Smarter Operations: The Value Chain's Vital Role in Digital Evolution

Chapter 2

The Look of Production of the Future



Smarter Operations: The Value Chain's Vital Role in Digital Evolution

A four-part series helping manufacturers make progress today while building for tomorrow

Modern digital technology is transforming every industry, including manufacturing. Yet in *The Rise of Smart Operations*, a survey of machinery manufacturers conducted by UPS and IDC, roughly one-half of the respondents said their digital or "smart" operations were lagging the competition or were at a significant disadvantage. This four-part series continues to explore the building blocks required to create a smarter, more digital operation. Manufacturers will also find practical solutions they can consider implementing today to incorporate smarter operations in their production processes of the future.

Concepts

Thought leaders envisioning the digital future of manufacturing production have put names to different movements or strategies. For consistency, the following definitions are being applied.

Digital Transformation (DX)

Technology analyst and advisory firm IDC defines DX as *transforming decision-making with technology*. Manufacturers must look at DX as a mechanism to deliver the next level of value for the organization through the use of digital technologies.

Industry 4.0

This fourth Industrial Revolution is the next wave of disruptive technology that will enable manufacturers to make great leaps in productivity, efficiency and innovation.

Smart Operations

A step forward from Smart Manufacturing to the digital connectivity of machines, facilities and people outside a factory's walls. Smart Operations helps integrate processes both upstream and downstream to improve visibility and enable flexibility in both planned and unplanned changes.

Trading Partners

Businesses contributing at any point in the value chain to the manufacture and delivery of products.

Value Chain

The unique internal and external contributors to a manufacturer's end-to-end supply chain that add value to the product being supplied to customers.

Introduction



by Charlie Covert

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Charlie Covert's executive role includes providing customer solutions, supply chain design and consulting services for UPS customers in the global industrial manufacturing, high tech and automotive industries.

Of all that digitization of the supply chain promises manufacturers, whether you call it Smart Operations, Digital Transformation (DX) or Industrial Internet of Things (IIoT), the potential to drive efficiencies gets the most attention. Often overlooked, however, is the potential of your digital transformation to fuel innovation and revenue growth.

Case in point: UPS built its Package Flow Technology using a network of connected sensors and scanners to monitor, evaluate and optimize every step in a delivery cycle — from the way a package is routed and tracked to how it's loaded and then delivered. That visibility, originally intended to optimize operations, also led to breakthroughs in the ability to intercept packages and provide the alternative delivery options now available through the UPS Access Point™ Network and UPS MyChoice® services.

Those UPS innovations evolved over a matter of years — a lifetime in today's terms considering the pace of technological change and rising customer demands. Just imagine the complexity of production processes of the future with virtual and augmented reality, Bluetooth beacons, RFID — not to mention the growing buzz about Blockchain technology. Few companies can assemble the skills needed to design, engineer and integrate these new operating processes and systems, let alone staff the new operation given the ever-widening manufacturing skills gap.

Recognizing this new reality, companies have been opening their doors to some surprising collaborators. Coined "industrial mash-ups" in a paper by Ernst & Young and *Harvard Business Review*, such alliances can come together faster than mergers and acquisitions, and they can "develop new products and services rapidly by piecing together components from an ecosystem of collaborating partners," the paper found.

As the "industrial mash-up" examples make clear, manufacturers today can no longer afford to be digital fast-followers. Further, companies will have to open their doors to a wider range of outsiders in order to find efficiencies and disruptive innovations.

My simple advice would be to start with your value chain partners. Not only do they have unique knowledge of their customers' operations and specialized expertise, they also have a vested interest in their customers' success.

*Whichever path is chosen, **the most important message is to start today.** In our new industrial reality, if you're standing still, you're actually falling further behind.*



Introduction (continued)

Today manufacturers are in the midst of the 4th industrial revolution, as our ability to connect digitally to physical assets is enabling change in the way they operate, manage, and interact with the equipment and processes across their entire value chain. In the modern environment, manufacturers are looking at this industrial revolution through the lens of digital transformation (DX).

Technology analyst and advisory firm International Data Corporation (IDC) defines DX as: *To transform decision making with technology*. Manufacturers must look at DX as a mechanism to deliver the next level of value for the organization through the use of digital technologies.

