



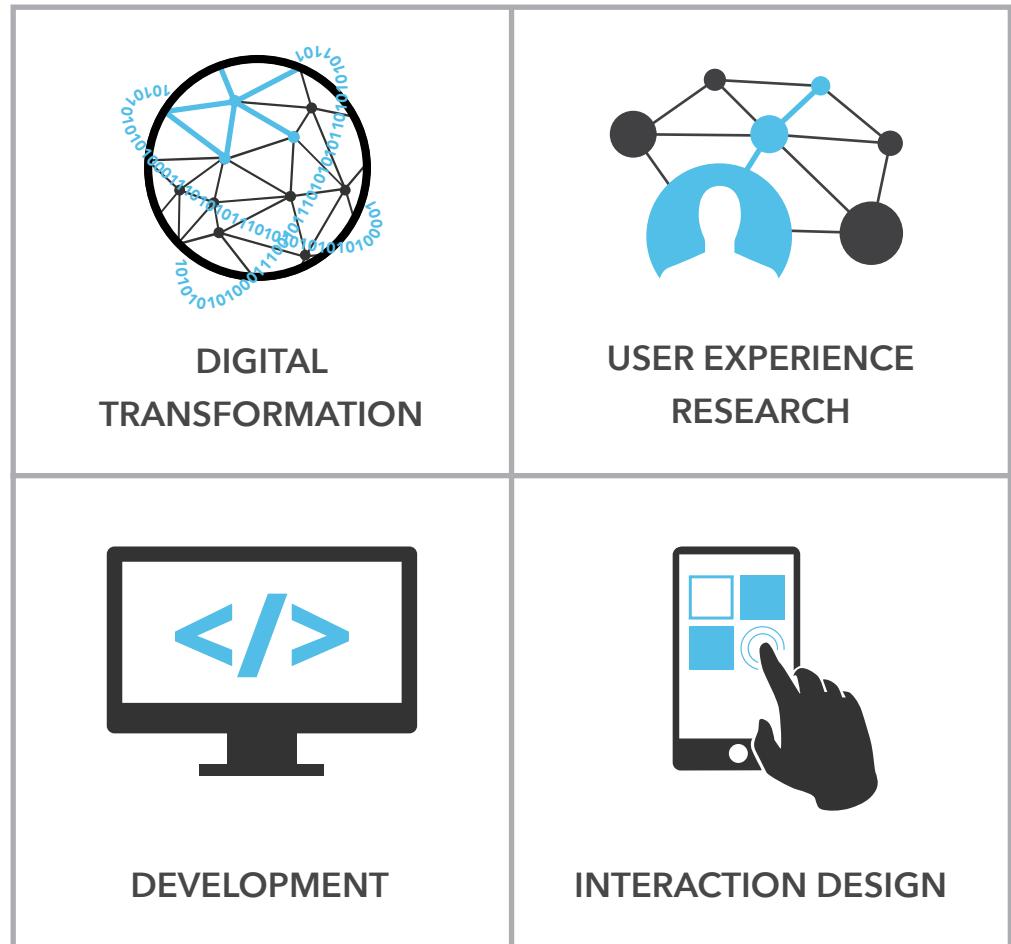
The Digital Transformation Roadmap for the Manufacturing Industry

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ABOUT CHAIONE

Founded in 2008, ChaiOne is an Enterprise Design Firm specializing in mobile solutions to help large enterprises innovate and run effectively. Through ChaiOne's mobile digital transformation process, they help to unlock untapped opportunities.





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The Digital Transformation Roadmap for the Manufacturing Industry

- 05** Introduction
- 09** Getting started with digital transformation
- 12** Weaponizing the supply chain for competitive advantage
- 19** Reimagining operations with the digital plant
- 26** Improving collaboration and relationship with customers and suppliers
- 32** Conclusion

01

Introduction





INTRODUCTION

Are you becoming a buggy whip maker?

Horse and carriage buggy whip makers became obsolete as soon as automobiles started taking hold of the American populace. No longer were devices needed to prod horses along down the road. This analogy, first put forth by Theodore Levitt in "[Marketing Myopia](#)," describes how the failure of buggy whip makers to view themselves as in the "personal transportation business" led to their downfall.

