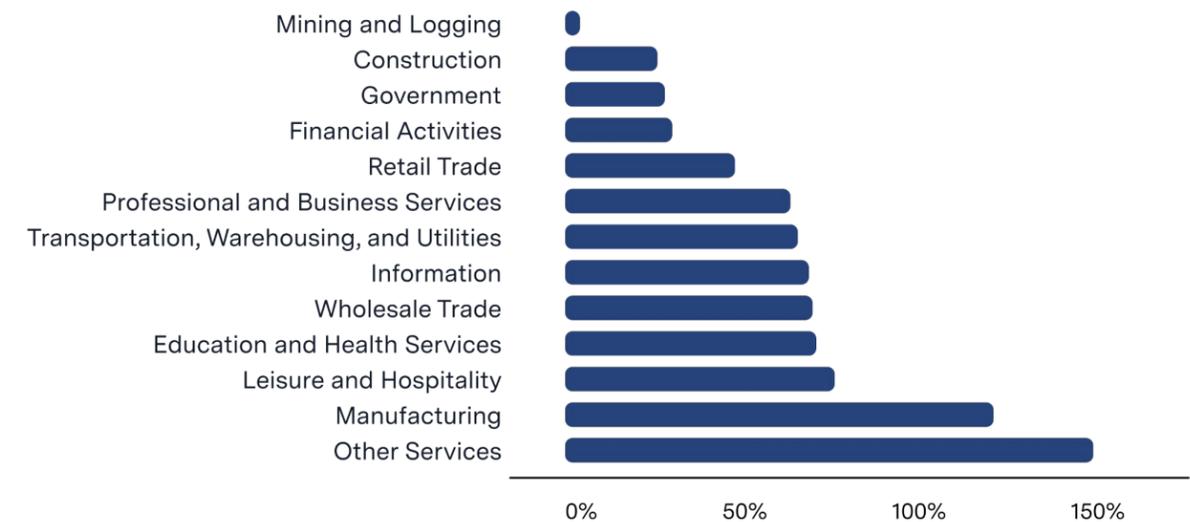
2021 was marked by the “Great Resignation,” which is very real and prevalent in the manufacturing industry. A tight labor market continues to impact manufacturers’ ability to recruit and retain workers way into 2022.

The January 2022 JOLTS report revealed a 150% increase in manufacturing job openings, topping both leisure and hospitality (43%) and other services (41%), clocking in the biggest increase among all industries surveyed. By September 2022, the number of manufacturing quits has seen another 25% increase from the previous year, deepening the labor shortage that has already impacted production and consequently companies’ bottom line.<sup>9</sup>

Not only is the manufacturing industry is losing its workers, it is also faced with a rapidly aging workforce that will soon retire from the industry. In 2021, 5% of the manufacturing workers are already beyond the retirement age according to the Manufacturing Institute, while another 20% of the workforce would reach retirement age in the next decade.<sup>10</sup>

### January 2022 JOLTS Report: Workers Quitting Jobs at Elevated Rates

Job openings by industry sector - Jan 2022, job openings, % chng since Feb 2020



Source: BLS

Bar chart showing job openings by industry sector. The chart shows the percent change of job openings in January 2022, compared to February 2020. Openings in construction are up 25% over that time period, compared to the astounding 116% increase for manufacturing.

<sup>9</sup> Nick Bunker, “September 2021 JOLTS Report: Job Openings Decline, but Quits Rise,” Indeed Hiring Lab, November 21, 2021

<sup>10</sup> “The Aging of the Manufacturing Workforce,” Manufacturing Institute. Accessed October 1, 2022

## Young people are not interested in a manufacturing career

The same survey also suggests that millennials and Gen Z now represent 31% and 14%, respectively, of the manufacturing workforce, with even further increase in representation in the future.<sup>11</sup>

The median age of workers in the manufacturing industry has risen from 40.5 to 44.4 years old between 2000 and 2020. This aging pattern within the workforce signals a double-edged problem for manufacturers: **Older manufacturing employees choosing to work past retirement and younger workers not wanting to enter the manufacturing industry.**<sup>12</sup>

Manufacturers are at risk of losing the critical workers that are running their frontline operations, along with the experience and knowledge that they carry, while still struggling to fill its openings.

Even if every manufacturing worker in the U.S. is employed, there would still be 35% more job openings than the industry's capacity to fill them, and by 2030, the number of unfilled manufacturing jobs would reach 2.1 million, representing a \$1 trillion opportunity cost.<sup>13</sup> And the demand for high-skilled workers is projected to continue to rise in the near future. The skill gap is widening. With people leaving the industry, there are not enough people interested in joining the manufacturing workforce, and the barrier to entry remains high.

In a survey by Nuts, Bolts & Thingamajigs (NBT), The Foundation of the Fabricators & Manufacturers Association, International, a staggering 52% of teens interviewed showed little to no interest in a manufacturing career. Another 21% are ambivalent about manufacturing as a career choice. When asked about the reasons for their choice, 61% of the teens identified their need for a professional career as their main barrier to choosing a manufacturing career, followed by pay (17%), and career growth (15%). To these teens, a manufacturing career offers neither a good career prospect nor satisfying working conditions.<sup>14</sup>

## Renewed attention to talent nurturing and retention

The manufacturing workforce is undergoing a face-lift: the majority of workers now are digitally savvy and expect to use digital tools in their daily work to gain efficiency and productivity. Unlike baby boomers—the generation making up the main workforce in manufacturing for a long time—younger workers care more about finding meaning and value in their daily work than financial stability and job security.



