

IndustryWeek **Special Research Report**

MANUFACTURING'S DIGITAL TRANSFORMATION:

**IS YOUR COMPANY
LEADING THE WAY
OR FALLING BEHIND?**



CONTENTS

Executive Summary.....2

I. Introduction:
Making the Leap from
Potential to Profits.....3

II. Setting Digital Priorities:
First Things First 5

III. Current Applications:
Don’t Miss the Boat 8

IV. Challenges:
Digital Downfalls.....10

V. Conclusion:
From Potential to Payoff.....12

VI. Respondent Demographics ...13

Executive Summary

OpenText commissioned this joint research project with *IndustryWeek* to investigate where manufacturers are today in their digital transformation journey. Specifically, we wanted to know how they are using data and digital manufacturing solutions to build a competitive edge in their markets.

As we found U.S. industry is at an inflection point. Manufacturing leaders clearly recognize the potential benefits of digital solutions and capabilities across the enterprise. Three out of four executives agree that the ongoing digital transformation of their businesses is critical to achieving an edge over their competitors. But only one out of four believe their digital capabilities have translated into any advantage so far.

Barriers include legacy systems and processes, solutions that focus mostly on functional benefits, and skill shortages. Data collection, storage and analytics remain top challenges even as more advanced digital capabilities emerge.

Digital Leaders (those companies reporting that their digital investments have provided a competitive advantage) lead the way both in digital applications and business results. Contributing to such returns, they more frequently report that their digital capabilities are connected to their business strategy and have created new data-driven lines of business.

For everyone else, the opportunity for a competitive advantage is fading. Digital technology investments are becoming less about achieving a market advantage and more a matter of keeping up with the competition. That said, superior execution can provide an edge.

For example, one of the oft-repeated promises of the digital enterprise is a real-time view of current performance, and potential opportunities. Despite the promise of business intelligence tools, management dashboards and mobile interfaces, most manufacturing leaders say it is still somewhat to extremely

difficult for them to get a comprehensive view of many internal areas of their business. Those that successfully develop such capabilities, whether they are early adopters or fast followers, can still gain advantage.

The digital future manufacturers ultimately achieve will depend on both the solutions they adopt and the vision of the business they want to create. Following the example of the Digital Leaders, manufacturing executives need to have a clear picture of their organization's current digital capabilities, what areas are most important to their specific businesses, and a strategic plan for aligning and developing those capabilities.

Research Methodology

This report highlights the findings of the **2017 IndustryWeek Digital Manufacturing Research Study**, underwritten by OpenText. The purpose of this research project was to investigate whether and how manufacturers are using data and digital manufacturing solutions to build a competitive edge.

During late July through early August 2017, Penton Research e-mailed invitations to participate in the online survey to a selection of *IndustryWeek* subscribers. That invitation was followed by reminders to non-respondents. For an accurate assessment we only allowed manufacturing executives and senior managers with direct reports to participate in the research, and excluded academics, consultants and other industry observers.

In total we received and tabulated 256 complete surveys from qualified respondents. This analysis and report is based on the views of these 256 senior-level executives and managers. Response percentages do not always add up to 100% due to rounding and the allowance for multiple responses on some questions.

I. INTRODUCTION

Making the Leap from Revolutionary Potential to Competitive Edge

Autonomous driving capabilities. Alternative powertrains. Mobile digital services and new ownership models. When and to what extent such technology and cultural changes will impact automotive markets is anyone's guess. What's clear is that disruptive changes are coming – in fact, they're already here – and everyone in the industry will have to evolve and adapt. The automotive sector is not alone.

Dubbed the Fourth Industrial Revolution and Industry 4.0, there's no shortage of hyperbole around the changes that networked, digitally-enabled technology will have on the global economy in general, and manufacturing in particular. Business leaders in every sector have been evaluating such innovations and experimenting with new digital capabilities. Some are further along than others.

There have been many forecasts of how many networked machines and devices will be connected to the Internet in the coming years and how big the market will be. For the record, Gartner forecasts that by 2020 there will be more than 7.6 billion connected things in the business sector, and that annual sales of such devices will exceed \$1.4 trillion. This includes smart meters, field service monitors, process sensors, real-time location trackers, security systems and many other devices.

For this project we wanted to find out where manufacturers are today in their digital transformation journey. How deeply do they understand the potential of emerging technologies? What capabilities have they implemented and where are they investing? How well are they marrying operational and informational technology? How are they

using networked digital solutions to gain and maintain a competitive edge? To get an accurate assessment of the current state of U.S. industry, we limited participants to current manufacturing business leaders and disqualified industry observers, forecasters, consultants and academics.

Where's the ROI?

In the questionnaire we defined digital manufacturing capabilities as “the software tools, solutions and other digital competencies that can be used to improve operational performance and efficiency, reduce costs, and shape new business models, products and services.” That covers a lot of territory from big data and analytics, advanced robotics and 3D printing to the Internet of Things. It's an intentionally broad definition intended to encompass all of the individual—and often isolated—technology investments that are re-shaping and transforming global manufacturing at different points in the enterprise.

For example, manufacturers have been using statistical process control to monitor huge volumes of machine operating data and maintain quality levels long before the rise of today's data storage and analytical capabilities. They are now expanding their data management and analytical capabilities to store and process more of this information, and connect it to other areas of the business.