Manufacturing companies are facing a similar transition. With customers needing more and more integrated products, they are expecting more digitally enhanced services from manufacturers, such as real-time tracking on logistics and just-in-time production.

The manufacturing companies who fail to prioritize digital innovation and disruption will fall behind, going the way of the buggy whip makers, in the next five years. Digital disruption is rapidly taking hold in manufacturing companies, solving the biggest global issues plaguing the industry.

- **Unlocking inefficiencies in the supply chain.** With real-time GPS tracking and big data in the supply chain, digital manufacturers are weaponizing their logistics management for competitive advantage. Using dynamic scheduling and data-driven planning techniques changes the game.
- **Improving collaboration and relationship with customers and suppliers.** Vendor-managed inventory and collaboration platforms are driving new spaces of engagement across the value chain. In collaboration-heavy industries, such as retail, smart shelves and retail execution applications are removing wastes of excess inventory and poor demand planning.
- **Reimagining operations with the digital plant.** Maintenance, the digital twin, workforce management—the digital plant is harnessing the power of data to catalyze serious changes on the factory floor.

TESLA CASE STUDY

Automotive manufacturer Tesla pushed a software update in 2013 to disable the Active Air Suspension, the ability to lower the Model S about an inch, at highway speeds.

Consider this: how many hours would have been spent to bring each car in and do this manually? Bloomberg estimates that 25,000 Model S cars were sold in 2012 and 2013. Multiplying that figure by the **\$19.58** automotive mechanics and technicians make per hour for two hours, according to the Bureau of Labor, the savings in wages alone is \$979,000. This does not even factor in the damages to the customer relationship, PR and crisis communications teams costs, and fluctuations with the stock price.



Smart products stem from
smart manufacturing facilities.



02

Getting started with digital transformation



GETTING STARTED WITH DIGITAL TRANSFORMATION

Too many companies rely on a series of one-off mobile applications to drive transformation. Digital innovation at scale, which is necessary for the next five to ten years, needs to come from the office of the Chief Information Officer or Chief Innovation Officer as an overall strategy. Connecting each area of business' digital needs into an integrated portfolio must be managed strategically from the C-suite.

Most IT groups have no shortage of ideas. Combine that with the ideas that are coming from the business lines, and it's clear that the company will explode with digital transformation. The issue arises when not all of those ideas drive an actual return on investment because they are not aligned with the most important stakeholder, the user.

