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# CREATING A NEW FUTURE

Reimagining Digital Transformation  
in the Manufacturing Industry



# Executive Summary

With the advent of the Fourth Industrial Revolution,<sup>1</sup> the manufacturing industry is once again going through a period of tremendous change – and opportunity. In the U.S., manufacturers are moving up the value chain and developing complex products with more favorable margins, while simultaneously offering new services built around these products. This “product-as-a-service” model is beginning to work well for manufacturers who already have the domain knowledge about how their products can best be used. These manufacturers can now offer end-to-end solutions that include components made by other companies, or they may work in concert with their distributors to customize offerings for individual customers.

This approach is a win-win for both manufacturers and their customers. Customers get a one-stop shop for solving their pain points, rather than having to stitch together a patchwork solution across multiple service providers, each of whom may not fully understand the other players involved or the customers’ needs. Manufacturers get more revenue, better margins, a more attractive offering to sell, and a closer connection to customers’ needs across multiple touchpoints.

However, these multiple touchpoints for customers are often paper-and-pencil, person-to-person transactions. This was the norm in the past, when manufacturers had little need for direct communication

with end customers. Instead, they relied on distributors and dealership networks to move their product. As new, more efficient competitors with similar products enter the marketplace, one of the biggest opportunities is to take advantage of emerging technologies that are now becoming commercially viable. The presence of high-performance computers, pervasive connectivity, and inexpensive sensors now allows for the collection and curation of vast amounts and types of data about product usage. This data itself can be analyzed and implemented on a near-real-time basis to advise customers about maintenance, recommend ways to optimize machine usage, and provide insights about customers.

<sup>1</sup> Klaus Schwab, Founder & Executive Chairman, World Economic Forum, “The Fourth Industrial Revolution: What it Means and How to Respond,” January 14, 2016: [weforum.org/agenda/2016/01/the-fourth-industrial-revolution-what-it-means-and-how-to-respond/](http://weforum.org/agenda/2016/01/the-fourth-industrial-revolution-what-it-means-and-how-to-respond/).

As manufacturers begin to explore these new technologies and value-added services, they are now confronted with potential competition from technologically savvy new entrants, such as Alibaba and Amazon. These companies – with a close-to-twenty-year head start in data science applications<sup>2</sup> – are also beginning to carry similar products and offer competing services focused on the same customers.

This is an opportunity for manufacturing to remake itself yet again.

The way forward is to focus on articulating and implementing reasonable roadmaps for a companywide digital transformation.

One of the most important outcomes on the other side of such modern companywide connectivity and automation is the ability to more clearly understand the needs of each customer, in a timely fashion. For the first time in this industry, intuitive technologies, combined with data interpretation tools, will allow for the mass customization of products and services, with individual customers able to interact more easily with both distributors and manufacturers.



***The way forward is to focus on articulating and implementing reasonable roadmaps for a companywide digital transformation.***

To secure this positive outcome, manufacturing companies must begin thinking of themselves as digital-first technology companies. Now is a crucial time for making key technology decisions that will result in long-term transformation into modern, data-driven, globally competitive entities.

<sup>2</sup> Alison DeNisco Raymone, “Seven Tech Companies That Hire the Most Data Scientists,” CXO, Tech Republic, June 18, 2019.

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## 1.0

# Manufacturing: A Fast-Evolving Industry Is Under New Pressure

The spread of manufacturing expertise around the world, along with outsourcing, offshoring, and increased global competition, has created tremendous change from many different directions, the pace of which is accelerating.

The Fourth Industrial Revolution<sup>3</sup> has created new opportunities for companies within the manufacturing industry. However, in order to take advantage of these opportunities, manufacturers need to become much more agile – and connect more closely with customers. Agility, speed, and adaptability are going to be imperative for competing in an increasingly complex global marketplace.

Manufacturers, with their traditionally long, multiyear time horizons for product introductions, are feeling the pressure to match the development times of high-tech companies that operate within timeframes that span months or even weeks. Along with the pressure to shorten product development times, the manufacture of commodity products continues to move to geographies with increasingly cheaper labor. In response, manufacturers are moving up the value chain and focusing

on the development of complex products that yield better margins. In addition, more and more manufacturers are now offering value-added services, either directly to the customer or in partnership with their distributors. These services range from the installation and maintenance of their products at a customer's site, to custom solutions that could include other vendors' products – in addition to software, sensors, and built-in analytics – to assist in providing greater insights and improving processes around the use of the product.