It's no surprise, therefore, that U.S. industry appears to be at an inflection point. Manufacturing leaders clearly recognize the potential benefits of digital solutions and capabilities. They are well aware of the opportunity for using networked sensors and predictive software to dramatically improve asset management, yields and maintenance practices. However, the use of digital

capabilities to improve efficiency and productivity has not translated into significant business benefits for many organizations.

As we discovered, **only one out of four** business leaders believe that their digital investments have contributed to any kind of competitive advantage (Figure 1). In this report we refer to this elite cohort as **Digital Leaders**. In terms of digital priorities, applications and results, these innovators and early adopters are way ahead of everyone else.

The failure of most manufacturers to leverage digital tools to achieve a competitive advantage could be because they have not yet focused in a serious way on the customer- and market-oriented solutions and capabilities. The development and launch of new business models, products and services tend to require more significant investments and greater risks, and are commensurately more difficult to justify and manage. We delve deeper into this issue in the next section of this report.

ONLY A QUARTER OF MANUFACTURERS HAVE A DIGITAL ADVANTAGE

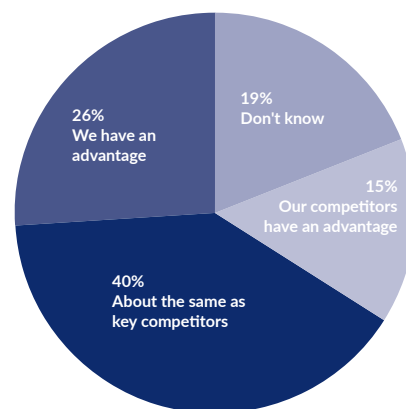


Figure 1

Departmental barriers can also limit the impact of these initiatives. Digital processes overlaid on existing order fulfillment infrastructure and processes are not agile and efficient, and do not support a more holistic approach to customer engagement. Legacy systems tend to lock up data in departmental silos, making it difficult to share and use. Product development, order fulfillment and customer relationship management need to become more seamless rather than a series of disjointed handoffs where projects and orders move from one function to the next.

Skill shortages are another barrier to taking full advantage of digital solutions, according to research participants. As more devices and sensors are connected, the quantity of data will grow exponentially. Data collection, storage and analytical expertise will need to expand as well. Manufacturers of all sizes are having difficulty finding people with the data management and analytical skills they need to take full advantage of emerging technology capabilities.

To get in front of such challenges manufacturing executives need a clear picture of where their organization currently

stands in every digital capability that’s important to their business. Then they need to identify the core digital competencies their company needs to strategically develop over the next three to five years.

As it stands, based on our research, a sizeable proportion of manufacturers don’t have a clear picture of their current digital competencies or a strategy for the capabilities they need to develop. This competitive weakness will only deepen as more digital solutions evolve and emerge.

II. SETTING DIGITAL PRIORITIES

First Things First

Given the ongoing need to maintain and upgrade critical equipment, it’s no surprise that most manufacturing managers believe that investment in digital solutions is essential to the future success of their organizations. According to our research, more than **three out of four** executives (78%) agree that the ongoing digital transformation of their businesses is critical to achieving an edge over their competitors (Figure 2).

MANUFACTURERS REVEAL THEIR DIGITAL PRIORITIES

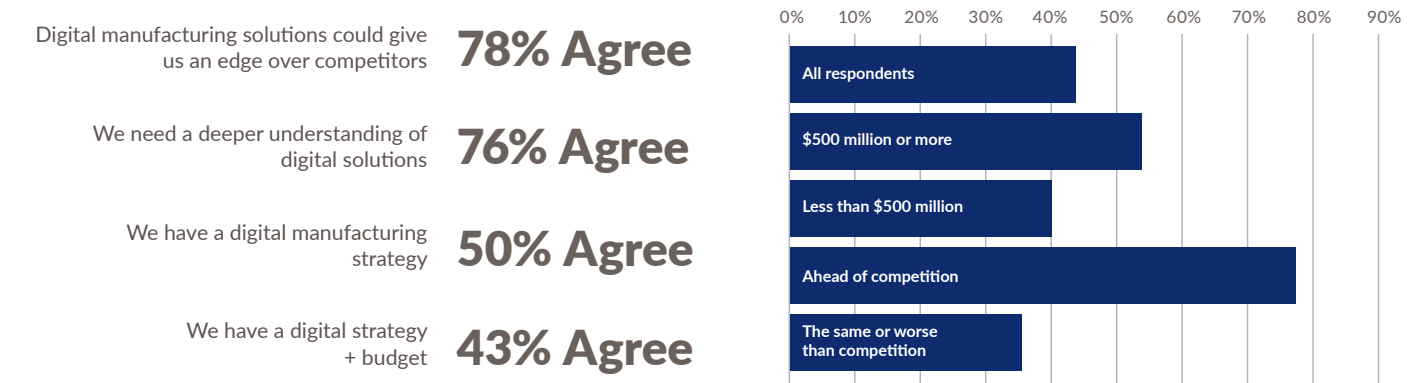


Figure 2

Our digital manufacturing solutions and capabilities are integrated and aligned with our company's business strategy.