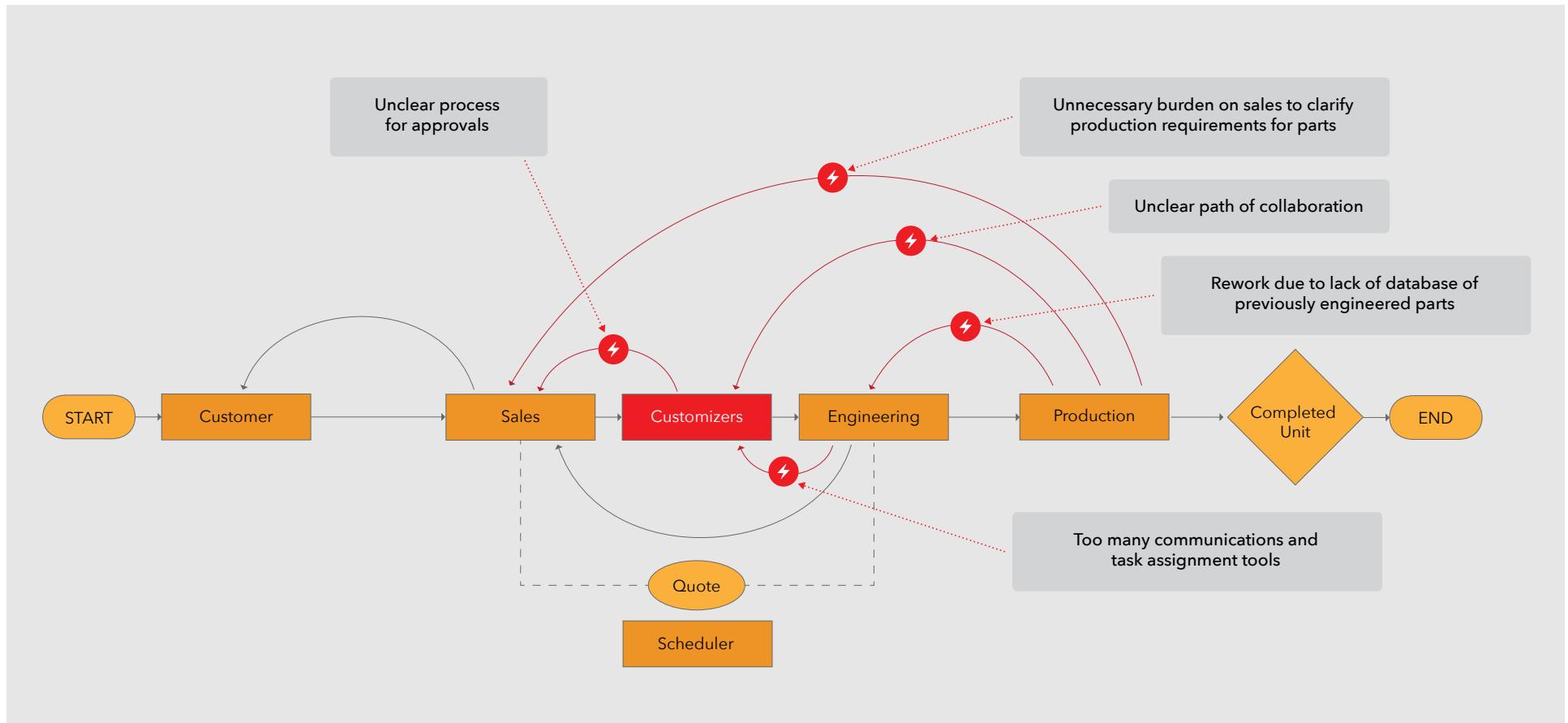
For example, a large processing facility in a highly regulated industry knew that checking raw materials into the facility caused serious bottlenecks due to the lengthy inspection from security officers. They decided the solution was to digitize the form and provide the inspection officers with iPads. Once the ChaiOne user research group observed the team, it became apparent that it is not the inspections themselves that are causing the long wait time; it's the time to get approvals from multiple different stakeholders, which was done by phone at a central office. Trucks with materials sat idle for up to three

days waiting for inspection, costing millions of dollars in overtime and operations delays. The digital solution uses push notifications and visualizations of the stages of the process to cut the operations delays by 70 percent. Digitizing the entry form would have done nothing to solve this backlog.

How do you avoid failed assumptions like the one above? Vet your current portfolio of ideas and make estimates of the ROI using scientific and data-driven user research.



Sending researchers out to the factory floor,
warehouse and even with the sales team will reveal
where the true bottlenecks in your process are.



03

Weaponizing the supply chain for competitive advantage



WEAPONIZING THE SUPPLY CHAIN FOR COMPETITIVE ADVANTAGE

"Change doesn't disrupt the system. It's part of the system." - Susan Berfield and Manuel Baigorri describing Zara's supply chain innovation in "["Zara's Fast Fashion Edge"](#)

Clothing retailer and manufacturer Zara introduced the concept of fast fashion two decades ago. Instead of purchasing classic pieces built to last, Zara builds trendy, affordable clothes that last as long as the trends themselves. The supply chain is

its competitive advantage. While other retailers order 80 percent of their garments at the beginning of the season, Zara averages only 50, relying on high-tech equipment to make sudden changes in production. Information about what's selling is fed back to the designers, when store managers make twice-weekly orders for new shipments. Unsold products make up less than 10 percent of inventory— compared to an industry average of 17 to 20 percent.

