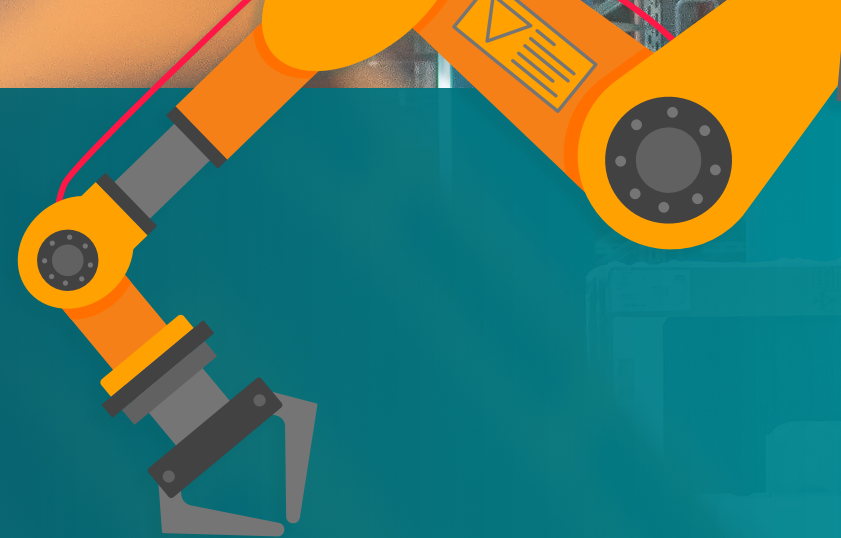


# Smart Manufacturing Guide

Leveling up to Industry 4.0



# Contents



Keys to leveling up as a smart manufacturer	1
Connected processes & the plant floor	3
Technology infrastructure & data strategy	6
Material tracking & supply chain management	9
Financial & tax considerations	10
Contact us	12

# Level up to smart manufacturing

*The Fourth Industrial Revolution is upon us, and it's here to stay. Smart factories, connected manufacturing, and Industry 4.0 (I4.0) can't be ignored.*

Manufacturers are looking for ways to manage disruption, drive innovation, and optimize plant operations – and in the new connected ecosystem, every aspect of your business and manufacturing value chain is a candidate for change. Automation, data analytics, and connected technology allow you to cut back on nonvalue-add activity, freeing up your team to focus on high-impact tasks.

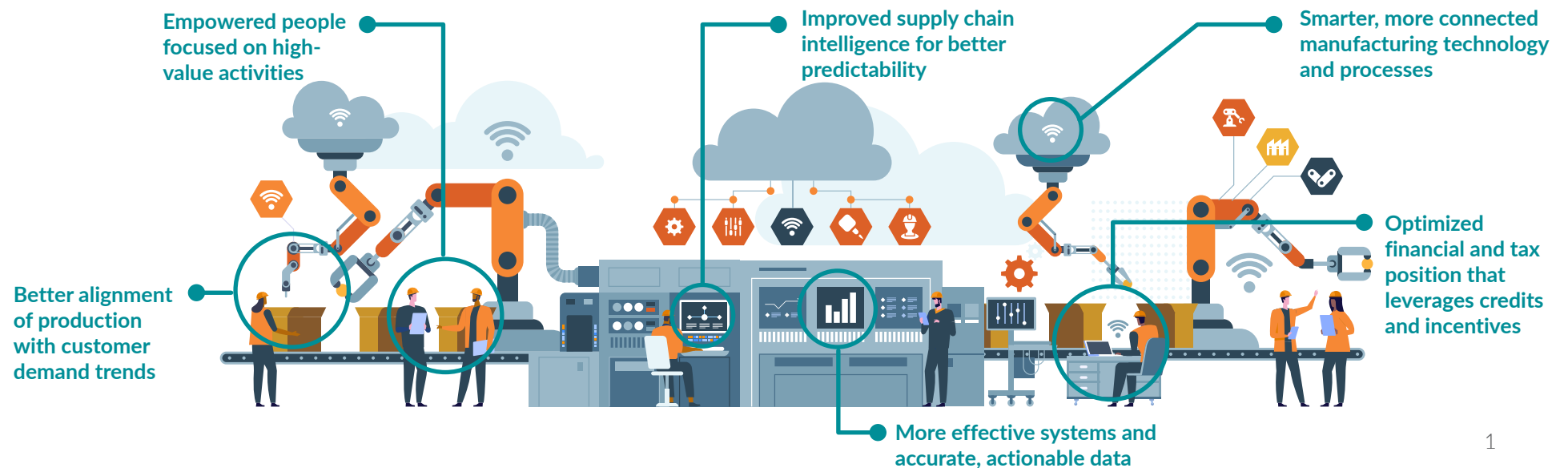
## Improve productivity & reduce risk with:

- Plant floor optimization.
- Maximized labor and asset utilization.
- Better supply chain synchronization.
- More plan accuracy.
- Improved manufacturing efficiency.
- Lower costs.

## Improve growth potential by:

- Generating new and incremental revenue.
- Finding new growth sources for your core business.
- Growing aftermarket revenue streams.
- Creating new offerings.
- Expanding into new markets and geographies.
- Identifying M&A opportunities.

## Smart manufacturing benefits



CONTACT

*Implementing smart technology strategies is a challenge, and opportunities for greater efficiency and more return on your investments exist around every corner.*

### Mitigate risk with smart manufacturing

As technology, processes, and consumer needs transform the industry, manufacturers are facing increased risk to their businesses.

- Customers are demanding scale customization, fast delivery, and high quality.
- Increased competition is being driven by existing and new competitors.
- Margins are being squeezed by market-driven pricing challenges and higher material and labor costs.
- Material shortages, long lead times, and transportation breakdowns are causing significant supply chain challenges.
- Skilled workers are increasingly difficult to find and retain.

### Intelligence and connectivity are key

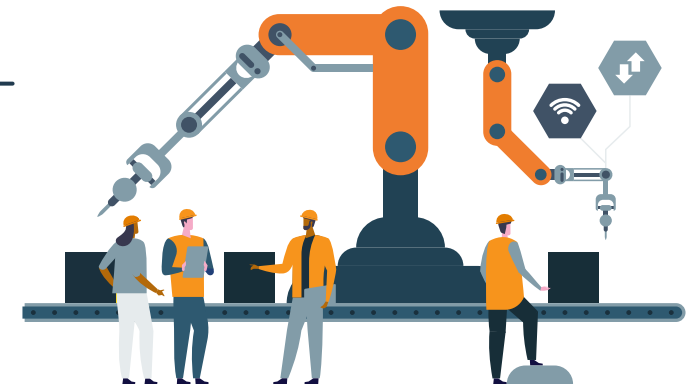
Smart manufacturing, I4.0, and connected technology represent the intelligent communication between your equipment, people, processes, and technology. Smart connectivity across not only your organization, but your entire value chain, allows for significant risk mitigation — tremendous cost savings, better automation, streamlined processes, and even the ability to self-diagnose and self-correct issues.

No matter your size or where you are in your digital maturity, adopting connected solutions can benefit you greatly, provided you take a cohesive, holistic approach. It can help you advance across key areas of your business so you can become more competitive, profitable, and sustainable — and level up to stay prepared for the future.



### Risk reflection: Late adoption

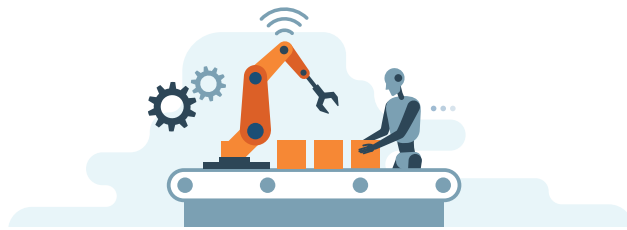
Late adopters could be left behind by the industry as customer needs evolve, margins shrink, and competitors increase pressure. A smart, connected technology foundation will improve operations in the short term but also serve as a vital base to enable future projects.





