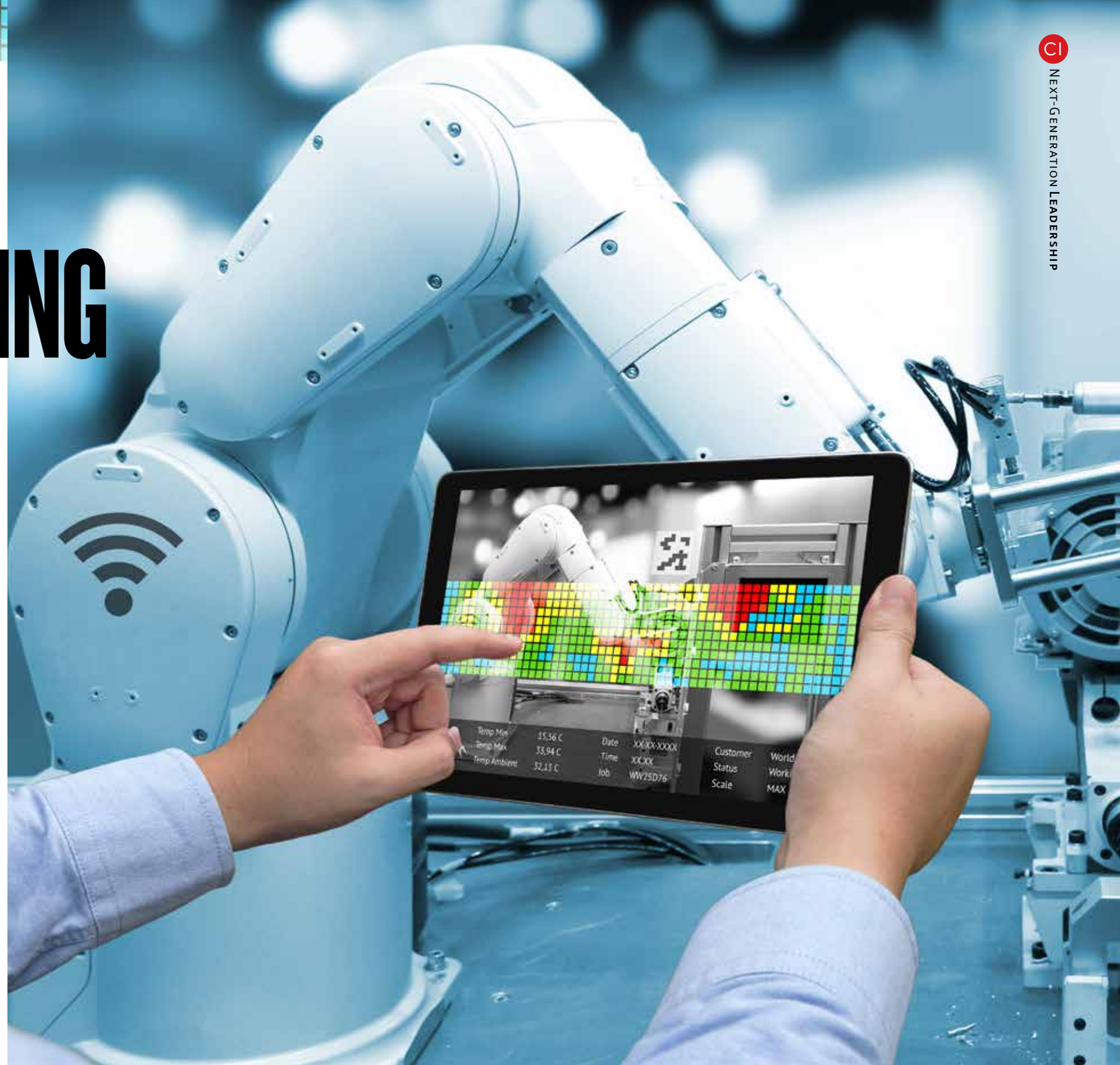
ADAPTING MANUFACTURING FOR THE DIGITAL AGE

By John Barcus

To take advantage of the opportunities presented in the digital era, manufacturers need to step up their adoption of a range of new technologies.