Logistics management in the digital age builds upon an interconnected network, streamlined remote workforce communication, and flexibility in the system. Connecting each major player in the supply chain with the visibility and data they need to be more effective generates serious ROI. Hybrid supply chains, relying on a mix of digital and traditional techniques, lose data at each step in the process, along with the key insights that lead to serious transformation. Later in this summary, we review key pain points solved by mobile and digital solutions.

Hybrid supply chains	Digital supply chains
Combination of physical and digital information	Completely digitized
Information kept in silos from other plants, teams and managers	Complete visibility into all aspects of the product lifecycle
Inaccurate forecasting and demand planning	Data-driven, real-time inputs into all planning activities

Key enablers of the supply chain transformation:

- **Cloud management.** Tracking data on where materials are in the process depends on shared data in the cloud. Cloud-based availability of real-time data powers the digital transformation of the supply chain, as well as the connection of disparate IT systems throughout the network.
- **Geolocation.** RFID tracking, sensors, beacons are all generating new sources of information as to where products are in the supply chain. Making indicators also tracked, such as temperature or pressure, also makes the operations more effective.
- **Data analytics.** Using predictive analytics and modeling techniques, companies can gain crucial insights into production changes, inefficiency bottlenecks and potential shutdowns. Investing in big data with a first investment in data maintenance and cleanup, reaps serious benefits when it also comes with a corresponding investment in the user experience of the tools to visualize and manipulate the data. Demand forecasting and capacity planning are two major issues to solve here.



Key enablers of the supply chain transformation:

Cloud management, geolocation and data analytics.



Holistically, these enablers solve the most pressing problem with the supply chain: visibility. Too often, everyone from the C-suite to the operators themselves are in the dark about product and raw material location, and lose out on the potential ROI with more effective decisions.

Case in point: dynamic scheduling. Nearly every customer will want their delivery at the same time. Instead of overbooking the busy shifts and leaving trucks and drivers idle during non-peak times, using the mobilized data of customer inventory levels to power a scheduling process that also pulls in driver shift and truck availability will increase efficiency of the entire process and cut down on the hard costs related to scheduling. Working with suppliers and customers to offer incentives to book less popular times will help even out labor costs and avoid backlogs.

One estimate says that senior manufacturing personnel spend 40 percent of their time away from their desks. This time is frequently spent on “safety walks” and equipment checks as part of overseeing the factory floor’s overall efficiency and safety. Imagine how much more powerful these walks would be if along the walk, BLE beacons generated performance reports to the manager’s mobile device, exception alerts were sent via push notification to the entire team, and the data was able to predict the asset issues that will cause lower quality. The paperwork pile two inches thick can come from a quality assurance specialists’ mobile devices, which have forms auto-populated with identification data and tagged for easy sorting. For regulations and audits, the real-time traceability of parts and

performance data can provide validation of compliance and support a firm’s commitment to vigorous adherence to regulatory structures.

The most effective manufacturer-distributor operations cross dock with digital tools, using data analytics and predictive modeling to move inventory quickly from its drop-off truck to the store delivery truck, minimizing the cost of inventory as much as possible. This becomes so much more effective when predictive modeling using inputs on the elements of the materials (weight, shape, surface area) is utilized. According to Forrester inquiries, about 30 percent of items in grocery manufacturing have at least one wrong element that throws off loading trucks.

CASE STUDY

In 2003, Pfizer made headlines when it started a “Right First Time” program aimed at identifying the factors causing the variabilities in quality in its processes, relying heavily on Process Analytical Technology and real-time data to identify and remove waste in their manufacturing processes. The team, after a value stream mapping exercise, were able to reduce end-to-end lead time by 60 percent for one product.



A medium shot of a man wearing a blue hard hat and a dark safety vest over a light-colored shirt. He is looking down at a white tablet computer he is holding in his hands. The background is a blurred industrial environment with metal structures and equipment.

04

Reimagining operations with the digital plant

REIMAGINING OPERATIONS WITH THE DIGITAL PLANT

What is the digital plant? It's a fully connected, flexible and data-driven network to drive the highest efficiency from assets, people and processes. Instead of the one-off applications, the digital plant drives a full plant portfolio of mobile and digital applications. Every asset and every person have their own data attached to them, which fit inside a larger data ecosystem. The key here is the integration of the entire plant, from unlocking the data in the ERP system with a modernization to deploying RFID tracking on all materials as they move through the production line.