*More manufacturers are now offering value-added services, either directly to the customer or in partnership with their distributors.*

<sup>3</sup> Klaus Schwab, Founder & Executive Chairman, World Economic Forum, "The Fourth Industrial Revolution: What it Means, and How to Respond," January 14, 2016: [weforum.org/agenda/2016/01/the-fourth-industrial-revolution-what-it-means-and-how-to-respond/](http://weforum.org/agenda/2016/01/the-fourth-industrial-revolution-what-it-means-and-how-to-respond/).

As an example of a value-added service, consider Cummins Diesel Engines.<sup>4</sup> It manufactures diesel engines for commercial trucks, buses, and recreational vehicles, as well as for agricultural, industrial, and construction equipment. This company is using internet-connected sensors that provide data from each of its fleets; this data can then be transmitted back to fleet owners with suggestions for optimizing maintenance and fleet usage.

*A better understanding of their customers and more transparent ways of communicating with them are now where manufacturing companies can make their greatest strides.*

In the case of Cummins, it is not necessarily the cost of the truck, but the cost of operating the truck and minimizing equipment downtime that is important to the customer. These value-added services can be offered by Cummins, its distributors, or dealers, but the manufacturer gets to own and manage the data collected.

The trend toward offering something “as a service” is an important differentiating strategy for manufacturing companies. The combination of domain expertise, in-depth product knowledge, and the

ability to maintain and optimize effective machinery would be a challenge for a new entrant into this business and thus provides a competitive moat. New entrants may be sophisticated about software and service offerings, but may not have the necessary domain knowledge and decades of experience of a product manufacturer.

But even providing custom solutions is not enough. At a time when companies such as Alibaba and Amazon are using sophisticated technologies to sell the same or similar products by connecting directly with customers, it is imperative for manufacturers and their partners to begin using technology to better understand and serve their customers. To date, manufacturers have focused on automating and streamlining the operational aspects of manufacturing. This traditional focus on logistics planning, supply chain issues, and production planning has resulted in much greater operational efficiencies. However, the value chains that link manufacturers, distributors, and their partners to the end customer remain complex and difficult to navigate.

A better understanding of their customers and more transparent ways of communicating with them are now where manufacturing companies can make their greatest strides.

<sup>4</sup> Cummins Inc., company website, “Connected Diagnostics, Telematics, and Fault Diagnosis: The Lifeline for Your Engine,” [cummins.com/parts-and-service/digital-products-and-services/connected-diagnostics](http://cummins.com/parts-and-service/digital-products-and-services/connected-diagnostics).

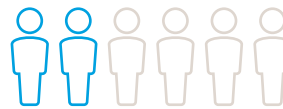
## 2.0

# The Many Aspects of Disruption

While industry trends are causing anxiety today, in the long term they will help companies become high-tech, data-driven organizations. Manufacturing will be nothing like it was in the twentieth century.<sup>5</sup>

## 2.1 Demographic Shifts and Changing Expectations

Manufacturers are facing a demographic shift that is occurring both within their customer base as well as with their employees. Close to one-third of their customers now are generally millennials or younger.<sup>6</sup> Their expectations have been formed by their consumer lives, where they are accustomed to being able to buy things, get answers, or receive round-the-clock customer service across multiple engagement channels. This demographic expects and demands a different level of engagement with all brands. Companies now find themselves being held to these same standards of ease-of-use and immediate access to information. As a consequence, millennials coming into positions of power



***Close to 1/3 of manufacturing customers are millennials or younger.***

within their organizations are finding it more difficult to do business with companies that cannot provide these kinds of capabilities.

Manufacturers need to deal with these changing external and internal expectations. At the same time, they must learn to adjust to new competitors that are unencumbered with legacy systems. The median age of manufacturing industry employees<sup>7</sup> – particularly within sales teams – is close to 50 years.<sup>8</sup> Many within these teams will retire within the next five years, taking their company-specific knowledge with them.