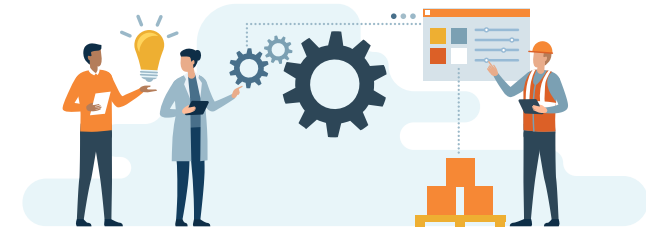
# Level up your plant floor with connected processes

*While smart technology will impact your entire organization, perhaps the most direct impact is on your manufacturing technology and processes.*



## Benefits to your equipment, tooling, and assets include:

- Better recognition of trends by logging downtime and repairs over your equipment's lifetime.
- Advanced analytics that manage unexpected downtime and real-time asset utilization.
- Better integration of performance- and productivity-enhancing technologies.
- Increased life of your equipment and machines through predictive maintenance.



## Benefits to your manufacturing processes include:

- Increased quality through predictive error avoidance.
- Better alignment between product development and your processes and tools.
- Improved efficiency and productivity through streamlined processes.
- Opportunities for your workforce to gain new skills as they optimize their time.



## Risk reflection: Talent attraction and retention

Automation will streamline your processes, but it won't replace your people – you'll still need a skilled workforce to put new technology to use. Smart technology gives you a serious competitive edge, but competition for talent is also fierce. A supportive culture that prioritizes innovation will help you maximize the potential of the talent you already have, and a focus on change management will facilitate a smoother transition to new technology.



# Meet the smart factory

*A key differentiator between traditional operations improvement projects and implementing a smart manufacturing strategy is the degree to which new capabilities and business models can be enabled.*

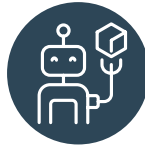
Traditional projects can bring about incremental change, but smart factory upgrades can transform your organization. From basic robotics to virtual reality, there are many ways smart technology can level up your shop floor.

## Here are some of the examples we're seeing in the industry:



### Automated vehicles

- No driver necessary
- Run prescribed route
- Sensors avoid collisions



### Collaborative robots

- No cages
- Interacts with team
- Fully sensing



### Simulation tools

- Intuitive for users
- Nearly matches reality
- Limited AI ability



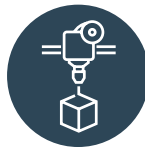
### Closed-loop adaptive manufacturing

- Process error sensing
- Real-time adjustments
- In machine quality checks



### Automated work directions

- Step-by-step instructions
- Increased productivity
  - Reduce errors



### 3D printing/laser inspections

- Larger, faster, finer
- Production capable
- Plastics/metals



### 3D cameras/laser inspections

- High speed & resolution
- 360° surface acquisition
- Integrated to process/robots