One of the major benefits of full digitalization is improving the ability to forecast and plan for change. Digital plants have a "digital twin," or a clone of the data and performance metrics for all of the assets in the plant, which allows the team to test and measure the impact of changes or new processes. It's simulation without limits.

The other major ROI driver for the digital plant stems from one of the biggest profit killers for manufacturers: maintenance. Reliability Centered Maintenance (RCM) is a framework to determine the most cost-effective maintenance practices for each asset by weighing its functional significance to the system and examining the data on its (and similar assets') failure and maintenance history. The potential savings for businesses are huge: two researchers found that implementing an RCM program at a utility company [reduced maintenance costs by 30 to 40 percent](#). After use by the aviation industry in the 1960s, its benefits have now caught on

with companies of all types, including [utility plants](#), [theme parks](#) and [manufacturing facilities](#).

Data plays a huge role in RCM strategy, powered by the ability of companies to integrate multiple data sources into one seamless dashboard for employees and communicating actionable insights from that data to the right devices for employees. The result: A reduction in labor costs, asset downtime and catastrophic failures, along with ultimately increasing the efficiency and ROI of plant assets and reducing failure sources.



The other major ROI driver for the digital plant
stems from one of the biggest profit killers
for manufacturers: maintenance.

Strategy and Definition	Ideal for
Reactive: Maintenance technicians focus on running items to failure. No monitoring is required.	Only non-critical assets. This asset will fail during operations; keep safety risks for employees and spare part availability in mind.
Preventative: Parts are replaced on a fixed, time-based schedule.	Assets that have an established failure pattern. This may lead to unnecessary replacements and larger inventory costs.
Predictive/Condition-Based: Assets are monitored for conditions indicating failure is likely to occur.	Assets that are relatively simple systems where a small set of conditions can reliably predict failure.
Proactive: Assets are monitored for conditions, and diagnosed for possible causes of failure.	Assets that are critical to the business functioning. This takes a large upfront investment in data analysis and diagnostic modeling.

For lean manufacturing practitioners, here are five wastes that the digital plant directly reduces:

- 1. Motion.** Searching for another technician on the shop floor. Checking email at the desk and heading over to the shop floor to gather data. Stopping at the dispatch office for a call list. These are all examples of motion waste that mobility can solve. The right mobile app provides the information and connections your employees need - in their pocket.
- 2. Waiting.** Mobile apps allow you to synchronize your processes and eliminate waiting waste between production steps. As materials move through the production line, RFID scanning integration can alert the people and equipment in the next production step and provide a seamless connection between the two steps. Mobile visualization of your production floor and equipment can also increase successful and quick changeovers between products because your managers will make better decisions with more information about how these changeovers will happen.

- 3. Overproduction.** To reduce overproduction waste, you have to reduce the causes of the waste. If you're producing too much or too quickly, you are missing a communications link between your processes (and the data from those processes) and your people. Deploy a mobile app that uses advanced pattern detection and analytics to forecast customers' demand and take action for production levels on the shop floor. You need to gain full visibility into the capacity utilization of your plant and tighten your demand projections to eventually shorten your cash-to-cash cycle.
- 4. Over-processing.** How often have you walked onto the shop floor and noticed that technicians were not using the best practices and techniques not explicitly stated in the manual? You're seeing over-processing waste where employees and processes are not working in the most efficient way possible. Instead of trusting that employees will use the efficient techniques outlined for them, remind them to do so with a mobile application with near-field communication and bluetooth low energy beacons to describe the efficient techniques to employees as soon as they approach a machine

5. Defects. The product goes through the production line, but fails the quality assurance test or, even worse, makes it to a customer who you have now lost. Integrating mobility into your predictive maintenance strategy means that employees can see a push notification wherever they are, and also means the difference between maintenance happening within a few minutes of downtime or a few hours. After the product has moved through the line, your quality control process takes over, and now requires stacks of paperwork and manual data entry. What if the quality control forms were available on a mobile device and populated the identification information for the product automatically? How much time (and labor costs) would that save?