DIGITIZATION IS CHANGING OUR WORLD IN PROFOUND ways. Product development cycles are decreasing and delivery models are dramatically evolving. Software-enabled innovations are creating new service-based business models that are replacing existing products and re-ordering industry dynamics seemingly overnight.

Innovations from companies such as Uber, Airbnb, and Apple are completely disrupting the status quo of business and the world as we know it. Others, such as Tesla, may be doing so as we speak. To stay competitive, companies must be flexible and able to quickly adapt to new technologies. In fact, the latest PwC CEO survey, which polled more than 1300 CEOs[1], indicated that 70 percent believe the "speed of technological change" is a top threat. With so many rapid changes in technology, it should be no surprise that this is also the fastest rising risk recognized by the group. Thus, the ability for manufacturers to rapidly adapt and leverage new technologies will be critical to meet the needs of the digital age.

John Barcus is Vice President, Industry Solutions, Manufacturing, HighTech, and Automotive, at Oracle Corporation, which is a member of the Manufacturing Leadership Council. Barcus works with manufacturing companies, partners, and across Oracle to define transformational industry solutions. He has been with Oracle for 20 years in a variety of positions including consulting where he was responsible for large global ERP and supply chain deployments as well as in the value chain planning group, where he worked with customers to define and implement transformational supply chain and manufacturing solutions.

As consumers, we now expect increased personalization, same-day delivery, simple interactions, and real-time visibility of our order status. We are not forgiving if the quality of the product or packaging does not meet our expectations. What was once considered best in class performance would only be mediocre today and what was once considered acceptable could now put you out of business. Since the year 2000, 52 percent of Fortune 500 companies have either gone bankrupt, been acquired, or ceased to exist.

Global Competition Increases

To meet changing customer expectations and stay ahead of rising global competition, manufacturing companies are learning to constantly do more with less. New technologies have been instrumental in improving manufacturing performance as capabilities have evolved over the years. According to U.S. Bureau of Labor Statistics data, manufacturing output per hour in the United States has increased by more than 2.5 times since 1987[2]. Yet, as significant as these improvements are, it is not enough when your competition continues to embrace automation. It is estimated that China will quadruple the use of industrial robots between 2013 and 2018[5]. Automation, however, is only a partial answer. New innovations (currently) require people, and both new innovations and enabling technologies are required to meet the requirements of the future. The key will be to leverage technologies that will help companies adapt to whatever changes the future has in store.

This adaptation requires a new way of thinking – a fundamental difference in the way we conduct business. We must learn to embrace and leverage new technologies faster. Moreover, we need to initiate a digital thread which serves to enable a seamless flow of data among systems that optimize the path from innovation, through design, engineering, production, utilization, and service, thus bringing the value chain together. Speed and collaboration are the differentiators for the digital age, helping to support whatever business models best meet the current needs of the market. Tying manufacturing directly to the needs of your customers and collaborating throughout the process helps to validate that you have the right offerings and are able to quickly adapt as market needs change or if your performance is no longer acceptable to your customers. A digital thread also enables companies to quickly and cost effectively develop the right new offerings earlier than the competition.

But manufacturers continue to struggle with requirements to keep costs low, a natural aversion for risk, and a philosophy of not fixing what is not broken. This has created a cultural hesitation to adopt new technologies early and aggressively. While we expect rapid innovation at home, the adoption of new technologies in the manufacturing world can be cumbersome and lethargic. In the PwC survey noted earlier[1], CEOs saw innovation as the number one area that they would like to strengthen in order to capitalize on new opportunities. How do manufacturers speed up their adoption of new technologies in order to become innovation leaders?

The Role of Business Applications

Systems and business applications have been critical enablers to help companies continually improve and evolve to accomplish process improvements that could not be done otherwise. E-commerce, automation, supply chain planning, efficiency improvements, and digital connectivity have all been enabled via systems and applications. As companies went from Material Requirements Planning (MRP) to Enterprise Resource Planning (ERP), and beyond, the systems have become significantly more capable.

However, these rich, monolithic systems have also slowly become much more complex over time and today these integrated systems have become a double-edged sword. While organizations need the rich functionality to support their business, they are also being held back as these systems' ability to adapt to change has become increasingly difficult. New business opportunities are being passed up as a result of being deemed too difficult or expensive to support. On-premise ERP systems that were once considered core business enablers are now being viewed as barriers to rapid change. More than ever, it is critical for manufacturers to leverage the latest systems and applications that can support the rapidly changing requirements of today's digital age.