For example, a company that is moving a business application to the cloud, that has not used the cloud before, would be considered a DX initiative as long as it enables the company to do something that it hasn't done before. On the more advanced side, a company deploying sensors across the manufacturing operation to gather and analyze captured data is also engaging in a DX initiative.

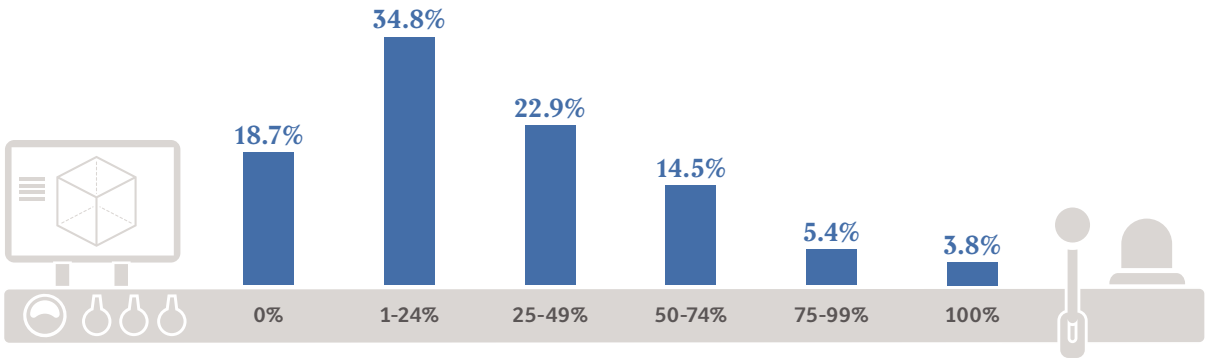
Manufacturers must look at DX as a mechanism to deliver the next level of value for the organization through the use of digital technologies.

DX Initiatives and Investments

As Figure 1 shows, most manufacturers are investing in DX to some degree. According to the IDC Manufacturing Vertical Insights survey, over 80% of manufacturers reported that at least some portion of their new technology initiatives were being driven by digital transformation, with 46% noting that more than one-quarter of their technology initiatives are being driven by DX.

Figure 1 **Digital Transformation is Driving New Tech Initiatives in Manufacturing**

What percent of your new technology initiatives are driven by digital transformation?



Source: IDC Manufacturing Vertical Insights Survey, IDC, 2016

A focus on DX initiatives comes with a concurrent rise in spending. In IDC's Worldwide Semiannual Digital Transformation Spending Guide, the research consultancy projected that spending on DX will reach $1.2 trillion worldwide, led by China and the United States. The report also projects "discrete and process manufacturers contributing almost 30% of this spending" with the spending highest in "connectivity services, IT services and application development & deployment (AD&D). Combined, these categories will account for nearly half of all DX spending this year. However, investments in these categories will vary considerably from industry to industry.