A similar percentage (76%) believe their company needs to better understand the application of digital manufacturing solutions and capabilities. By recognizing such a knowledge gap, manufacturing executives seem to acknowledge that they haven't yet tapped the full potential of their digital capabilities. Closing the gap will require more than sending a few engineers to a conference or two, however. It requires a strategy.

Manufacturers are notoriously cost and risk adverse. In part, this is because of the capital investments required (compared to a software or call center-based business, for example) and long payback periods. Most companies tend to invest in digital solutions only after the technology is proven beyond a few test cases.

Even if a manufacturer is an early adopter, no initiative ever goes anywhere without a plan and a budget. Although they recognize the importance of digital capabilities and solutions, **only half of manufacturers** report that they have a digital manufacturing strategy. Fewer still (43%) report that they have a digital strategy that is supported by an investment plan and budget.

Adequate funding and a well-executed implementation plan won't deliver results that executives care about if a company's digital strategy is not aligned with its business strategy. One characteristic of such alignment is that digital solutions provide some value beyond the area or department where they are implemented. A field service management system, for example, if it's accessible across the enterprise, can provide valuable information for sales and marketing, quality and engineering.

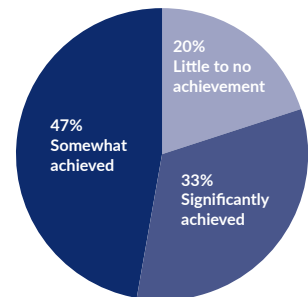
Less than **half of respondents** (44%) report that their digital manufacturing solutions and capabilities are integrated and aligned with their company's wider strategy. In contrast, for the **Digital Leaders**, more than **three out of four** (77%) say their digital capabilities are tightly connected to their business strategy.

MANUFACTURERS' CURRENT DIGITAL ACHIEVEMENTS LEAVE PLENTY OF OPPORTUNITIES FOR IMPROVEMENT

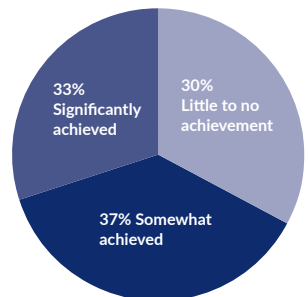
Manufacturing leaders rate the capabilities of their organization to:

BUSINESS PRACTICES

Effectively collect, store and manage available operational data



Leverage analytics for operational insights and decision making



Use cloud-based software solutions to minimize fixed IT costs

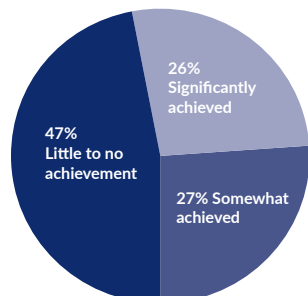


Figure 3

Digital Transformation Starts with Good Data

Robust data management is the foundation of a digital business transformation. Although the media spotlight has jumped from big data to analytics to the Internet of Things, and now artificial intelligence, we found that manufacturers are still struggling with basic data management. **Only a third of respondents** are confident in their organization's ability to collect, store and manage operational data (Figure 3). This suggests that there's still an opportunity for manufacturers to gain a competitive advantage by continuing to invest in and hone their core data management capabilities.

As solutions mature and skill levels grow, more and more use cases are emerging that demonstrate the value of analytics. This growing familiarity and awareness may be one reason why **two-thirds of manufacturing leaders** feel they have not maximized the potential benefits of analytics for operational insights and decision making.

Effective data collection and storage, as well as analytics, can be hindered by the use of legacy systems. To find out if this might be the case we asked manufacturers about their use of cloud-based solutions, which are mature enough now that the initial concerns about security and other issues have largely been addressed.

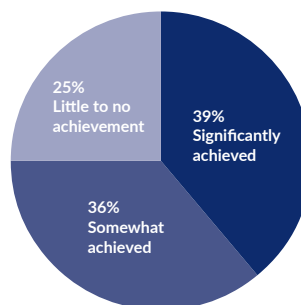
Cloud solutions are still in the early adoption phase among manufacturers. **Only a quarter** believe they have maximized the use of such systems, and half report that they have made little use of them. Again, there's an opening here for manufacturers that have not yet embraced such solutions to improve their data management and analytics capabilities in addition to leveraging the cost and other IT management benefits of the cloud.

Looking at the business impact of digital solutions and capabilities as a whole, manufacturers still have significant room for progress. Their greatest achievements so far have focused on reducing operating costs and maximizing margins (Figure 4). **Digital Leaders** are significantly more likely than other manufacturers (60%-plus vs. 25%) to have created new data-driven lines of business (Figure 5).