<sup>11</sup> National Association of Manufacturers, "2022 2nd Quarter Manufacturers' Outlook Survey." Accessed October 18, 2022

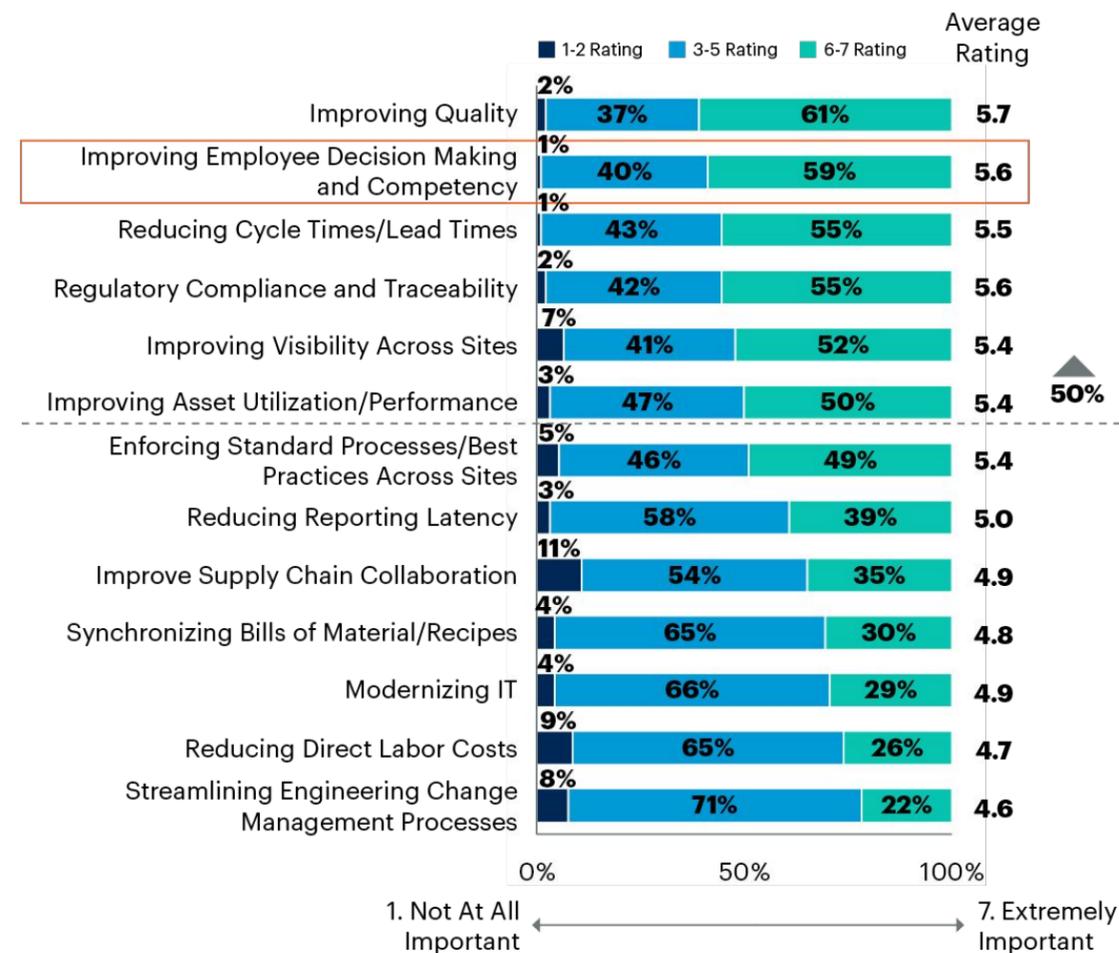
<sup>12</sup> "The Aging of the Manufacturing Workforce," Manufacturing Institute. Accessed October 1, 2022

<sup>13</sup> Glenn Gow, "The Labor Shortage Is Killing American Manufacturing. Here's How AI Can Bring It Back To Life," Forbes. Accessed October 18, 2022

<sup>14</sup> Michael Collins, "Should Young People Consider Manufacturing as a Career?," Industry Week. Accessed October 18, 2022

### Criteria for MES Investment Justification

Percentage of Respondents



n = 92, Total Respondents

Q: How important were each of the following business criteria in your organization's justification to invest in a manufacturing execution system (MES)?

Source: Gartner MESA Business Value of MES Survey, 2018  
731763\_C

Gartner

This critical change in the workforce is forcing manufacturing companies to rethink and adopt fundamental changes in their approach to talent acquisition, training, and empowerment in daily operations. To attract and retain these younger workers means relieving them of manual, repetitive tasks and empowering them to participate in more impactful activities, such as problem-solving and innovation.

Workers will require greater empowerment to stay with their current employer. That means there is an immediate need for liberation from manual and error-prone tasks to enable the development of problem-solving skills. 38% of executives participating in a Deloitte survey report that attracting new workers is their top priority for the production workforce in 2022, followed by retention (31%) and reskilling (13%).<sup>15</sup>

Manufacturing has long suffered from the stigma of being a highly manual, repetitive, and labor-intensive industry, while the fact is that some of the most amazing innovations start on the shop floor itself.

Companies' abilities to attract and retain workers will depend on how they eliminate this stigma and create room for creativity and innovation in their frontline operations.

2023 will see a big step taken toward reshaping the future of frontline factory workers with more attention on upgrading development programs, identifying valuable technological deployment, and nurturing talent pools.