The transition from large, complex, on-premise software systems to cloud applications has changed the dynamics of enterprise software by helping companies move faster and become more agile. The nature of cloud deployments can make implementations significantly faster and more successful as cloud applications are more likely to support rapid release cycles with enabled best-in-class business processes. This can help businesses to shrink implementation times even with a larger scope. Of course, these

1 - 20 years inside the mind of the CEO... What's next? PwC Global http://www.pwc.com/gx/en/ceo-survey/2017/pwc-ceo-20th-survey-report-2017.pdf

2 - United States Department of Labor Bureau of Labor Statistics https://www.bls.gov/lpc/

5 - Industry perspectives 2016 Industrial Manufacturing Trends PwC https://www.strategyand.pwc.com/trends/2016-manufacturing-trends

Manufacturers need to initiate a digital thread to provide a seamless flow of data across functional areas of the enterprise.

terms are not normally used together when associated with large ERP deployments. Another significant reason this is possible is that the nature of cloud applications discourages and can even eliminate the need for customizations. Rick Hassman, Vice President and CIO, Pella Corp, in referring to their HCM cloud deployment, said, "After we went live, I called my team and asked if we had done any customizations. They said no. And I called them again, because we had never implemented an application before that wasn't customized…."

Again, this concept of zero customizations is almost unheard of for large, on-premise implementations, but should be expected with cloud deployments. It is not that custom requirements do not exist; it is that any required extensions can be compartmentalized and separated from the standard applications. This separation allows manufacturers to move quickly, as the standard applications, absent customizations, are easily upgraded to meet evolving business requirements.

The Importance of Collaboration

Moving quickly requires robust and flexible integrations within the entire value chain. These connections should enable, and not constrain, a manufacturer's ability to adapt to rapidly changing business conditions. Flexible integrations via embedded web services enable a responsive digital thread connecting all aspects of the value chain, which develops and supports rapidly evolving business models to serve the needs of the business.

The inherent flexibility and adaptive nature of cloud applications enable the digital transformations necessary to compete today. New capabilities evolve rapidly and the applications are much easier to use. Cloud applications with flexible integrations are the foundation for supporting a dynamic digital thread that connects the value chain, enabling a manufacturer to adapt faster to changing requirements. However, changing the culture to support automated communications and workflows can be difficult, and it is sometimes hard to change conventional processes that have been familiar to employees for years.

Common communication methods used in business today such as faxes, phone calls, spreadsheets, correspondence, and emails delay transactions and prevent real-time collaboration with an extended value chain. Manually communicating with contract manufacturers, suppliers, partners, customer sites, and transportation hubs increases latency and can reduce the quality of the interactions. Manual steps take time and increase the likelihood of mistakes. Standard, high volume, fixed-ordering processes have been automated with rigid technologies such as EDI; however, these also create additional challenges, as any necessary changes are difficult, take time, and add costs.

Being connected now is more important than ever, as digitization is rapidly evolving how businesses interact. Not only is everything rapidly becoming digitized, but also the connection between functions and processes via a digital thread automates connections at speeds not possible through phone, fax, or manual activities. Manufacturers still have a long way to go, though, to become fully integrated. A recent Manufacturing Leadership Council survey[4] reports that only 7 percent of the respondents see themselves as extensively electronically integrated with customers and suppliers. However, they also see this as important for the future, since 41 percent see themselves being extensively integrated in five years' time. Yet, with the rate of technological change happening today, integration will become even more critical. Five years may be too long.

Additive manufacturing is a prime example of a fast-moving technology that will continue to evolve how businesses operate. While still in the early stages of value creation, Gartner has estimated that the use of 3D printers for rapid and iterative prototyping, which enables frequent, low-cost design changes prior to production and enhances product quality, will reduce new product introduction timelines by 25%[6].

As 3D printers become faster, their benefits will increase exponentially and it is feasible that communications alone will be the longest manufacturing lead time component. This will not be a smooth ride as printer speeds and material options rapidly evolve. For example, recently developed 3D printing technology has increased speeds up to 100 times faster than previous generations. Manufacturers with the fastest, most flexible digital threads will have the competitive advantage. As these printers continue to move from primarily prototyping to supporting high volume production, leveraging an integrated digital thread will automate manufacturing in ways only dreamed about today. However, connections alone will not be enough. The systems will also need to be smarter.