<sup>5</sup> Rosemary Coates, “Not Your Grandfather’s Manufacturing: The Rebirth of Makers in America Is Gaining Momentum,” Logistics Management, October 2015: [logisticsmgmt.com/article/not\\_your\\_grandfathers\\_manufacturing](http://logisticsmgmt.com/article/not_your_grandfathers_manufacturing).

<sup>6</sup> Mark Emmons, “Key Statistics About Millennials in the Workplace,” Dynamic Signal, October 9, 2018: [dynamicsignal.com/2018/10/09/key-statistics-millennials-in-the-workplace/](http://dynamicsignal.com/2018/10/09/key-statistics-millennials-in-the-workplace/).

<sup>7</sup> The Manufacturing Institute of the National Institute of Manufacturers (NAM): [themanufacturinginstitute.org/Research/Facts-About-Manufacturing/Workforce-and-Compensation/Median-Age/Median-Age.aspx](http://themanufacturinginstitute.org/Research/Facts-About-Manufacturing/Workforce-and-Compensation/Median-Age/Median-Age.aspx).

<sup>8</sup> Source: [datausa.io/profile/naics/manufacturing](http://datausa.io/profile/naics/manufacturing).

As a result, the domain knowledge they have built up over a lifetime of working at the same company is not being captured in any digital systems, retained within the company, or leveraged by other employees.<sup>9</sup> The next generation of employees coming on board are frustrated with antiquated ways of doing business, leading to a poor employee experience and employee turnover. This makes it harder to recruit and retain new talent. A separate challenge faced by manufacturers is that the overall workforce today is much more transient than a generation or two ago. Manufacturers can no longer rely on workers staying in the same jobs for decades. They need to institutionalize the knowledge within their companies. Because of all this, manufacturing companies today face a double-edged problem: They need better internal tools to remake themselves as nimble, modern workplaces that attract the next generation of talent, and they need to transform the way they interact externally to meet rising customer expectations.

## 2.2 A Skills Gap Brought About by Technology and Automation

As discussed earlier, the previous generation of employees at manufacturing companies is leaving at a faster rate than new employees are coming on board to replace them. Much of their experiential knowledge has not yet

been documented and is leaving with them.

While they need to preserve operational knowledge of existing systems and processes, companies are also in the process of installing greater automation using new technologies. In order for their employees to use more sophisticated systems, businesses are competing – both within and outside their industry – for knowledge workers who are comfortable with software and proficient in subjects that include light programming, data interpretation, and analytics.<sup>10</sup> There is a shortage of such talent today, and it is difficult to attract new employees with these skills to work at a manufacturing company.

*Millennials are looking to work at organizations that are forward-thinking, fast-moving, and modern.*

Workers already on the job need broad retraining in a variety of subject areas to become capable of running, maintaining, and operating new equipment and processes. Millennials are looking to work at organizations that are forward-thinking, fast-moving, and modern. With a record low unemployment rate of 3.6% in the U.S.<sup>11</sup> and new employees looking for high-tech or service jobs, it has been difficult for traditional manufacturing companies to brush up their image and attract new employees with the necessary skills. Many

<sup>9</sup> Harold L. Sirkin, Bloomberg, “The Coming Shortage of Skilled Manufacturing Workers,” January 14, 2013.

<sup>10</sup> James Manyika, Jeff Sinclair, Richard Dobbs, Gernot Strube, Louis Rasse, Jan Mischke, Jaana Remes, Charles Roxburgh, Katy George, David O’Halloran, and Sreenivas Ramaswamy, McKinsey & Company, November 2012, “Manufacturing the Future: The Next Era of Global Growth and Innovation,” [mckinsey.com/business-functions/operations/our-insights/the-future-of-manufacturing](http://mckinsey.com/business-functions/operations/our-insights/the-future-of-manufacturing).