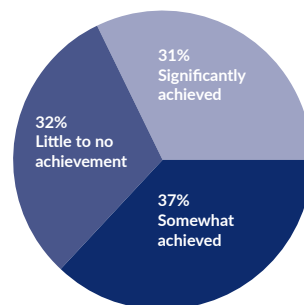
MANUFACTURING LEADERS RATE THE DIGITAL ACHIEVEMENTS OF THEIR ORGANIZATION TO

INTERNAL IMPACT

Reduce operating costs and maximize margins

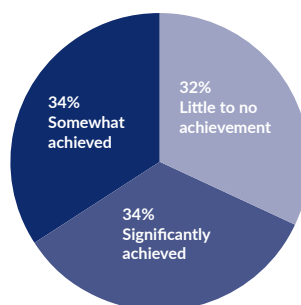


Gain a performance advantage (higher quality, reduced scrap)



EXTERNAL IMPACT

Create a market advantage (faster delivery, faster speed to market)



Create new (data specific) lines of business

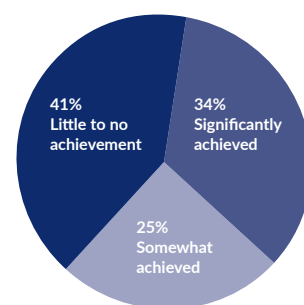


Figure 4

DIGITAL LEADERS FOCUS MORE ON MARKETS AND CUSTOMERS

Digital solutions have helped our organization:

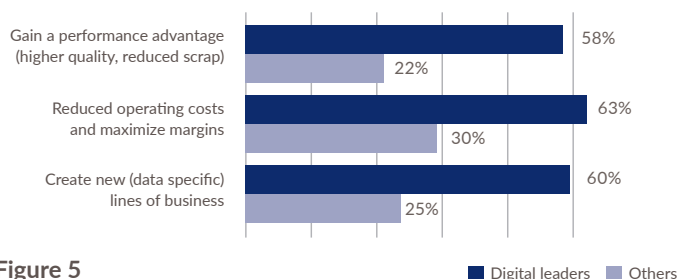


Figure 5

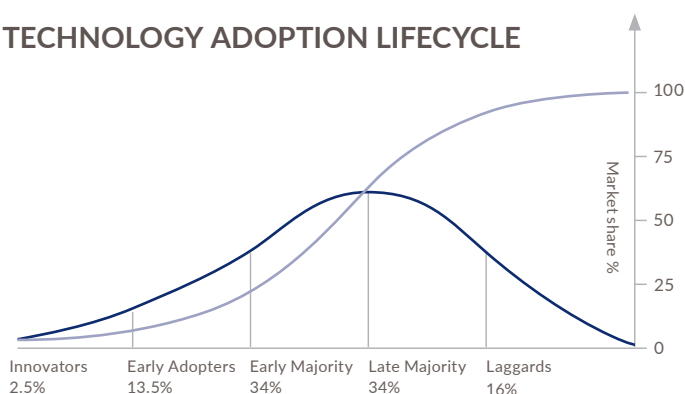
III. CURRENT DIGITAL APPLICATIONS AND IMPACT

Don't Get Left Behind

Most manufacturers regularly or extensively use digital capabilities and solutions for scheduling, capacity planning, quality control, and maintenance planning. That's not a surprise. After all, production planning and management is at the heart of how they create value for customers.

Half of company leaders report that they are also using digital solutions for customer relationship management, product development and supply chain management. Referencing the well-known digital technology adoption lifecycle curve, this indicates that U.S. manufacturing has passed into the early majority phase for customer-oriented solutions.

TECHNOLOGY ADOPTION LIFECYCLE



Source: The Technology Adoption Lifecycle was popularized in Everett Rogers' book Diffusion of Innovations, first published in 1962.

This is good news for manufacturers as a whole. After all, it's easier to strengthen relationships and thereby sell more products and services to current customers than develop new ones. Digitally integrating customer relationship management and order fulfillment solutions can improve customer retention and reduce churn. Maintenance programs and performance-based contracts can further move manufacturers away from commodity-based transactions and toward longer-term partnerships with customers.

However, the opportunity for a competitive advantage is fading. For those manufacturers who are still holding off, the incentive for making new technology investments becomes less about achieving a market advantage and more a matter of keeping up with the competition.

Analytics Bridges the Gap Between Data and Better Decisions

To find out more about manufacturers' technology investment objectives, we looked at how they're currently using analytics. Specifically, we asked them to rank the importance of analytics for improving key business performance metrics (Figure 6).

All respondents shared the same top four priorities for analytics (Figure 7):

1. improved decision making,
2. increased productivity,
3. lower costs, and
4. greater business agility.

That won't surprise anyone who has ever pulled together an ROI report or been involved in a solution justification meeting.