<sup>15</sup> Paul Wellener, Kate Hardin and David Beckoff "2022 manufacturing industry outlook," Deloitte, accessed March 16, 2022

# Your Workforce Holds the Key to Solving Your Challenges

CHAPTER TWO

The two main challenges faced by the manufacturing industry, though ushered on and intensified by macroeconomic factors such as inflation and the impacts of COVID-19, are not outside of the control of manufacturers. The common denominator for these challenges is a **lack of focus on the human factor** in manufacturing operations.

## A common root cause for enduring challenges

Digital transformation failed to deliver its promised boost to productivity because manufacturers continue to chase after buzzwords rather than the actual operational pain points. The traditional method of deploying digital tools is a top-down approach that emphasizes buy-in from the upper management level with very little involvement of operators in the selection process. This results in a disconnect between the people who build digital transformation strategies and the ones who will actually execute on those strategies. Oftentimes, manufacturers end up with expensive systems that few people know how to run, take long time to deploy, and have almost no room for changes and extension in the future.

In a top-down approach to digital transformation, strategies are formed by top-level management and then communicated to the rest of the team. Goals are filtered down through the tasks of lower levels in the organization. Top-down approach prioritizes standardization of processes and operational harmony across different functions and, in the context of manufacturing, different operating units. When digital tools are deployed with a top-down approach, they can help executives build towards a big-picture goal of the organization.

Executives and managers can identify and solidify certain operational metrics, such as Overall Equipment Effectiveness (OEE). What they cannot do is connect that number to the tactical challenges of frontline operators and provide solutions to operators' pain points. This disconnect adds another layer of challenges on top of difficult deployment: when the tools cannot help operators solve their most pressing needs, there is no incentive to learn and master the tools, and thus inefficiency implementation. Long implementation time with low efficiency means extended time-to-value and low impact on the production line.

With an aging workforce, experienced workers will soon retire and manufacturers will need to train the newcomers on how to use their systems. But the training incentive is low since the tools do not help make their jobs any easier. This is a classic example of the process-centric approach to frontline operations and digital transformation—the workers are expected to fit into pre-built systems.

Process-centric transformation **fails** to take into account the unique qualities of workers compared to machines. These include observational skills, adaptability, common sense, contextual and situational awareness, good judgment, decision-making ability, and innovation potential.

While manufacturers may share the same challenge of waste reduction and bottleneck elimination, how these challenges play out on the shop floor is different from one another because of the way operators interact with the machines and with each other in one production line. Therefore, there are no one-size-fits-all solutions that can be easily replicated exactly from one factory to another.

Process-centric transformation focuses on bringing digital tools to speed up operational processes. In the process-centric approach, there is an underlying assumption that the way the work is designed stays that way. Because the system is very rigid, once it has been selected, the decision is rarely overturned.

While manufacturers may share the same challenge of waste reduction and bottleneck elimination, how these challenges play out on the shop floor is different from one another because of the way operators interact with the machines and with each other in one production line. Therefore, there are no one-size-fits-all solutions that can be easily replicated exactly from one factory to another.

A rigid, process-centric approach to digital transformation excludes frontline workers from the strategizing process with the assumption that technology should be the driver of innovation and improvements. However, by curbing the involvement of frontline workers in the digitization efforts, organizations are limiting their own abilities to extract insights and utilize them to come up with a development plan specific to each organization's situation. That's

why many digital transformation efforts fail to make sticky changes to frontline operations.

Low worker engagement and empowerment also contribute to the difficulty attracting and retaining workers in the manufacturing industry. Workers now care more about the nature of their work, and so should employers. Yet, a process-centric mindset to transformation keeps treating operators as liabilities: Technologies are brought on with the goal of reducing human errors, speeding up processes, and increased performance tracking.

With the skills-gap widening and a new generation of workers expecting to have digital tools ready for their use, the workforce is asking to become owners of technologies, actively participate in building that digital system, and to utilize them to solve their operational pains.

In a tight labor market where workers have many other career options outside of manufacturing and the public interest in manufacturing is already low, it's crucial for organizations to recognize that the workers are their most important and valuable asset, not the technology. The recent rapid commoditization of technology has leveled the playing field, and any competitive advantages brought on by automation and digitalization are no longer sustainable. Competitors will soon cut down your technological lead and catch up with you.

At that point, the human factors in your operations will be the new differentiation point and ensure that you can continue building competitive advantages in the future. It is the workers that will help organizations identify room for improvement and innovate, not the machines.

# A human-centric approach to manufacturing

## What is a human-centric approach to manufacturing?

To solve both the productivity and workforce challenges, manufacturers need to pivot from a process-centric to a human-centric operational mindset that prioritizes workers' pain points. Digital tools need to be implemented with the focal point of solving operational challenges that workers are facing every day, and augmenting their abilities beyond following instructions and performing manual, repetitive tasks. Digital augmentation will replace automation as the north star of your digital transformation journey and become your sustainable competitive advantage in the future.