### Virtual reality

- Augmented views
- Error proofing
- Rapid learning

## Real-world example: Streamlining with robotics

### Issue:

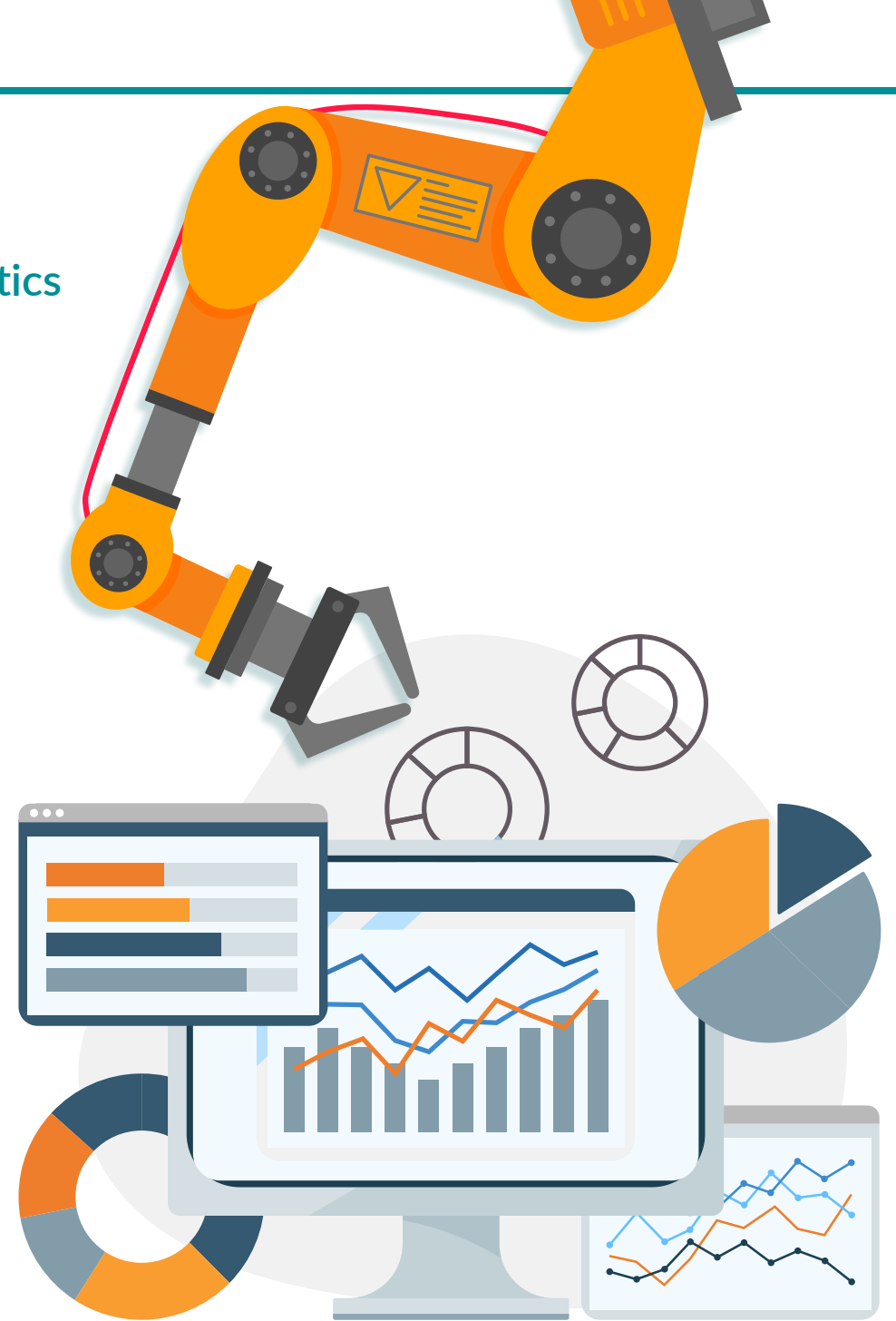
- ➔ **A metal manufacturer** was manually capturing and entering data prior to completion for each piece they produced. This manual process had a high probability of data entry error. Operators were engaged in remembering and typing in numbers, rather than giving proper attention to production activity.

### Solution:

- ➔ **The manual process** was replaced by a robotic process automation solution developed to automatically gather data and store it in an ERP associated with the correct lot number.

### Impact:

- ➔ **The low cost solution** allowed the company to drastically reduce the error rate, providing clean, trustworthy data for upstream operations and analytics. Moving their systems, equipment, and people from siloed to integrated freed up operators' time so they could focus on production.





# Level up your technology infrastructure & data strategy

*Is your technology infrastructure ready for the future of manufacturing?*

Smart and connected manufacturing technology allows you to:

## Say goodbye to:

- Error-prone, productivity-reducing manual processes.
- Siloed people, processes, and data.
- Low visibility into your supply chain and operations.

## Say hello to:

- Automated processes like tracking, data consolidation, and reporting.
- Improved utilization, throughout, and efficiency.
- Increased supply chain and operations visibility, planning, and performance.

Your ERP system is an essential piece of your smart infrastructure that connects to your machines and your entire enterprise. Without these foundational building blocks, anything added on top could topple over. To fully integrate your manufacturing and financial operations, supply chain, and digital technologies, you'll need to align your analytics architecture with your business strategy.



## Risk reflection: Cybersecurity vulnerability

With increasing connectivity and modern enterprise systems, the manufacturing industry can be considered as an appealing target for attackers as they look for opportunities to move laterally across a manufacturing network. It's vital to review your cyber vulnerabilities and protect against increasingly sophisticated cyberattacks.