<sup>11</sup> Department of Labor Statistics, U.S. Department of Labor, “The Employment Situation,” News Release, June 7, 2019: [bls.gov/news.release/pdf/empsit.pdf](https://www.bls.gov/news.release/pdf/empsit.pdf).

manufacturing companies are at various stages of digital transformation, and addressing this skills gap is a key aspect of this transformational exercise.<sup>12</sup>

## 2.3 Mergers and Acquisitions Among Large Manufacturing Entities

The mergers of large manufacturers such as Dow and DuPont or Bayer and Monsanto create tremendous disruptions in existing relationships between manufacturers and their distribution channels. In each case, both companies had overlapping divisions with existing relationships between themselves, their customers, and their distributors. Mapping out new relationships between the merged entities and these contacts takes a great deal of technical and logistical effort from all involved parties.

Danaher, a manufacturing-focused global science and technology company, is one that has grown primarily through acquisitions. In just the past two to three years, the company has acquired Cepheid, Integrated DNA Technologies, AVT, and Pall, resulting in more than 50% of its total revenues over the past seven years<sup>13</sup>, being generated from acquisitions. Although this company chooses to maintain a decentralized approach for its portfolio companies, each acquisition still creates a rethinking of how best to engage with suppliers, distributors, and end customers.

Transactions that combine two large organizations, each with its own existing networks, further complicate and obscure supplier-manufacturer, manufacturer-distributor, manufacturer-customer, and distributor-customer relationships.

The greatest need at this stage is for manufacturers to streamline these interactions so that – to the end customers – their interactions around ordering a particular product or customized service appear to be with the manufacturer of the product.

## 2.4 Dealing with Uncertainties Associated with Globalization

Most large manufacturers are used to doing business globally and know how to reduce assembly costs through outsourcing tasks, such as the fabrication of castings and forgings, to countries with less expensive labor costs.

*For multinational corporations with manufacturers and suppliers around the globe, increased geopolitical uncertainties have added to the complexity of doing business.*

<sup>12</sup> Pablo Illanes, Susan Lund, Mona Mourshed, Scott Rutherford, and Magnus Tyreman, “Retraining and Reskilling Workers in the Age of Automation,” McKinsey & Company, January 2018: [mckinsey.com/featured-insights/future-of-work/retraining-and-reskilling-workers-in-the-age-of-automation](https://www.mckinsey.com/featured-insights/future-of-work/retraining-and-reskilling-workers-in-the-age-of-automation).

<sup>13</sup> Danaher (website): [danaher.com/how-we-work/acquisitions](https://www.danaher.com/how-we-work/acquisitions).



Today, the source of much manufacturing capacity is in Asia and the EMEA countries. However, potential policy changes and efforts such as the White House's "Made in America" initiative are strongly encouraging U.S. manufacturers to bring back much of the work they had outsourced to other countries. The result is logistics chains that now need to be completely rethought. Recent changes in trade agreements between China and the U.S., for example, have contributed to short-term headaches and significant cost increases, as companies scramble to find other suppliers or less expensive alternatives for the manufacture of their products.

For multinational corporations with manufacturers and suppliers around the globe, increased geopolitical uncertainties have added to the complexity of doing business. While these companies have spent a great deal of money on streamlining their logistics and supply chains, their operations are now at significant risk because of potential changes in international trade agreements, tariffs, and political conditions in any given geographic region.

All this uncertainty has exacerbated the current disruption taking place within manufacturing. It is useful to pause for a moment to think about what might be on the other side of overcoming and getting through this period of disruption.

## 3.0

# Technology: The Key to Getting from Now to the Future

As manufacturers determine how to adjust to all the changes facing the industry, many have realized that using technology effectively will be the biggest factor in helping them navigate these changes to become digital-first. Easier-to-use technologies, now available at lower costs and with high returns on investment, are making it reasonable to consider investing in modernizing their manufacturing organizations.

This opportunity to transform themselves through technology is being enabled by three key factors:

- Access to increasingly powerful, on-demand computing resources
- High-speed connectivity, along with the availability of low-cost sensors that power the Internet of Things (IoT)
- The ability to collect, analyze, and interpret large volumes of data from a variety of online and offline sources

This combination is powerful. The quantity of data now being generated and collected – along with sophisticated analytical tools – has provided capabilities for deep insight into every aspect of a business, from the R&D division to finance and internal operations. The growth in tools for measuring and analyzing

this data has created opportunities to drive much greater operational efficiencies than previously possible.