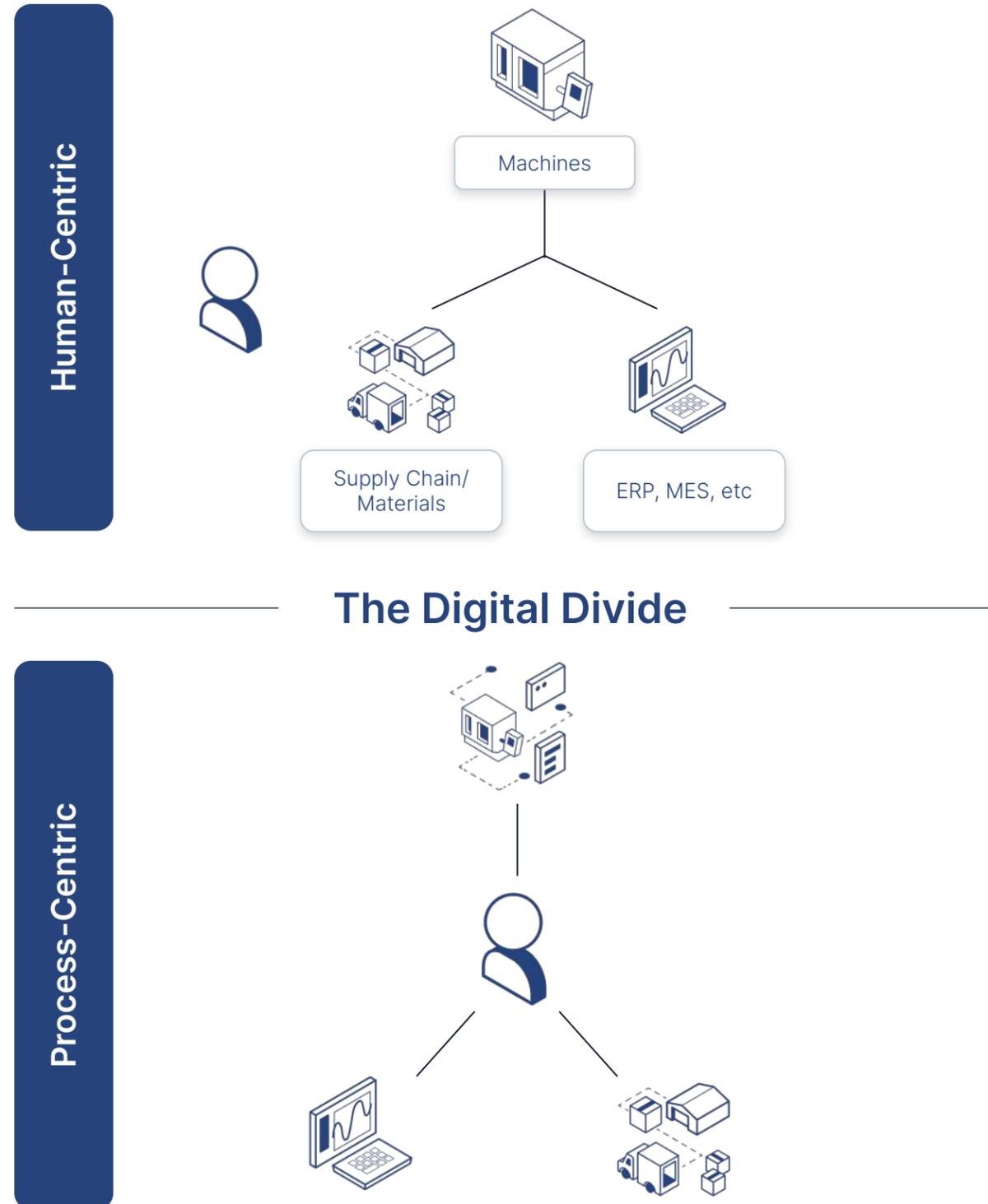
Digital augmentation is the human-centric approach to manufacturing that leverages digital solutions to augment operators' abilities and productivity, empower decision-making, and continuously improve their work experience.



In a human-centric approach to manufacturing, workers are the central part of the system and the driver of innovation. Digital tools are devices to relieve workers' cognitive load, gain insights into bottlenecks in operations, and empower them to come up with solutions for those operational pain points. New skills need to be sought out by the workers based on their actual needs in frontline operations, not forced upon them in order to fit in with a pre-existing system.

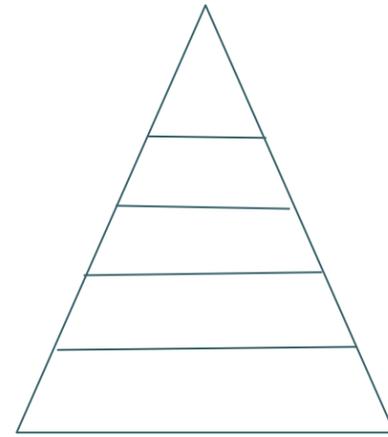
The guiding principle of digital augmentation is that improved human performance and involvement in the innovation process will translate into greater productivity, increased efficiency, and higher quality.

The human-centric approach to manufacturing ensures that manufacturers do not end up with a huge investment that does not solve a specific problem, or worse, intrudes on the daily operations of their workers. In digital augmentation, upskilling occurs as a natural step in the self-improvement process when workers are well-equipped to identify gaps in the production line and empowered to join the solution-making process. Workers have a direct incentive to learn new technologies—they can reduce their manual work burden while improving processes and making their work life easier.