DIGITAL APPLICATIONS USED REGULARLY AND EXTENSIVELY

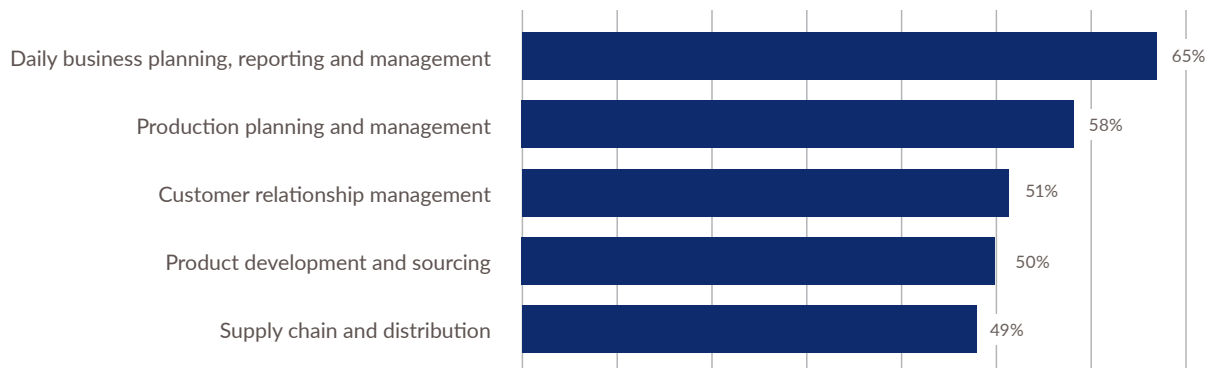
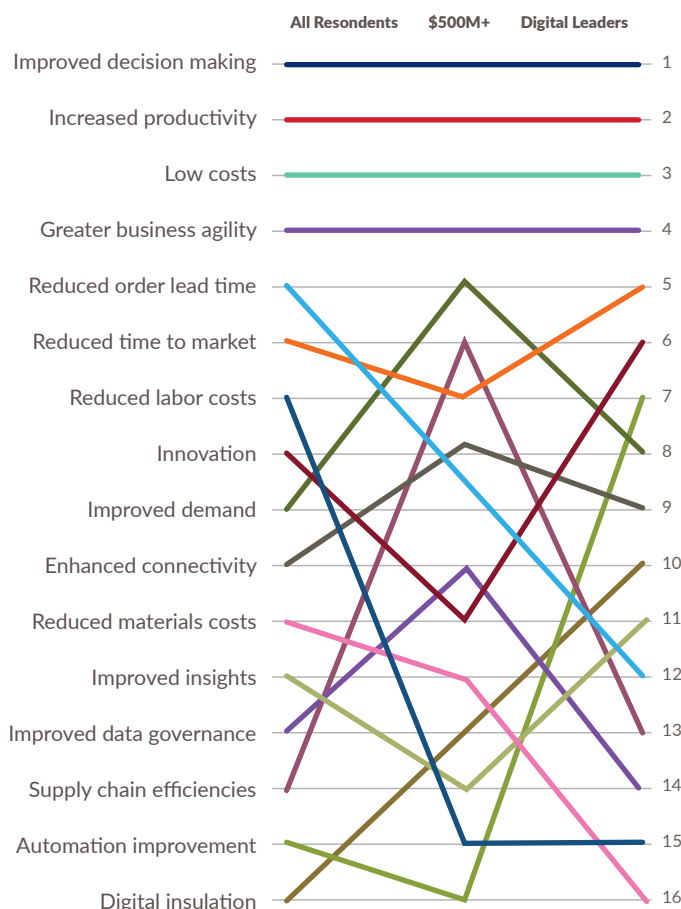


Figure 6

MANUFACTURERS AGREE ON ANALYTICS PRIORITIES



This chart compares the rankings of analytics priorities between 1) all respondents (left), 2) manufacturers with more than \$500 million in annual sales (middle) and 3) Digital Leaders (right). The top four priorities for each group are consistent, below those different priorities emerge.

Figure 7

Both larger companies (annual revenues \$500 million or higher) and our **Digital Leaders** rated every analytics priority higher. Again, no surprise there. Larger organizations tend to invest in solutions sooner. But when we compared how each group ranked the potential benefits, we found some interesting differences.

Manufacturing executives at larger companies are more interested in better demand forecasting, improving supply chain efficiencies in general, and better data governance when compared to industry as a whole. They are less interested in using analytics to reduce labor costs, shrink lead times, and (somewhat surprisingly) improve innovation. One possible explanation for this is that larger organizations tend to have dedicated R&D activities, which might be outside the scope of an analytics investment. Their innovation activities are also often driven through acquisitions.

Digital Leaders are more focused on strategic goals like automating business processes and avoiding digital disruption. Operational priorities such as reducing order lead times and material costs are much less important, presumably because they have already realized significant improvements in these areas.

Creating a Data-Driven Culture

Although data management remains an ongoing challenge for manufacturers, they are making progress. To delve deeper into this issue, we first looked at how they are using the data they are collecting (Figure 8). More than two-thirds use data and analytical tools to improve productivity (69%), followed in popularity by supply chain efficiencies and customer engagement.

MANUFACTURERS ARE USING DATA AND ANALYSIS TO:

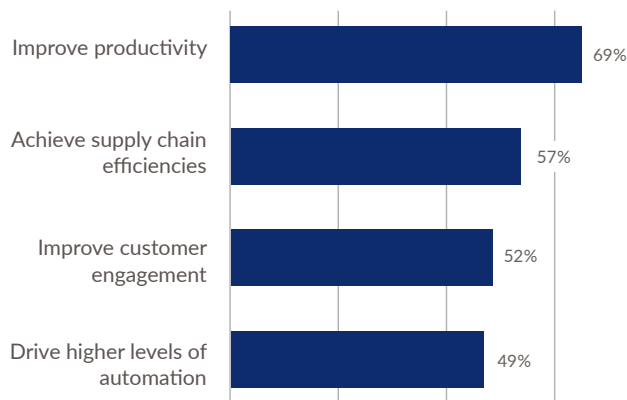


Figure 8

One of the issues with raw data is that it needs a “contextual framework” to give it meaning and make it easier to analyze. Such a structure also enables the data to be fully digitized and shared across the enterprise.