***The manufacturing industry is now engaging in some form of digital transformation through technology.***

As a result of access to this data, large companies around the world – including those within the manufacturing industry – are now engaging in some form of digital transformation to move into an era of transparency and modern ways of doing business.

## 4.0

# Digital Transformation Within the Manufacturing Industry

While manufacturing companies realize the need to employ digital technologies to transform themselves, they are still very far behind companies in other industries. A McKinsey report places companies in the media industry at between 65% to 70% on their way to a digital transformation, while the same report characterizes the manufacturing industry at only between 30% and 33% digitally mature.<sup>14</sup> Given this gap, manufacturing companies still have a great deal of room for improvement.

Today, the idea of digital transformation means different things to different people in the manufacturing industry. Some are focused solely on exploring new technologies and view digital transformation as the process of applying emerging technologies – such as robotics, artificial intelligence, and the Internet of Things (IoT) – to automate internal company processes. This bottom-up and often piecemeal approach to leading in-house digitization efforts tends to consist of individual teams or divisions exploring new technologies, and then looking for the potential applications of these technologies within their organizations.

Others involved in digital transformation efforts are creating grander, more cohesive top-down strategies and roadmaps to:

- Streamline the physical structure and layout of their plants
- Digitize, automate, and augment their labor (by using collaborative robots, implementing additive manufacturing techniques, and employing augmented reality)
- Develop increasingly efficient uses for energy and materials used within manufacturing processes<sup>15</sup>

<sup>14</sup> Tanguy Catlin, Jay Scanlan, and Paul Willmott, McKinsey & Company, “Raising Your Digital Quotient,” June 2015.

<sup>15</sup> Daniel Küpper, Kristian Kuhlmann, Sebastian Köcher, Thomas Dauner, and Peter Burggräf, Boston Consulting Group, “The Factory of the Future: 2030 Vision and Roadmap,” December 6, 2016.

*While manufacturing companies realize the need to employ digital technologies to transform themselves, they are still very far behind companies in other industries.*

In just about every case, though, the focus of these efforts so far has been on improving internal operations within their organization, in order to make processes faster and more efficient.

Over the past twenty years, manufacturers have attempted to make the most of the digital revolution through efficiencies brought about by an increase in automation. Manufacturers have historically been engineering-driven, and their focus has been almost entirely on improving R&D, supply chain, and manufacturing processes. As a result, over the past couple of decades, these companies have spent a great deal of money on supply chain systems, enterprise resource planning systems (ERPs), and supplier management software to help them achieve their goals. These improvements have paid off through increases in operational efficiency, helping companies produce the best product in the fastest time at the lowest cost.

This approach may produce the best product due to scale. Manufacturing companies may have the best and broadest distribution channels. However, perhaps due to the fact that many manufacturers

in the past typically didn't sell directly to retail, the idea of a "customer" is a bit more complicated. Manufacturers have typically relied on networks of distributors and dealers to market their products. As a result, very few if any of these efforts to date have considered streamlining interactions with the end customer.

This needs to change as manufacturing companies go through their digital transformation exercise. Especially now that services and solutions are becoming increasingly important for the manufacturer and distributor in order to remain competitive, this omission of attention to the customer is myopic. By shoving inventory into distribution channels and leaving it up to distributors to find the customer – and, to some extent, service the product – manufacturers today often do not yet have a direct connection with their customers, and aren't able to receive feedback about their products.

For domestic manufacturers with inherently higher cost structures, it is no longer sufficient to just focus solely on increasing internal efficiency or optimizing supply chain issues and to continue outsourcing the external-facing experience. Due to the changing nature of work, a workforce whose demographic is changing, global competition, and different customer expectations, it is now critical for both process-oriented and discrete manufacturing companies to redirect their attention to an issue they have not had to tackle previously: spending time to better understand their customers.