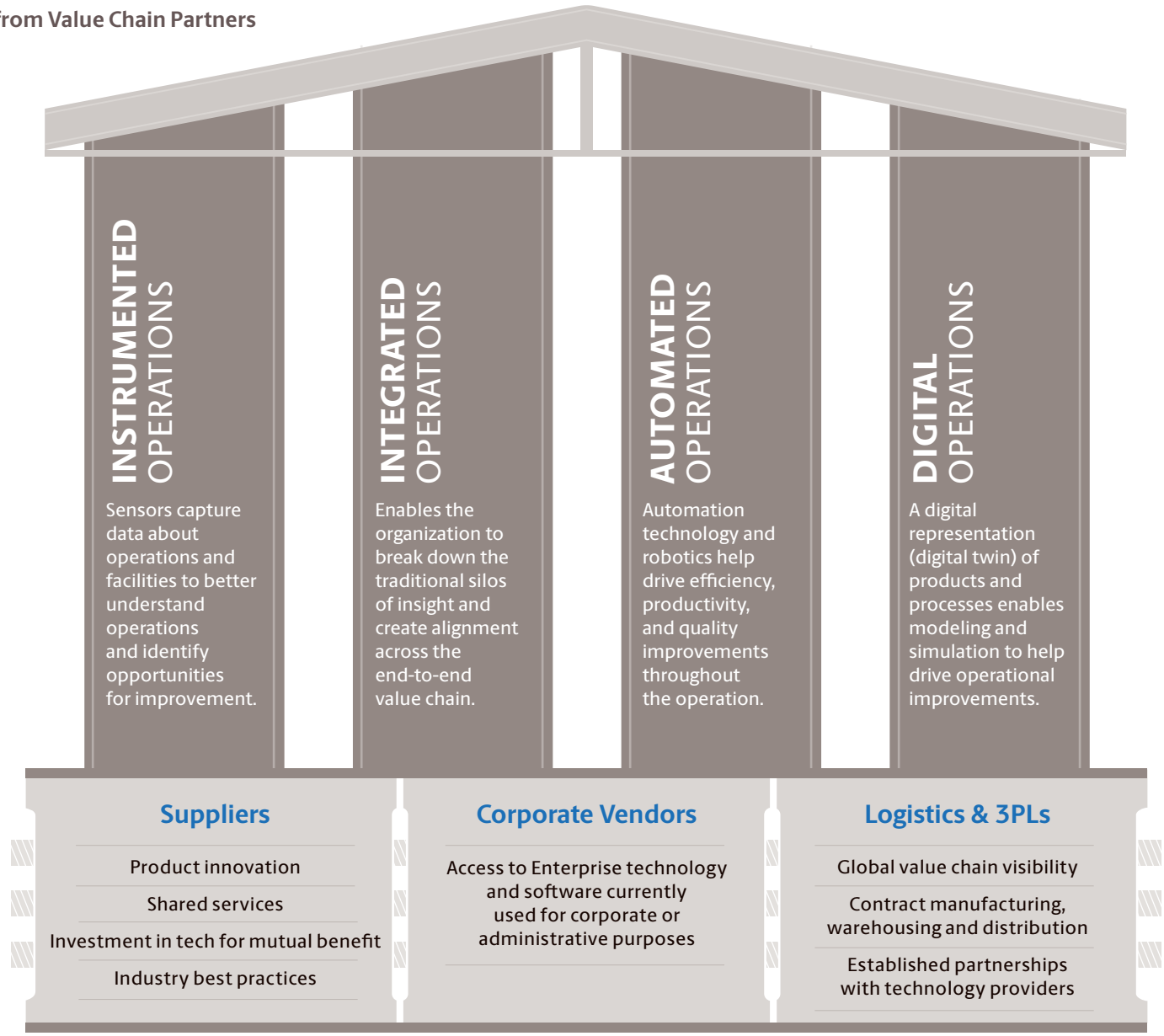


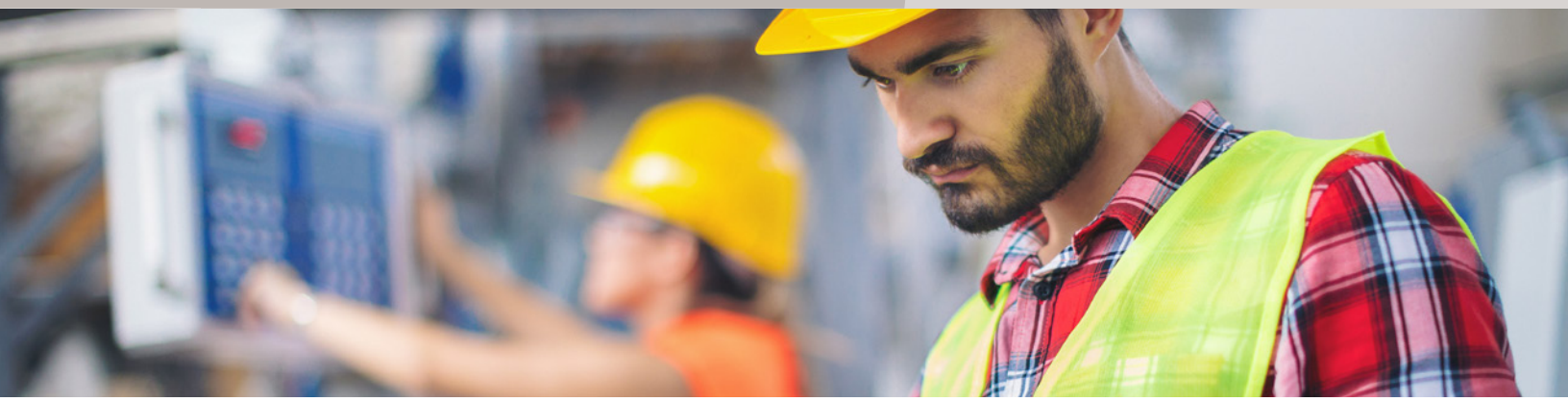
Digital Operations

Chapter One reviewed the four pillars of production of the future (Figure 2) which outline the foundational steps toward smarter operations — Instrumentation, Integration, Automation and Digital Operations. The Digital Operations pillar leverages software and applications from all pillars to create a digital model (digital twin) of the products and processes across the manufacturing operation. Through digital operations, manufacturers are able to run simulations to evaluate how their products and processes will respond to changes under a variety of scenarios.

Figure 2

Advance Smart Operations with Support from Value Chain Partners





Digital Operations (continued)

Digital Operations is an extremely powerful element in production of the future.

The capabilities that enable the digital twin, shown whitin the Digital Operations pillar, also provide operations intelligence used in decision-making with fewer constraints from assumption-based simulations. Therefore, the digital twin improves the accuracy of projections by relying more on data from sensor-enabled operations than hypotheses or assumptions.

Modern manufacturing processes and products are increasingly being outfitted with sensors and feedback mechanisms. These enable manufacturers to capture data which are then input into the digital operations layer where the data is analyzed, modeled, and simulated.

Through this modeling and simulation, manufacturers are able to:

Reduce Risk and Improve Outcomes	Increase Operational Speed and Responsiveness into the Operation	Support Innovation and Improve Return on Investment
Risk reduction and improved outcomes arise from the ability to make better-informed decisions based on actual operational data. Because the volume and accuracy of the data are more reliable than fully assumption-based insight, manufacturers are able to enact change with lower risk.	Modeling and simulation enable manufacturers to evaluate and prepare for a wide variety of scenarios and, therefore, improve their ability to respond quickly to change.	The Introduction to this chapter mentioned customer service innovations enabled by the digital connections powering UPS Package Flow Technologies. Similarly, improved digital modeling can also provide manufacturers with a clearer view of the potential of new processes and technologies — perhaps well beyond the goals of the original hypothesis.