Anticipating Requirements

Our computer interactions at home are becoming significantly smarter, with systems "knowing" where we want to go on vacation, even though we only did a single casual search late one night from our smartphone. In fact, we are now expecting our computer applications to anticipate our requirements regardless of the device we are using. Where we were once concerned that Google was mining our Gmail accounts for opportunities to engage, we now expect it.

For many millennials, this is the only experience that they have ever had with computers, and as they continue to migrate into the workplace, their expectation is to have the same user experience at work that they have at home. Unfortunately, most of our system interactions at work have not reached this level. In the previously mentioned Manufacturing Leadership Council survey[4], 70 percent of the respondents see the future significant potential of machine learning and cognitive technologies. We should plan for every system or machine interaction to eventually be smarter and to proactively anticipate our needs. Smarter systems with integrated feedback and collaboration will allow us to make the most of the digital thread.

At home, immediate feedback and collaboration are now a part of every interaction we have. With the expanded marketplace accessible to us, we are more specific about what we

"The inherent flexibility and adaptive nature of cloud applications enable the digital transformations necessary to compete today."

3 - https://www.forbes.com/sites/oracle/2016/10/04/12-executive-views-on-moving-to-the-cloud/#317aa65f60bc

4 - The long road to digital transformation
Jeff Moad
Leadership Journal
February 2017
http://www.mljournal-digital.com/meleadershipjournal/february_2017?pg=16#pg16

6 - Predicts 2017: 3D Printing Accelerates
Published 15 November 2016
Gartner

Monolithic software applications have become much more complex over time and are now inhibiting change in many companies.

want, and are more demanding of when we get it. We can compare prices, delivery, and return privileges instantly with the push of a button and have access to real-time customer reviews so we know how the product or service performs. For many of us, we would rarely purchase something new online or go to a new restaurant without evaluating the reviews first. It is sometimes easy to forget how rapidly these technologies have advanced until we look at the way our manufacturing operations operate.

"Digitization is driving behaviors, expectations, and capabilities in ways thought impossible just a short time ago."

These experiences have not transferred seamlessly to business. Whereas technologies such as computers, email, and cell phones have transferred from work to home, new technologies such as social, collaboration, and expectation management need to transfer in the opposite direction. The same product review process available to consumers is not yet as available at the same scale to manufacturers. Evaluating new suppliers or services or collaboratively providing feedback does not yet have similar value.

Collaboration and feedback must be timely to be effective. Phone communication is not sufficient, but real-time collaboration across the value chain enhances the experience and provides better results. This is a real gap for manufacturers today. Only 9 percent of the Manufacturing Leadership Council survey[5] respondents think their factories are managed in a collaborative manner. Yet again, they see the value in doing so, as 39 percent see themselves moving in this direction within the next five to 10 years. Many will find this to be too slow, however, and will be forced to speed adoption. Real-time collaboration increases speed and agility and must be an integral part of our transactions throughout the value chain.

As a manufacturing company, your goal should be to know real-time how well you are performing, and to be able to quickly change course as the need arises. The sooner you are able to make course corrections, the less it will cost you, the more you will gain, and the more likely you will be successful. With collaboration, you can become more agile, increase performance, and add value with every transaction. This is the foundation for how your business meets the needs of the digital age.

The digital age is here and it is rapidly changing the world around us. Digitization is driving behaviors, expectations, and capabilities in ways thought impossible just a short time ago. This is an exciting time as long as we are prepared and can adapt. A few points for manufacturers to consider as you prepare:

- Digitization is enabling new business and revenue models that may be difficult to support without rapidly embracing new technologies
- Leveraging cloud systems enables flexibility and change
- Value chains should be connected via an integrated digital thread
- Interactions with machines and systems should be smarter
- Integrated collaboration must be leveraged throughout the value chain

While this transformation may be creating new challenges, this is also an exciting time with endless opportunities. As manufacturers face the rapid changes reflective of the digital age they might do well to consider a concept attributed to Charles Darwin:

"It is not the strongest species that survive, nor the most intelligent, but the ones most responsive to change." M