## 5.0

# What's Needed Next: A Focus on the Customer

When considering companywide digital transformation, perhaps even more interesting for manufacturers – in addition to the internal operational efficiencies brought about by new technologies – are the exciting opportunities for the external-facing side of their businesses by enabling deeper and more dynamic connections with various stakeholders within their business.<sup>16</sup> These include channel partners like dealers and distributors, as well as suppliers, contractors, and – perhaps most importantly – customers.

The customer-facing sides of a manufacturer's interactions require a much-needed upgrade. Most large manufacturers today have at least a web presence, but in many cases the technology used to build them is years old and needs to be replaced or updated. At the time that these websites were originally built, they were designed to provide data from a back-end system to distributors and partners, rather than building a consistent and cohesive customer experience. It was up to the distributor to learn how to use these proprietary systems and to put up with their typical lack of user focus. In the past, these systems were not usually considered strategic to their organizations,

and were typically managed by an IT department that was usually isolated from a company's senior decision makers.

*Most large manufacturers today have at least a web presence, but in many cases the technology used to build them is years old and needs to be replaced or updated.*

As technology becomes core to the operation of every business, though, this siloed approach is quickly becoming unacceptable to a manufacturer's partners,

<sup>16</sup> Venkat Atluri, Saloni Sahni, and Satya Rao, McKinsey & Company, "The Trillion Dollar Opportunity for the Industrial Sector: How to Extract Full Value from Technology," McKinsey Digital, November 2018.



distributors, and customers. Today, manufacturers still have limited visibility into their customers' perspectives, gaining mostly from their distributors who are willing to share limited information, such as the details of warranty claims, and what they can get from their own limited marketing activities. But even though these manufacturers may market to the end customer (consumer or enterprise), they have little feedback into the effectiveness of their marketing efforts. On top of this, there can be some tension between manufacturers and their distributors, who in many cases, may be carrying competing products.

This is a time of great change for the manufacturing industry, and although it will be a challenge to go through the process of digital transformation, there have been several studies done by consulting firms about what manufacturing might look like in the future.

*That future has to consider the best outcome for customers, and therefore both manufacturers and distributors must shift their focus from being product-centric to becoming increasingly customer-centric.*

These studies illustrate the vast opportunities for the entire manufacturing sector to reinvent itself yet again.<sup>17</sup> These reports collectively paint a hopeful picture of a thriving, technology-driven manufacturing industry powered by data and analytics.<sup>18</sup>

It is true that the automation of operational aspects of the manufacturing organization – optimizing plant structure, creating a modular, flexible line setup, and developing energy-efficient practices for sustainable production – will continue<sup>19</sup> as processes for both discrete and process manufacturing are further streamlined. However, manufacturing companies have already optimized and automated so many of their processes that they are getting to the point where there are now diminishing returns on continuing to optimize internal investments. Given all the changes that companies need to consider, it is often overwhelming for executives to determine how to proceed. For those who have been in the industry for most of their professional lives, the rapidly increasing speed of change in the industry has been a challenge. In the short term, executives need to work with their existing distributors and find ways to acknowledge that their distributors already have credibility with their end customers. Together, they need to agree about what they see happening in the marketplace and jointly come up with a plan for what they want the future to look like.

<sup>17</sup> Venkat Atluri, Saloni Sahni, and Satya Rao, McKinsey & Company, "The Trillion Dollar Opportunity for the Industrial Sector: How to Extract Full Value From Technology," November 2018.

<sup>18</sup> Erin Blackwell, Tony Gambell, Varun Marya, and Christoph Schmitz, McKinsey & Company, "The Great Re-make: Manufacturing for Modern Times," August 2017.

<sup>19</sup> Daniel Küpper, Kristian Kuhlmann, Sebastian Köcher, Thomas Dauner, and Peter Burggräf, Boston Consulting Group, "The Factory of the Future: 2030 Vision and Roadmap," December 6, 2016: [bcg.com/en-us/publications/2016/leaning-manufacturing-operations-factory-of-future.aspx](https://www.bcg.com/en-us/publications/2016/leaning-manufacturing-operations-factory-of-future.aspx).

That future has to consider the best outcome for customers, and therefore both manufacturers and distributors must shift their focus from being product-centric to becoming increasingly customer-centric.