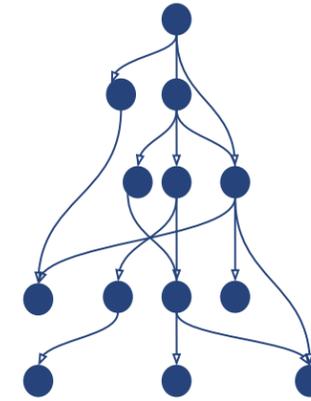


Relationships between humans, systems and machines in human-centric approach vs. process-centric approach to system design

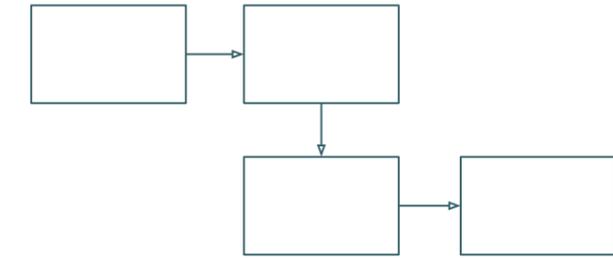
Traditional



Functional Hierarchy



Top Down Control



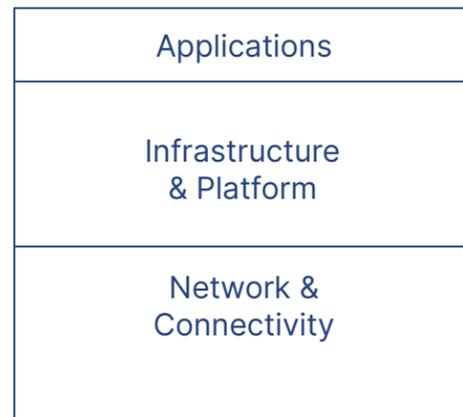
Process Centric

### The Digital Divide

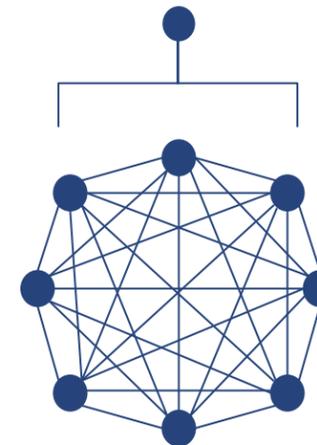
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Digital Augmentation

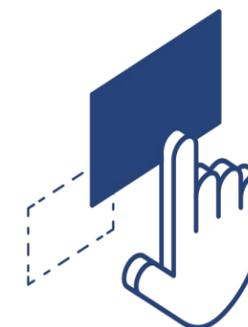
Edge - Fog - Cloud



Emergent Control



Human Centric



Comparing traditional digital transformation approach vs. digital augmentation

Deployment of digital tools in a human-centric system utilizes a bottom-up approach that puts frontline workers at the center of transformation. A bottom-up strategy recognizes those closest to the operations—operators, engineers, and plant managers—as the ones who best understand the unique situation of each operating unit and gives them the power to decide on which strategies will best fit their goals.

Bottom-up management style emphasizes the role of employees in building business strategies. Goals, projects, and tasks are mostly created by employees' feedback. Bottom-up philosophy focuses on minimizing disruptions due to surprising changes to process or tasks, and providing fast values to challenges happening at the ground level of the operations.

**Benefits of digital augmentation include:**

- Increased productivity by eliminating human errors and solving critical operational challenges on the shopfloor
- Empowering workers to make better decisions on the spot and perform more impactful jobs such as innovating and problem solving
- Relieving the pressure of knowledge transfer between generations and providing an incentive for workers to enter or stay in manufacturing
- Opening up room for continuous improvement by ensuring that process updates are sticky

# Turning Your Workforce into Your Competitive Advantage

CHAPTER THREE

Putting the workers back at the focus of the operations means manufacturers now can empower those closest to the operations—their operators, engineers, and plant managers—to identify problems, create solutions, and drive changes. And all of this can happen within weeks, not months.

## Boosting efficiency and productivity with digital augmentation

Recent research shows that 23% of unplanned downtime in manufacturing is as a result of human error, compared to an average of 9% among other industries. On top of that, 80% of errors in manufacturing are from human errors. Speeding up processes and reducing errors is critical in improving productivity and efficiency in frontline operations.<sup>16</sup>

However, that doesn't mean manufacturers are replacing workers with digital tools. The machines are only as good as the people operating them, and workers remain the most important asset of any organization. We have seen the consequences of disconnecting from the workforce during the last decade as we look at automation as a silver bullet for efficiency and productivity challenges. Instead of the expected leap forward, companies end up with an overblown IT budget and underwhelming returns on investment.

The plague of over-automation brought on by Industry 4.0 showed us the consequences of forcing workers and processes to fit into the rigid structure of a systems. While it does help by increasing the speed of manual, repetitive tasks and reducing avoidable mistakes, more often, automation intrudes in the daily work of frontline operators. The value gained from the technology is disproportionate to the time and effort required to learn how to operate the system.

<sup>16</sup> "The Cost of Unplanned Downtime and the Rally for Digital Transformation," ServiceMax. Accessed October 18, 2022

The real boost in productivity and efficiency comes from utilizing the power of technology to enable workers to perform tasks that they couldn't before. Digital transformation unlocked a whole new range of data, insights, and capabilities for those closest to the operations, but these only translate to value when utilized by workers to improve processes. A human-centric approach to digital transformation keeps your projects grounded in added value and impact on production line instead of vanity metrics.

Armed with full visibility of the plant, analytics, no-code platforms, and more, workers, engineers, and managers can now identify problems as they emerge and design solutions without reliance on an IT team. When liberated from manual and error-prone tasks and empowered to make changes as needed, your workers can focus on improving processes and come up with innovate ways to improve their efficiency.

"I was given the opportunity to identify problems, recognize multiple solutions, and drive lasting positive impact. If you are familiar with a manufacturing environment—the challenges are inevitable but opportunities for continuous improvement are endless."

**Continuous Improvement Engineer, Stanley Black & Decker, Inc.**

## Facilitating a smooth generational turnover in manufacturing

With an aging workforce and a general lack of enthusiasm among young people to enter the manufacturing industry, the priority for any manufacturer is to facilitate a smooth transition of knowledge and demolish the stigma around manufacturing as a low-skilled, highly manual profession. A human-centric approach to manufacturing can help organizations achieve both of these goals by ensuring that any tools implemented serve all frontline employees, not just the engineers or the plant managers.