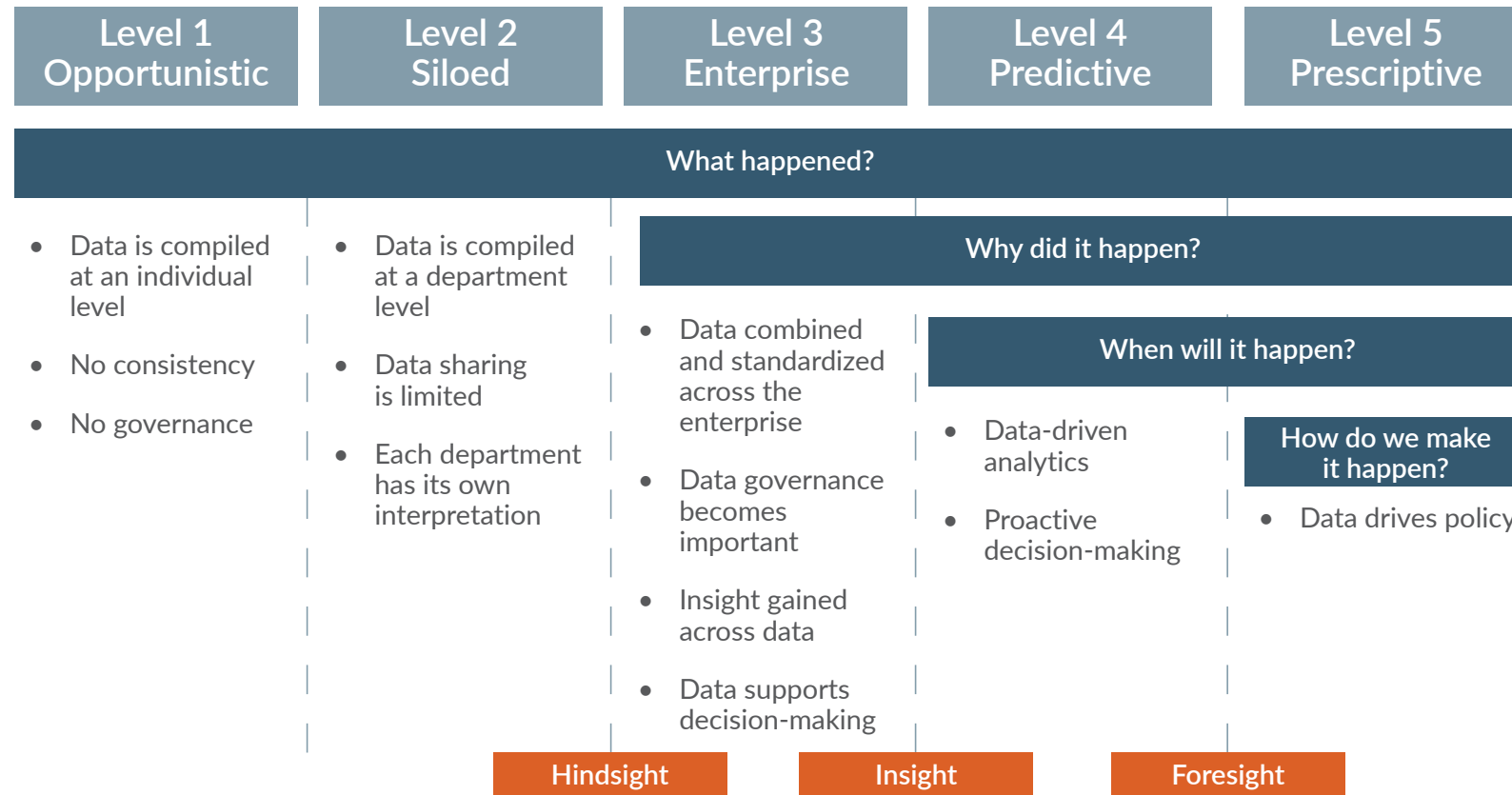


## Turning data into insights

*If your organization isn't already prioritizing using data in decision-making, it's time for a cultural shift.*

No matter how good your instincts are, gut decisions alone can't get you the results you're looking for anymore. An increased focus on ensuring the completeness, accuracy, and relevance of your data is the basis for better decision-making. From there, the goal is to move from opportunistic and siloed to predictive and prescriptive analytics. These more advanced data analytics tactics are the key to driving improvement, reducing waste, and bringing opportunities to light.