The Value Chain's Role

To progress in the modern operating environment, manufacturers must digitally connect their extended ecosystem both upstream and downstream in the value chain. The technology exists. The challenge lies in designing effective processes and aligning disparate systems while overcoming internal resistance to sharing sensitive data outside of company walls.

Strategic Partnerships

Digital operations is all about turning operational data into intelligent and actionable insight that can be used to drive value for the manufacturer and its customers. Manufacturers must first look to optimize the quality and utility of their existing data while continuously supplementing the data they already have.

Value chain partners have ownership of a tremendous amount of data about the operation that can add value to parties up and down the chain. The following provides a short list of data that can help to form the basics of smarter operations.

Logistics partners	Third-party contract manufacturing partners	Third-party distribution partners	Suppliers
Offer real-time asset locations, shipment status, inventory location and quantities, frequency and volume of shipments.	Capture manufacturing process data, capacity and production planning.	Provide demand-driven data, inventory quantity and location, through-put, fulfillment rates and returns.	Track material purchase history such as quantity, frequency, spend, capacity and quality.

All of this data is relevant to understanding the health of the manufacturing operation and can be valuable in the modeling process used to determine the best way to drive operational improvements. However, data sharing must be a two-way street. Value chain partners must collaborate in both directions in order to drive a partnership with trust and transparency. Not only can strategic value chain partners help drive digital operations proficiency, they should also be looked upon as key players in building the other pillars of smart operations shown in Figure 2, such as instrumented operations and integrated operations.

The bottom line is that any manufacturer thinking of developing a strategy for production of the future must consider the role of their value chain partners, and must work with them to align operations and provide data-driven visibility across the operation.