Two out of five manufacturers have digitized many key processes (Figure 9). **Digital Leaders** have made more progress across the board, which is to be expected. As these initiatives mature they move from internal areas (manual processes and compliance for example) to a more external, customer-focused orientation. This could

DIGITIZATION STARTS INTERNALLY BEFORE FOCUSING ON CUSTOMERS

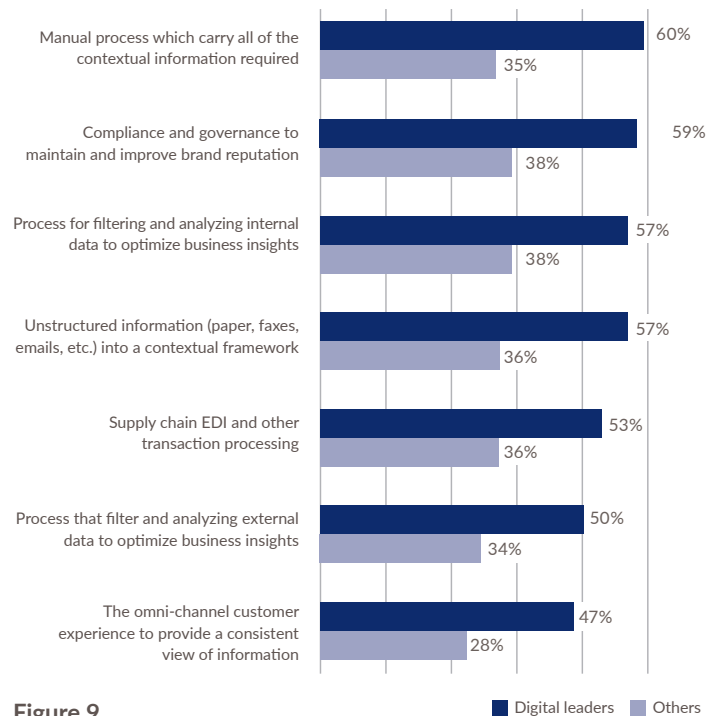


Figure 9

be because external and cross-functional data sources require more expertise to manage and integrate into a company’s analytical and decision-making processes.

IV. DIGITAL CHALLENGES

Pitfalls and Possibilities

Since the first MRP implementations, managers have griped about how long such “solutions” took to implement, the software’s failure to match the unique needs of their businesses, and a hard-to-calculate return on investment. Today, decades later, when digitally-based business processes are the norm, there’s a lot less griping. That’s not to say that significant challenges don’t remain.

For example, one of the promises of the digital enterprise is a comprehensive, real-time view of current performance and instant alerts when anything veers outside of defined

parameters. Despite the promise of business intelligence tools, management dashboards and mobile interfaces, most manufacturing leaders report that it is still somewhat

MANUFACTURERS CRAVE GREATER VISIBILITY

Companies reporting difficulty getting a 360-degree view of:

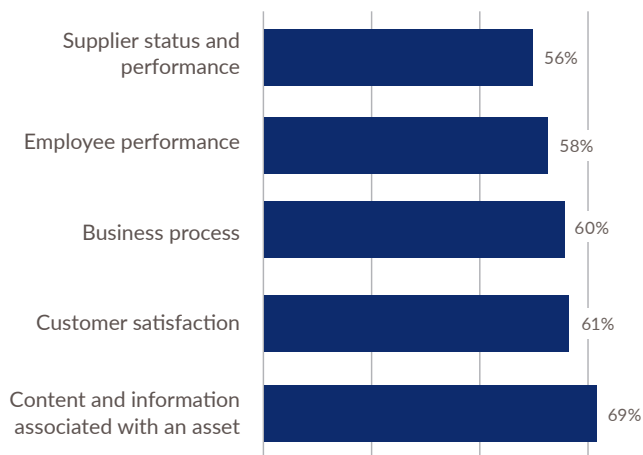


Figure 10

to extremely difficult for them to get a 360-degree view of many areas of their business (Figure 10).

Supplier and employee performance are only moderately easier to monitor than customer satisfaction and asset information. **Digital Leaders**, as one would expect, have a much better view of their performance in every one of these areas.

Digital Transformation Requires Technical and Management Skills

Implementing and maximizing the potential of these and other digital solutions often requires specialized expertise. The number of data scientist and analytics job openings are increasing by the day. The finance, insurance, professional services and IT sectors are all competing for analytical talent. It's no wonder manufacturers are struggling to

hire people with the digital skills they need (Figure 11). This skills shortage will be an ongoing challenge for manufacturing companies, which are already managing a wave of retirements in high-skill positions.

Although companies rarely go back and look at how closely they come to meeting ROI projections on such projects, people do have a pretty good feel for what has caused their digital initiatives to fall short of achieving their full potential (Figure 12). Management issues top the list. This includes poor collaboration between departments, inadequate planning and support, and lack of support from senior management. Effective collaboration is both a cultural issue and a technical challenge, the latter of which starts with the ability to easily share data between departments.