### A look into the progression of data analytics:



## Real-world example: Analytics in action

### Issue:

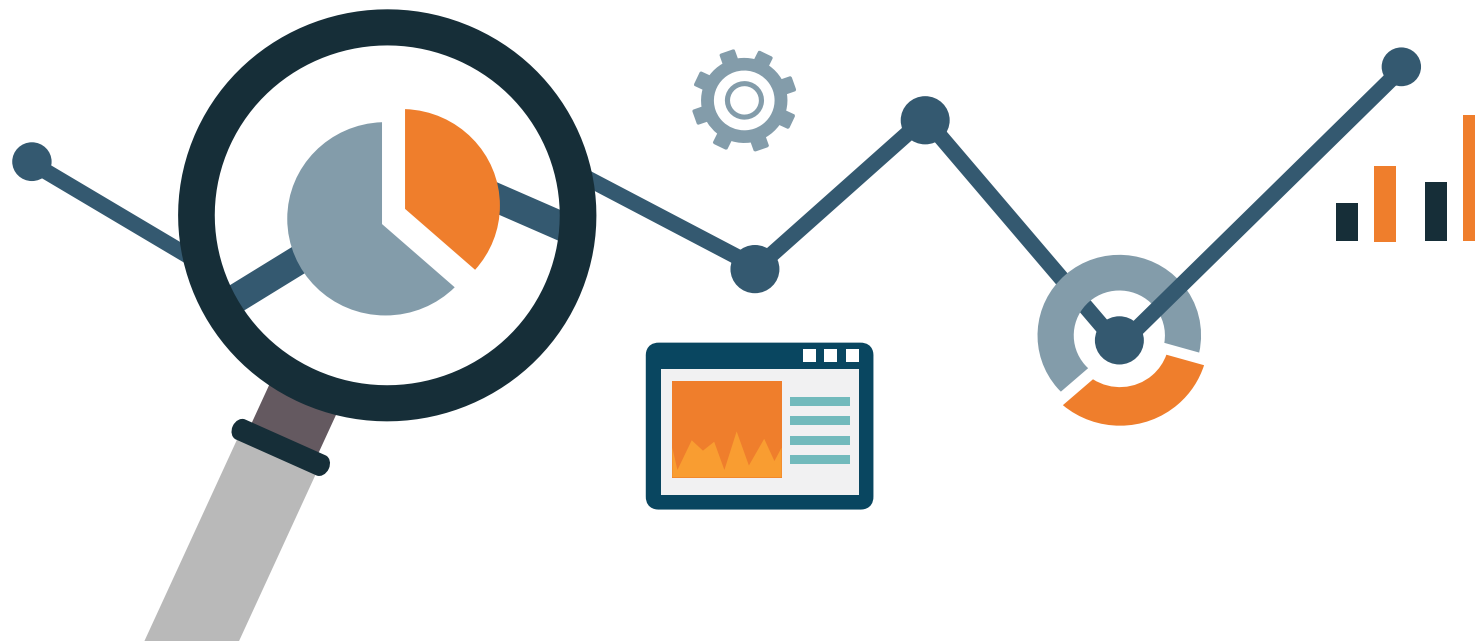
- ➔ **A processing and packaging company** was using a time- and labor-intensive, error-prone manual process to reconcile incoming forecasts and actuals with milling and storage capacities, quality parameters, and shipping costs.

### Solution:

- ➔ **An automated system** allowed them to pull data together without human interaction. A data analytics program added support to business decision needs.

### Result:

- 👍 **Automated reporting** led to lower data error and more time spent on value-add activities.
- 👍 **Predictive data analytics** improved storage utilization, line throughput, shipping costs, and supply chain visibility.
- 👍 **Siloed systems, processes, and people** became integrated with materials movement, reducing wasted time and money.





# Level up your material tracking & supply chain management

*Data analytics, AI, and other smart technology give you unprecedented insight into your supply chain and materials movement.*



## Evolve your technology to combat disruption

Advanced data analytics from connected technology gives you a dramatically improved view of your materials flow and supply chain, allowing you to track in real-time for better forecasting, customization, and optimization. Add in a continuous sourcing strategy and you'll be ready when disruption comes your way.