The manufacturing workforce will continue to be a mix of older and more experienced workers, and younger, digitally native ones. Facilitating a smooth generational turnover means satisfying the very different requirements and expectations of manufacturing technology that these two personas have.

Experienced workers need an effective way to transfer their knowledge to the next generation of creators. Not only do experienced workers possess the general know-how of the operations but they are also often tribal experts in their own field—a direct result of a lack of standardized training, a document-based process, and technology-centric operations.

For younger workers born in the digital age, they are fully accustomed to having technology at their service in every aspect of their life. They expect the same thing from manufacturing technology: Not only to automate some tasks but to offer meaningful assistance to their daily work.

This is how onboarding often plays out traditionally: Workers are provided with written instructions that are hard to update, and as they master the system, there is nowhere to document updated best practices and operational know-how because the system was not designed to take workers' input—it was designed to work the other way around. Therefore, training relies completely on these experienced workers manually teaching the new ones how to complete each task. This is an inefficient, ineffective, and error-prone method, not to mention the frustration created for both experienced and younger workers—experienced workers over the speed of onboarding, and younger ones over the manual process.

Switching to a human-centric mindset to operations flips the script when it comes to onboarding and knowledge transfer. Technology designed around the needs of workers paired with a mindset of quickly adopting changes according to operator feedback eliminates the information vacuum that occurs when a system is so hard to understand and operate that only a few people have mastered it.

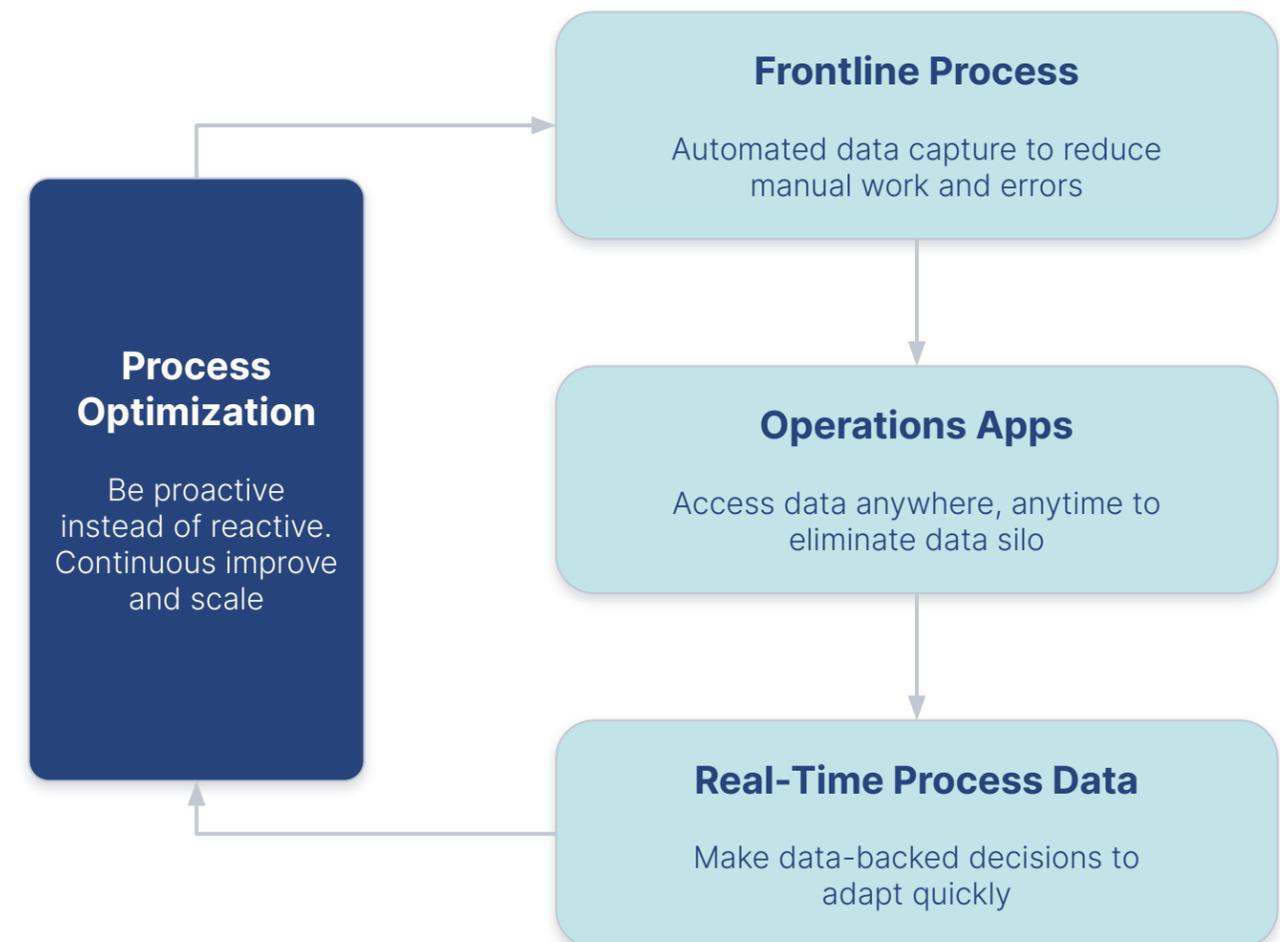
With this approach, updates can be quickly reflected in the work instructions, and official records replace documents and tribal knowledge. Instead of having experienced workers walking trainees over the details of how to operate complicated systems and machines, onboarding can become an opportunity for workers to connect with each other, understand the operations and the people they work with, and most importantly, quickly ramp up to meet operational speed and demand.