Industrial IoT and Production of the Future

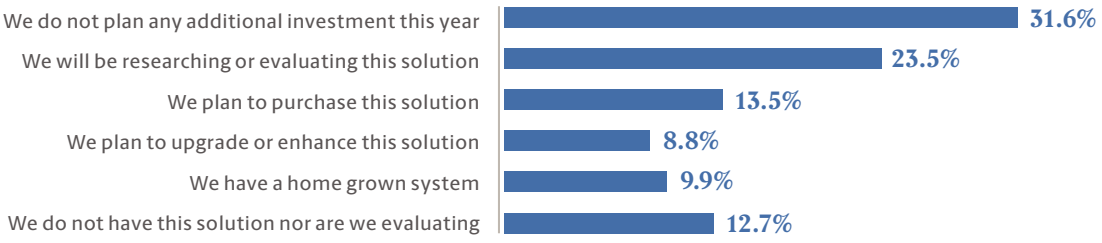
The Industrial Internet of Things (IIoT) refers to the increasing use of sensors, communication and analytics across the operational environment. This includes sensors on operational equipment, throughout the warehouse, on products, across the logistics environment, and essentially all aspects of the operation where data can be collected through the use of sensors.

Manufacturers must consider how the disparate sensor applications are best connected, and must have a plan for analyzing the data and applying the insights to benefit the operation — the true definition of Digital Transformation. Many manufacturers have been investing in the instrumentation of their operations for several years now with greater than 87% having some instrumentation of their operation (Figure 3).

Figure 3

Making Investments in IIoT

Using IoT and sensors with analytics to improve factory performance — which statement best describes your organizations investment strategy for each of the following solution areas?



Source: IDC Manufacturing Vertical Insights Survey, IDC, 2016

Investing in IIoT introduces several benefits that are often unattainable without its deployment.

- **Operational visibility.** One of the most visible benefits of IIoT is the ability to capture real-time operational data, thus gaining visibility into how well operational processes are performing.
- **Quality control.** IIoT can provide visibility to production processes so that if something falls outside of control limits, the operation can take corrective action.
- **Predictive maintenance.** Combining real-time operational data with analytics enables manufacturers to identify asset performance risk and proactively make necessary repairs.
- **Productivity and efficiency gains.** Insight into the operation through IIoT can help manufacturers identify opportunities for productivity and efficiency gains across the operation.
- **Innovation.** It may be difficult to envision new thinking or abilities that may arise from enhanced connectivity and robust data. However, manufacturers should always assume innovation will be a byproduct of those new operating processes and should be ready to capitalize in a timely fashion.

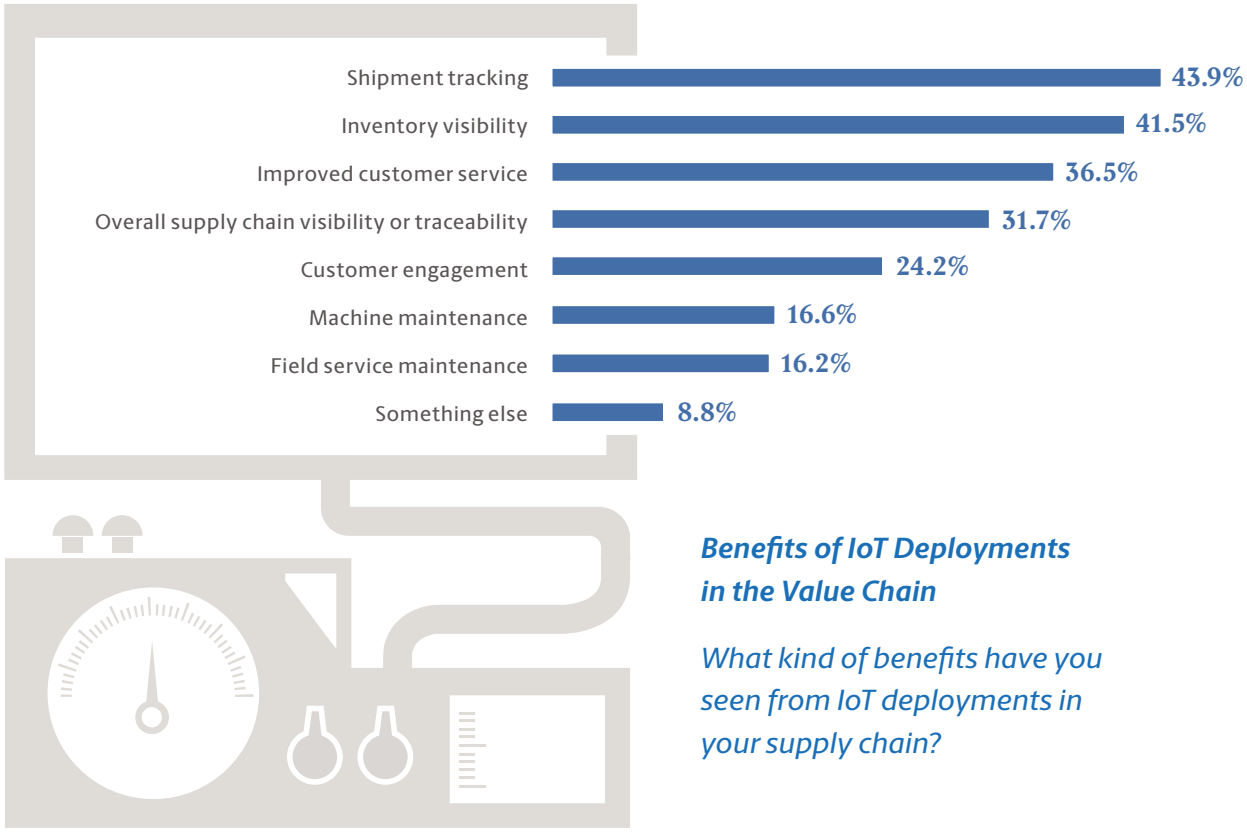
Industrial IoT and Production of the Future (continued)