## Better track material flow with intelligent operations

Not only can technology like predictive algorithms help you better understand the flow of materials through the supply chain, but it can also help you better track how things move through your own facilities. Digitalization — enhancing your business and creating new opportunities using digital technology — can significantly improve your warehouse and transportation management capabilities, allowing you to become a stronger performer in an increasingly competitive environment.



### **Risk reflection: Supply chain disruptions**

Regular production interruptions, shipping delays, and other supply chain disruptions have become a constant reality. Better supply chain visibility, provided by smart technology and connected processes, can help you forecast more accurately, get ahead of potential issues, and pivot faster when necessary.

### **Actions you can take to optimize your operations:**

- ✓ **Use automation** to gain end-to-end transparency and real-time material tracking, in and out of machinery and throughout the facility.
- ✓ **Use advanced forecasting** using predictive analytics to extract valuable insights from complex and diverse data.
- ✓ **Track the entire supply chain** in real time.

### **Potential benefits:**

- 👍 **Create shorter time-to-market** that provides quicker reactions to new customer demands.
- 👍 **Reduce supply chain disruption and manage risk.**
- 👍 **Increase agility** and ability to meet customer expectations with individualization and customization.



# Level up your financial & tax strategies

*While smart technology will require an investment, a prudent, comprehensive financial strategy aligned with your connected manufacturing roadmap will help minimize the financial burden of upgrades and improvements.*

Done right, your investments will pay for themselves over time. But it doesn't just enhance your financial position by making your organization more efficient, it also creates significant opportunity for funding your investment by optimizing your tax structure and decreasing your tax impact. A detailed financial strategy is helpful both for long-term sustainability and for easing the burden of the initial implementation.



## Return on invested capital

Assets such as facilities, equipment, and tooling are some of the largest expenditures by manufacturers. I4.0 initiatives offer opportunities to optimize your returns while achieving the integrated financial benefits from automation initiatives.



## Tax credits & incentives

Offset costs by leveraging R&D tax credits and incentives. The R&D tax credit is designed to encourage innovation and can be significant – currently up to 11.1% of qualified spending for federal taxes and up to 40% of qualified spending in some states. Even if the entire project doesn't qualify, partial credit may be awarded but rigorous recordkeeping to support all analysis and inclusion of QREs is critical.



## Transfer pricing implications

Digitalization may present opportunities to restructure your supply chain, which can drastically impact your global footprint and the jurisdictions in which your profits should be taxed. It could also have an impact on the number and nature of your intercompany transactions, which may require a reassessment of the transfer pricing of these transactions. Further, I4.0 will assist in effectively operationalizing the compliance and proactive management of your transfer pricing.



## Tax implications

A redesign of your supply chain and operations presents the opportunity to lower your global tax impact. It can further reduce your footprint with additive manufacturing technology like 3D printing, which reduces the need to source raw materials and ship physical goods around the globe.



## Costing, margin intelligence, & pricing implications

With better data and insight into your organization, processes like costing and estimating become more effective and allow you to better understand where you're making money and where you're not.

# Smart technology can advance your business. Your financial strategy should follow suit.

These upgrades are all positive for your overall business, and with a fresh approach to your financial strategy comes additional considerations. **Components of your financial framework may change, which could include more efficiency but could also require tighter and enhanced internal controls.** Improved data will build more efficiency, insight, and automation into your future. With better data and insight into your organization, processes like costing and estimating become more effective and allow you to better understand where you're making money and where you're not.



## Risk reflection: Shrinking margins

As costs rise and margins shrink, smart technology can help you do more with less. Improved quality and productivity mean selling more and for a higher price. Smarter planning and automation mean less materials and labor needed, reduced inventory and storage needs, and better material flow. You'll also benefit from R&D tax credits and other incentives.



# Optimize. Innovate. Advance.

Smart manufacturers are looking for new ways to conquer today while preparing for tomorrow. **We can help.** Our experts will take a holistic approach to transformation, resulting in improved productivity, agility, and value.

## Let's discuss the possibilities.

*Schedule your complimentary strategy session with one of our experts — no cost or obligation, just complimentary advice tailored to your needs.*

**CONTACT OUR EXPERTS**