More importantly is that digital augmentation puts humans at the lead of factory operations. They oversee operations with apps that can run and adjust production practices. Workers become owners of their workflows, and are fully capable of utilizing tools and technology to solve their daily challenges. With digital augmentation, upskilling occurs as a natural step in the self-improvement process when workers are well-equipped to identify gaps in the production line and empowered to join the solution-making process. Workers have a direct incentive to learn new technology—they can reduce their manual work burden while improving processes and making their work life easier.

This is crucial to reducing the stigma around manufacturing as a low-skilled profession: Not just by showing the general public how advanced manufacturing technology is, but by opening up opportunities for workers to develop their skills and careers. Operators do more than push buttons, assemble parts, and inspect finished products. In human-centric operations, they are the source of improvement and innovation themselves, and that is the inspiration, sense of purpose, and meaning that younger people look for in a career.

“I built an application to capture production visibility.... Throughout this process, the operators were my #1 customer. I took into consideration that after working at a company many years, welcoming change in their process will be challenging. With their support I made sure the app was easy to use and I had 100% of their buy-in.”

**Continuous Improvement Engineer, Stanley Black & Decker, Inc.**



Process optimization can fuel improvements right where frontline operators live — truly augmenting the worker. The graphic above shows a cycle of connected improvement.

## Digital augmentation at scale with agile implementation

The human-centric approach to manufacturing shields manufacturers from huge investments that do not solve a specific problem, or worse, intrude on the daily operations of their workers.

Digital augmentation ensures that workforce training and development can keep up with the demanding economic environment by connecting humans, machines, and systems. The north star is to provide complete data with context to the workers when they need it and provide actionable insights. Workers then can make better decisions on the spot, communicate with engineers and managers, and drive actions that can have immediate impact on daily operations. This will, in turn, translate to fewer errors, higher quality, and greater productivity.

Shifting to human-centric operations means democratizing the shop floor and empowering frontline workers to make impactful decisions. What's emerging is a hybrid workplace that blends on-premise and off-premise working environments with the help of digital tools, unlocking immense agility and scalability for the organization. The most competitive organizations leverage this hybrid structure and an augmented workforce of frontline operators, engineers and managers to provide timely adjustments based on incoming

analytics from machines, sensors, markets, and fellow workers and by applying common sense. This is the foundation of having a resilient workforce that can continuously improve and scale their operations.

This is even more important in the current environment when the only certainty is that the future is uncertain. With no foretelling of how the economy will fluctuate in the coming months, or even years, for organizations to be able to survive, they must be able to move nimbly and pivot quickly along with external conditions. There is no space for complex systems that require huge initial investments and lengthy time to value.

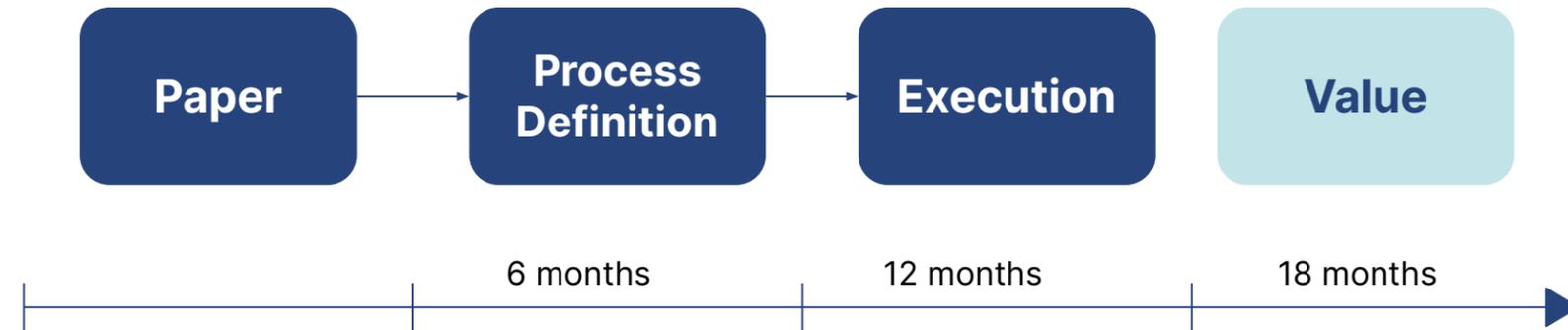
The mantra now is to solve critical and valid problems that have direct impact on daily operations without a rip-and-replace of the existing infrastructure.