Today, much of the back-office operational information within manufacturing firms is in silos, some focused on logistics and the supply chain, some focused on enterprise resource planning (ERPs) offered by vendors such as SAP or Oracle. Many of these systems were developed during an earlier time, and tend to be difficult to use. As a consequence, knowledge about how to access them is often limited to one or two frequent users who have learned these systems over time, but may not have documented this.

The pressure to adapt to the changes described above requires a manufacturer to have quick, intuitive access to customer-facing technology and agile platforms that knit together customer interactions.

The most enlightened manufacturing organizations are those that consider an end-to-end digital transformation, one that shifts a company's focus from a product-centric to a customer-centric perspective, and where customer relations are an ongoing and key aspect of the organization.

## 5.1 The Need for a Customer-Centric, Connected Software Ecosystem

Most manufacturing organizations are still lagging when it comes to adopting

customer-facing technology. Their systems need to be updated to take advantage of the wealth of data available to them, and to connect the entire ecosystem of software within their organization.

*What's needed more than ever are customer-facing systems focused on usability and on the simple onboarding of new users.*

The data silos that exist within different software systems need to be connected so that, over time, the company, its sales representatives, and its various distributors can all understand inventory issues and how these might impact their customers. Today, these siloed systems are so hard to use that relevant knowledge is often restricted to one or two people. No one else knows how to use them, so they are often underutilized and deliver less value than they could.

What's needed more than ever are customer-facing systems focused on usability and on the simple onboarding of new users.

## 5.2 Online B2B Commerce

While consumers are used to doing commerce online, corporate customers of manufacturing companies now also need to be able to perform B2B commerce operations online, and have access to all the ordering, status, and tracking updates that are available to consumers who purchase products online.

## 5.3 A Personalized Customer Experience

Access to data about customer transactions can help manufacturers personalize their offerings to customers. For example, process manufacturers such as those developing and distributing chemicals need to consider developing and offering more customized services, such as labs to create specific chemical formulations for specific customers.

Besides mass-customizing products and services for individual customers, access to customer data can also help manufacturers personalize marketing engagement as well as the kind and level of service provided to individual customers.

## 5.4 Dealing with Uncertainty in Forecasting

Given the long lead times necessary for manufacturing customers to estimate the inventory they might need from any particular manufacturer, it is easy to underestimate or overestimate what they might need for any given time period. These forecasts are often based on simple inputs and assumptions, and do not always take into consideration the wealth of data that manufacturing firms could access. Because of this, even a forecast made with the best of intentions can end up wrong if the supplier happens to be in another country and if (for example) there is a change in trade policy; this might impact both parties negatively.



***Software that provides a single source of truth about inventory, any particular order, and the financial implications of planning for too much or too little volume will go a long way in mitigating long-term risk.***

Customer-facing software will mitigate risk in the long term and provide both the manufacturer and customer with some degree of comfort about the long-term forecasting of their estimated and actual purchases.

## 6.0

# Getting to 2025: A 360-Degree View of Relationships

While much of the focus within manufacturing organizations continues to be on streamlining operational issues, process automation, and production efficiency, customers have come to expect not just a great product, but personalized service, mass customization, and a user-friendly digital-first interaction experience with their suppliers.

A complex issue within manufacturing organizations that has not yet been addressed involves the interactions between manufacturers and their customers on issues such as product support, pricing, credit limits, penalties (for ordering too little or too much), and buying commitments. Today, such transactions occur manually, through long-established, person-to-person relationships between manufacturers, distributors, and customers. If and when a customer requires support, it remains unclear whether the distributor, dealer, or manufacturer is the right organization to contact. However, eventually, the customer should not have to worry about this: All transactions about a product and any associated services need to be digitally explicit, and easily accessible on a manufacturer's website, as well as on any partners' websites. The network of partners behind the scenes should still look to the customer like one organization, representing the manufacturer.

*Customers have come to expect not just a great product, but personalized service, mass customization and a user-friendly digital-first interaction.*

When customers are able to interact digitally with the manufacturer, when their needs are anticipated, and products and services customized to dynamically meet these needs, then manufacturing will have truly transformed into a customer-centric, data-driven, competitive, responsive, high-tech industry.