5 wastes the digital plant directly reduces:

Motion, waiting, overproduction, over-processing and defects.

05

Improving collaboration and relationship
with customers and suppliers



IMPROVING COLLABORATION AND RELATIONSHIP WITH CUSTOMERS AND SUPPLIERS

Sales had stagnated for a major foodservice product distributor. It took 50 percent more interactions for new sales hires to achieve the same results as their veteran counterparts, due to inexperience, management of sales collateral and inability to field customer questions.

The leadership team sounded the alarm for the IT team, who sent out an RFP for a customized digital sales enablement solution. The problem: it was never a collateral issue. Observing the sales team in action yielded the insight that the customers' mood was to blame. They were in the dark about when their previous orders would arrive and were anxious about filling their own performance goals for the day.

The sales enablement solution would have never improved the sales metrics. Building a robust user research engagement with field observation into the RFP uncovered this in time to invest the IT dollars into a customer-facing application with real-time insights on their orders.

Equipping the supply chain with GPS tracking that also keeps the customer informed can also go along way toward improving customer relations. This story, which is true, illustrates how incorrect assumptions wreak havoc on customer relationships.

CPG manufacturers especially face a lot of pressure to develop the collaboration platforms with their retailers. Retail execution is all about managing the end customer's experience in the store, a priority for both the retailer and manufacturer. Current retail execution teams rely on a set and agreed upon pattern for their routes each day, hitting each store every week. Data could make these teams much more effective, by creating prioritized lists of stores to hit based on their activity and units sold.

Anticipating customers' needs is much more streamlined when data powers customer demand planning and capacity forecasting. Connecting the current inventory levels to the CPQ system removes the friction for the sales team. One automotive parts manufacturer deployed a solution that did this, and recommended current offers for the customer and saw massive rates of return in the time to close customer orders.



Connecting the current inventory levels to
the CPQ system removes the friction
for the sales team

Another driving force in manufacturing is “lot size of one,” or the ability “componentize” products to allow for mass customization. This requires full value stream mapping of recurring service orders and redesign of product development process from one-off, high volume products into modular components that can be built to customers’ exact preferences. For example, the automotive industry is facing a lot of pressure in a competitive market to build cars that are personalized for each individual, with thousands of combinations for each car. This all stems from focusing on the customer as the key value driver, and extending that focus into every area of the business. This service-oriented model is the next evolution of many manufacturing industries.

Providing better service, not just in products, but also within the team itself, will also drive customer engagement. For most manufacturers, the customer-facing team is remote. The key to making tools for a remote workforce staff, whether in sales or field service are:

- **Full online and offline functionality.** Native applications are the best option for the remote workforce, who may not have access to Wifi or data in remote locations.
- **User-first, not mobile-first.** Most companies assume that the best option is a mobile application, but that may not always be the case. In the security check-in example from above, the company initially requested a tablet application for the digitized data entry. When their security officers have up to 75 pounds of gear on and are doing a lot of movement during the check-in, a tablet is not feasible. A wearable, such as a smart watch, is a much better option.
- **Consider their environment.** Have you tried to look at a white background on your smartphone in direct sunlight? You can't, but that does not stop IT leaders from making choices like this for their remote workforce. Contextual inquiries and field research are essential to creating these tools.
- **Communication is key.** Most remote workforces spend quite a bit of time communicating and coordinating with central office staff, whether through automated task assignments or directly with someone on the phone. It's important to drive serious ROI by leveraging the full options of communication, from push notifications to get quick decisions on approvals to geofences to alert team members, for example, of incoming shipments.

06

Conclusion





CONCLUSION

The digital transformation is here and it's driving serious changes in every segment within the manufacturing industry. The key takeaway here is to prioritize digital innovation as a CIO, and to use data-driven user research to identify the products that will generate the most ROI from your operations.

WANT TO SEE EXAMPLES OF THESE SOLUTIONS IN THE REAL WORLD?

Check out our case study to monitor remote assets and streamline operations.
Download it [HERE](#).

FREE 30 MINUTE CONSULTATION