## Monolithic System Implementation—the Old Way

### High Risk Solution

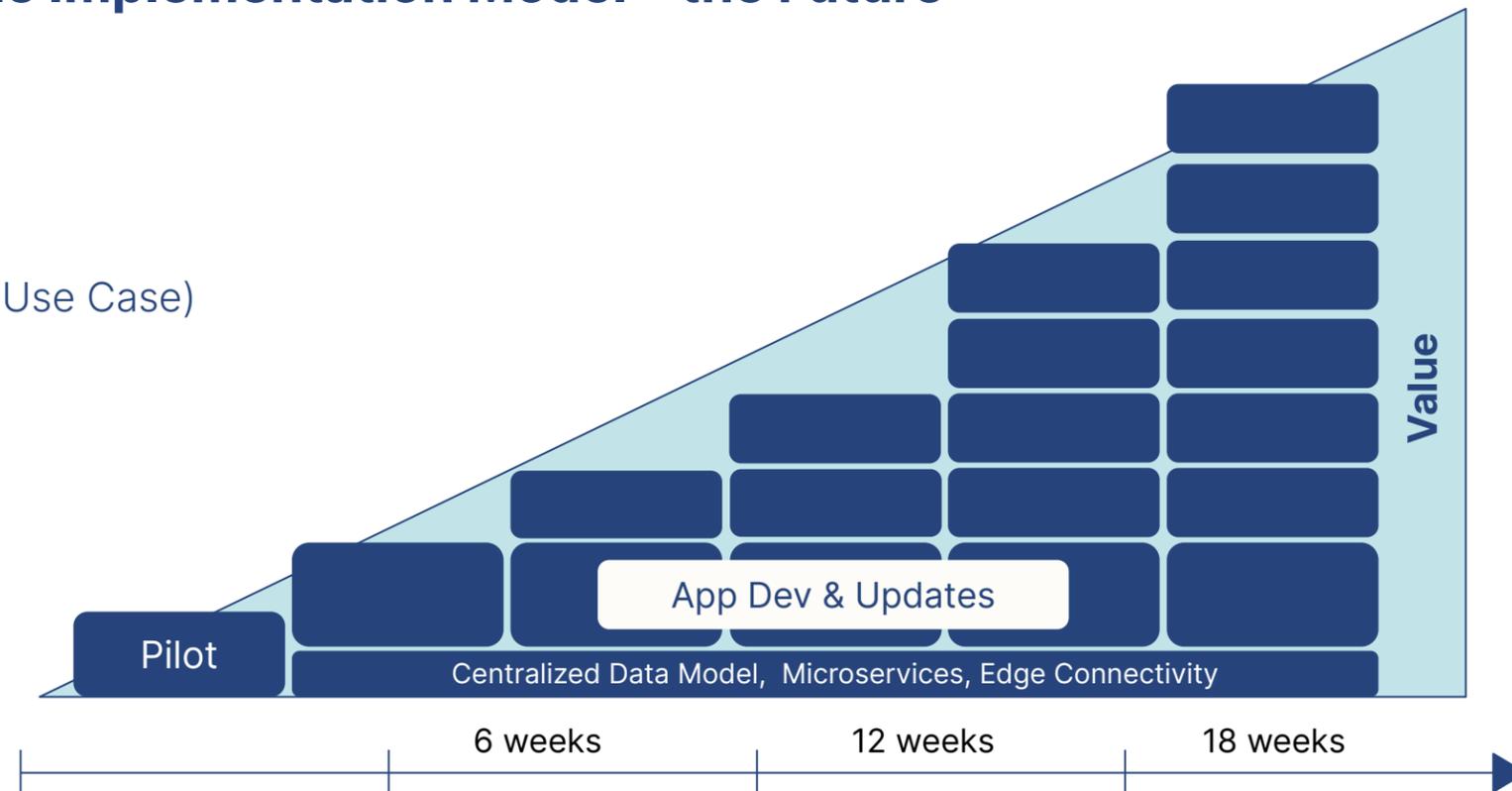
- All-or-Nothing
- Delayed Value



## Agile Implementation Model—the Future

### Low Risk Pilot

- Gradual Growth (Use Case by Use Case)
- Immediate Value



Solution implementation vs. time-to-value for traditional monolithic systems and platforms that enable citizen development and governance

An agile approach to problem-solving allows manufacturers to quickly identify and resolve problems as they arise by implementing short, inexpensive pilots. These pilots target specific and valid challenges that are confirmed through direct and frequent communication between frontline operators and engineers.

Each pilot represents a cycle of establishing goals, gathering the proper team, implementing sprints, and iterating and improving. Depending on the problems being tested, ROI can be seen within days or weeks, versus with a traditional MES where you may have to wait several months before seeing any value.

Agile does away with the belief in a one-size-fit-all solution, or a silver bullet that can fix all operational challenges. Instead, by breaking digitization projects into composable steps, agile teams can now gradually build up their arsenal of digital tools that remains grounded in valid pain points. Agile emphasizes full utilization of existing infrastructure and built upon what manufacturers have already invested in to expand their capabilities one use case at a time.

Agile is enabled by a commitment to transparency, accountability, and collaboration, which are brought forth by a human-centric approach to digital transformation. Only when you can augment the abilities of your human workers, satisfy their need for empowerment, and connect them into one streamlined workflow can you bring meaningful changes to your production line.



# Conclusion

With rising demand for improved productivity, a need for greater worker engagement, and pressures for an overall more resilient operations, manufacturing companies are under immense pressure to innovate themselves. Digital transformation has brought on the I4.0 revolution but has failed to deliver on its promised significant jump ahead for manufacturing. Manufacturers need to rethink the traditional approach to digitalization in the manufacturing space.

To mitigate rising costs, organizations need to become leaner in operations and improve operators' productivity. To retain workers, you need to liberate them from labor-intensive processes and empower them to be more involved in the decision-making process.

By solving your human problems, you can solve all other operational challenges that are holding you back from sustainable growth and continuous improvement.

There is no time to waste. Augmentation will soon replace automation as the new competitive advantage. With a younger generation entering the workforce, it's time for the manufacturing industry to replace the old image of a low-tech, rigid, labor-intensive segment. The human-centric approach to manufacturing will allow organizations to build a more resilient and adaptive culture, which will translate into improved productivity and accelerated growth.

**See how you can build resilient and agile workforce and scale your operations with Tulip's Frontline Operations Platform. Get a personalized demo, today!**

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