IIoT is much more than simply deployment of sensors throughout an operation. Both of the following ecosystems must be considered:

- **The technology ecosystem.** The end-to-end IIoT technology stack required to deliver an IIoT deployment. Any IIoT initiative must take this into account to ensure that the project delivers on the expected value.
- **The value chain ecosystem.** Production of the future requires a holistic perspective of the value chain ecosystem. There is a significant opportunity to collaboratively design and deploy business processes, enabled by modern technology, that extend to all participants in the value chain.

Figure 4 shows the areas where providers along the manufacturing supply chain said they've benefited from IoT deployments. As in the case of the UPS innovations mentioned earlier, it's fair to assume that some of the benefits being realized by value chain partners occurred above and beyond the original objective to connect and optimize a supply chain.

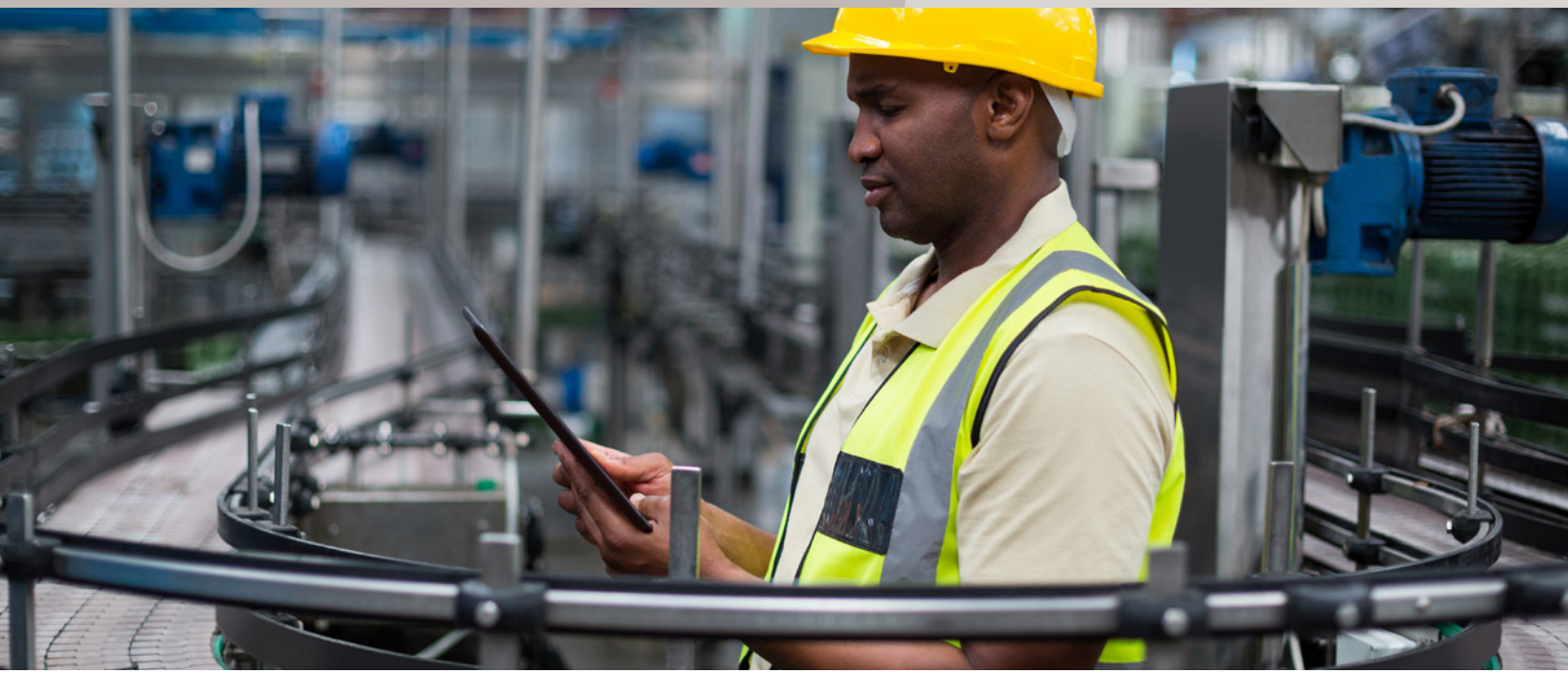
Figure 4



Benefits of IoT Deployments in the Value Chain

What kind of benefits have you seen from IoT deployments in your supply chain?

Source: IDC Supply Chain Survey, IDC, 2016



Conclusions and Key Takeaways

It is clear that manufacturers are investing human and financial capital in order to advance toward more digitally transformed, or smarter, operations. The decisions are weighty and, understandably, will not happen quickly for most companies. But they must take action now. Standing on the sidelines these days may as well be moving backwards.

These thought-starters may help:

- Invite value chain partners to the table early in DX discussion to benefit from the knowledge, expertise and fresh perspective they can offer.
- Tap into existing technology and infrastructure, whether in-house or through the value chain, to enhance manufacturing operations in less time and with less capital outlay. For example, UPS offers a range of shipping and visibility solutions that mirror some of the same benefits of having a more digitally connected supply chain.