Other frequently cited points of failure include IT staff skill deficiencies, manufacturing technology, and analytics. Training investments and cloud-based solutions –

ANALYTICAL SKILL SHORTAGES PERSIST

Manufacturers are having difficulty finding, recruiting and hiring people with the following skills:

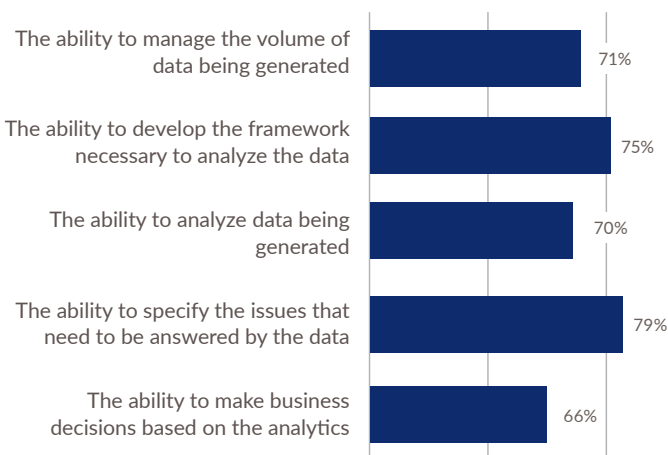


Figure 11

MANAGEMENT FAILURES UNDERMINE ROI OF DIGITAL SOLUTIONS

Why do digital manufacturing solutions fail to achieve their full potential?

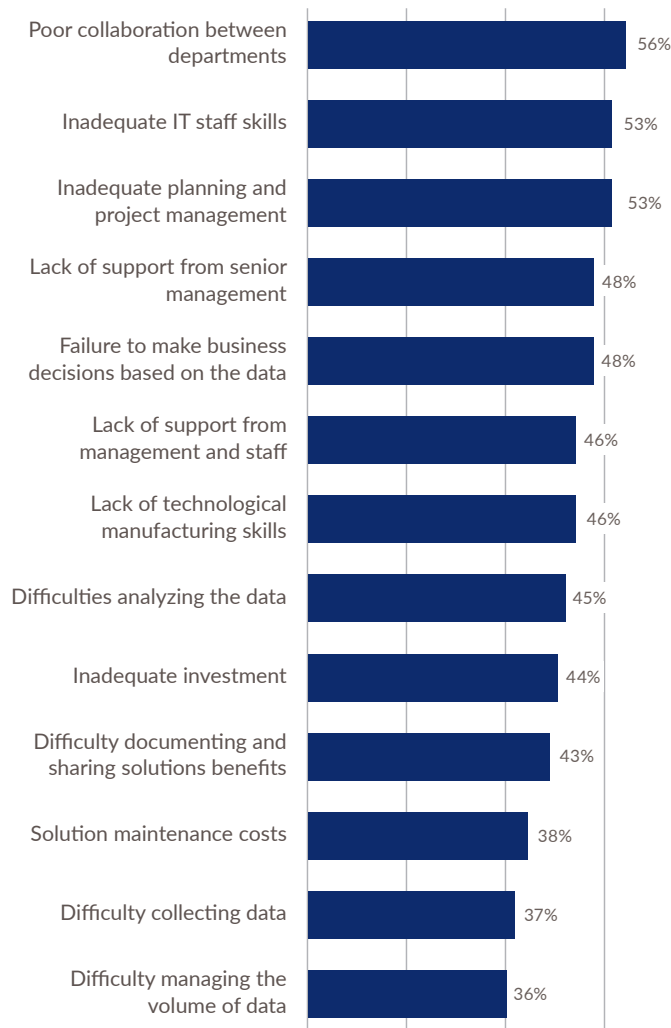


Figure 12

outsourcing much of the implementation, maintenance and upgrading costs – could help manufacturers overcome these skill and staff deficiencies while reaping the business benefits.

Manufacturing managers recognize these challenges, of course. Ease of integration tops the list of features that they look for when evaluating new digital solutions (Figure 13). That's followed by widespread accessibility

TOP 5 FEATURES MANUFACTURERS LOOK FOR WHEN EVALUATING DIGITAL SOLUTIONS

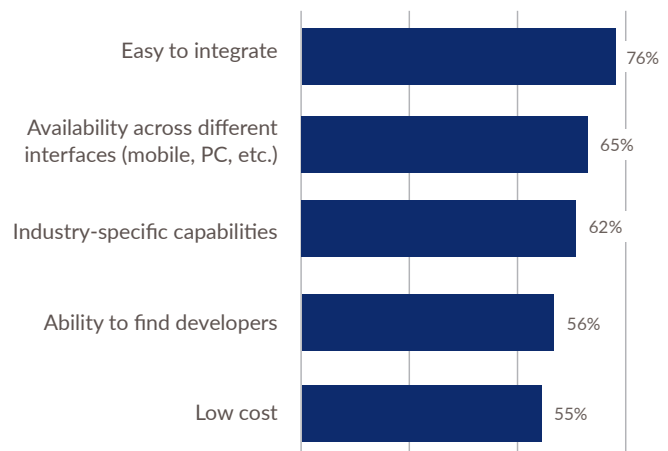


Figure 13

and availability on different devices. Traditional solutions are neither well integrated nor mobile ready. Ideally, new solutions and interfaces should be integrated with existing applications to minimize employee training requirements and encourage usage.

CONCLUSION

From Promising Potential to Payoff

Descriptions like the Fourth Industrial Revolution and Industry 4.0 imply a sharp break from the past, but the roots of today's digital solutions and networked devices go back decades. For example, the use of low cost radio-frequency identification tags for tracking products and shipments as they move through the supply chain began to take off in the early 2000s. However, the idea and

technology evolved from radar applications in World War II and the first passive responder demonstration took place in 1971.

As more devices and sensors are connected, and data volume grows exponentially, successfully harnessing such technology will require even more robust data management. As we found, manufacturers are struggling to manage the current volume of data. As a result the benefits of analytics and other digital solutions are being hindered at the enterprise level.

As we noted above, only half of manufacturing companies have a digital manufacturing strategy, and even fewer have a digital strategy supported by an investment plan or budget. IT departments have traditionally focused on projects that promise to save money and take costs out of the business. To contribute strategically and deliver a market advantage, the CIO and IT teams need to focus more on enterprise-wide digital initiatives that identify customer issues and needs, and drive sales growth.

Television cartoons in the early 1960s presented two versions of society. The prehistoric world of the Flintstones, where Fred and Barney smashed rocks all day. And the futuristic cityscape of the Jetsons, where George pushed one button in a hyper-automated factory that occasionally went haywire. The digital future manufacturers ultimately achieve will depend on both the technological capabilities and the vision of the world they want to create.

RESEARCH PARTICIPANT RESPONSIBILITIES



Figure 14

ANNUAL REVENUES PER EMPLOYEE

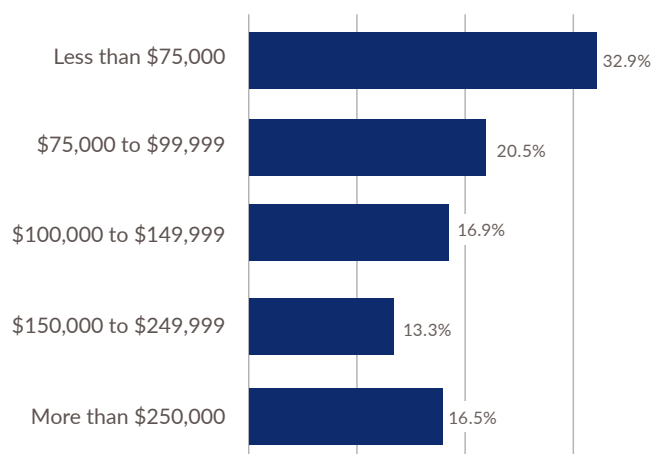


Figure 15

Respondent Demographics

Participants in the **IndustryWeek Digital Manufacturing Study** underwritten by OpenText were almost evenly divided between managers (52%) and senior executives (48%) (Figure 14). Functional representation was led by general management (24%) and operations/production leaders (22%), followed by quality/reliability/process improvement (13%), sales/marketing (11%), product engineering/design (6%) and HR/finance/administrative leaders (5%).

Survey respondents represented a broad spectrum of American industry. Specific sectors included industrial, commercial and farming equipment (15%); automotive (13%); aerospace and defense (7%), consumer durables (7%), chemical, oil and gas (5%), metals and mining (5%), medical equipment and pharmaceuticals (4%), consumer packaged goods (3%), electronics (3%) and many others.

About OpenText

OpenText is the leader in Enterprise Information Management (EIM), enabling organizations to grow the business, lower costs of operations, and reduce information governance and security related risks.

OpenText enables the digital world, creating a better way for more than 100,000 organizations to work with information, on premises or in the cloud. As a global leader in Enterprise Information Management, our products enable businesses to grow faster, lower operational costs, and reduce information governance and security risks.

For more information about OpenText (NASDAQ: OTEX; TSX: OTC), please visit: www.opentext.com.

About Industryweek

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Sources:

Unless otherwise noted, the sources for all figures is the *IndustryWeek/OpenText Digital Manufacturing Research Study, September 2017 (n=256)*.

Figure 2: Strongly and somewhat agree, n=256.

Figure 3: Significantly achieved (4 or 5), Somewhat achieved (3), Little to no achievement (2 or 1) on a 5-point scale.

Figure 4: Significantly achieved (4 or 5), Somewhat achieved (3), Little to no achievement (2 or 1) on a 5-point scale.

Figure 5: Significantly achieved (4 or 5) on a 5-point scale.

Figure 6: Used regularly and extensively (4 and 5) on a 5-point scale.

Figure 7: Priority rankings by very important (4 and 5) on a 5-point scale.

Figure 8: Somewhat and extensively implemented.

Figure 9: Effectively digitized (4 or 5 on a 5-point scale).

Figure 10: Somewhat to Extremely Difficult (3, 4 or 5 on a 5-point scale).

Figure 11: Somewhat to Extremely Difficult (3, 4 or 5 on a 5-point scale).

Figure 12: Major cause (4 or 5 on a 5-point scale).

Figure 13: Fairly important (4 or 5 on a 5-point scale).