- Make a plan for drawing in specialized talent and skills from outside the company's walls or even outside the industrial sphere. For example, UPS has based a relationship with CNC Machining and 3D printing company Fast Radius. While on the surface the connection may not be clear, the benefits are vast. UPS customers gain access to on-demand, commercial-grade 3D printing services in combination with multimodal logistics services. At the same time, both companies gain valuable industry knowledge and business development opportunities.
- Take a long-term view of the benefits of DX investment. To consider only the efficiencies to be gained in DX implementation risks leaving breakthrough innovation on the table and limits return-on-investment.



Conclusions and Key Takeaways (continued)

Learn more about the ways UPS can help you progress toward Digital Transformation.

Read **Chapter One**

Coming Soon:

Chapter 3 | The Role of Additive Manufacturing in Production of the Future
Chapter 4 | Production of the Future – Conclusions and Guidance

UPS Logistics Supporting Smarter Operations

Corporate Strategy & Innovation

- Supply chain consultation to help identify short-term and long-term steps toward smarter operations
- Financial and insurance products from UPS Capital to enable growth and investment while mitigating risk

Operations

- Advanced operating capabilities through contract warehousing, distribution and field stocking locations
- Order intake, processing, shipment and delivery
- On-demand Additive Manufacturing (3D Printing) services
- Package Engineering

Inbound/Outbound Logistics

- Integrated global transportation network: ground, air, ocean, rail
- Multimodal visibility into inbound and outbound UPS shipments
- Trade Management and Customs Compliance
- Global Freight Forwarding

Post-Sales Services & Solutions

- Returns solutions to streamline customer experience and better manage inventory utilization and costs
- Test, repair and refurbishment services
- Critical MRO order fulfillment
- 27,000 drop-off and pick-up sites

