Microsoft Dynamics AX

7 emerging trends that are changing manufacturing

Microsoft

Empowering manufacturing

In the last decade, few industries have been impacted by rapid advancements in technology quite like manufacturing has. Manufacturers have been faced with an "evolve-or-die" ultimatum as customers expect faster rates of innovation. A lower cost of entry has introduced a seemingly endless flow of new competitors, and new technology has transformed the modern shop floor. The proliferation of smart sensors is changing R&D and operations, providing manufacturers with massive amounts of data that presents both a great risk and a great opportunity.

As manufacturers look to manage the opportunities and challenges that technology has delivered, many are looking back to the source to help them thrive in this new environment. With the tools available in Microsoft Dynamics AX, manufacturers are able to accelerate product introductions, have more agile shop floor execution and deliver more intelligent order fulfilment. In this modern era of manufacturing, Microsoft is empowering manufacturers to improve their speed of doing business through connected operations, driving business success today and into the future.

Microsoft Dynamics AX

7 emerging trends that are changing manufacturing

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Emerging trends

In today's fast paced global economy, manufacturers are facing demands like never before. Their customers expect products that are more customised to their individual needs, the speed of innovation and new product releases continues to accelerate and the tolerance for error has become razor thin.

And if that wasn't enough pressure, the Internet now provides buyers with more options than ever before; in order to thrive, manufacturers must deliver excellence. They must accelerate product introductions, create more agile shop floors and improve order fulfilment through intelligent connected operations.

The following will explore seven emerging trends in manufacturing that will help empower manufacturers to increase their speed of doing business and deliver excellence every time.

Internet of Things

Executive summary
The Internet of Things (IoT) is having a major impact on manufacturing, giving manufacturers more visibility into their operations, enabling predictive maintenance on their machines and allowing them to provide remote support to their customers.

Highlights
- *There will be nearly 20.8 billion devices on the IoT by 2020.*
- *41% of manufacturing organisations use sensor data frequently.*
- *Wearables are being used to improve worker safety, education and customer support.*

The Internet of Things has arrived

Since the early days of the Internet, the dream has been to create an ecosystem of products, from kitchen appliances to HVAC, that were somehow all connected and integrated. The Internet of Things (IoT) is just that: the interconnection of unique devices within an existing Internet infrastructure.

The Internet of Things has become a reality thanks to near ubiquitous Internet access, smaller sensors and cloud computing, but despite the millions of devices that are already connected to the Internet, the IoT is still in its infancy. Most experts believe the IoT will be the next big boom. A recent Gartner study projected that by 2020, there will be nearly 20.6 billion devices on the IoT.[1]

For manufacturers, the Internet of Things means having more data available for monitoring and improving operations. This enables more efficient energy management, remotely monitored safety and emergency notification systems, better infrastructure management and process automation. The IoT also has big implications for manufacturing smart capabilities into products themselves. With the ability to monitor remote systems in real time, IoT connectivity opens the door for an array of other business solutions, like remote service and support options for customers.

Security challenges

Despite the amazing opportunities that the IoT presents, it is not without its challenges, perhaps the greatest of which revolves around privacy and security. Being constantly connected to the Internet means being constantly monitored. This is particularly worrying for the users of wearable devices but extends to other connected devices whose usage may provide insights into our lifestyle and behaviours that we would rather not share.

As worrying as a corporation having user data might be, the risk of this data falling into the wrong hands is a huge problem. The security vulnerability of these connected devices was recently put on display by a group of hackers who posted live feeds of thousands of private web and security cameras on the Internet, including web-connected baby monitors.[2] And while much of the data that is being collected off these devices is simply metadata, a surprising amount of personal data can be gleaned from these sources. In 2014, researchers at Stanford University analysed 546 participants who volunteered to share their metadata over a short window of time. With relatively high accuracy, and relatively low effort, they were able to obtain surprisingly intimate details about these individuals, including medical conditions and religious affiliations, as well as individuals with substance abuse issues, those who owned guns and couples who were on the brink of a divorce.[3]

Despite these challenges, the IoT opens the door for amazing opportunities that will have a large positive impact on the world. The true power of the IoT has yet to be seen, but is it already set to be a game changer?

Smart sensors

Another challenge facing the IoT is the cost of devices. While we've become accustomed to updating our mobile phones regularly, few consumers will have the desire to update their refrigerator or door lock every two years so they can have the latest and greatest devices, let alone purchase expensive new manufacturing equipment. Enter smart sensors.

20.8 billion

Projected number of Internet connected objects by 2020.[1]

Remote data sensors are becoming increasingly common, and they're just getting started. According to a 2015 study by the Aberdeen Group, 41% of manufacturing organisations use sensor data frequently.[4] This trend is fuelled by several factors. First, as mentioned above, smart sensors provide the ability to add "smart" capabilities to otherwise "dumb" devices, and they can do so for a relatively low cost. Instead of needing to replace an entire piece of machinery with a smart device, smart sensors can be added to existing equipment to provide the required feedback from said device. Second, the ability to produce smaller microchips means smaller sensors. Smaller sensors provide the opportunity to include sensors in devices that may have been too small to contain them in the past. This has been particularly prevalent in the wearables market, with fitness bands that now include an array of sensors that would not have been feasible to put in a wearable device even a few years ago.

Along with reduced size, the development of low-power sensing technologies has had a large impact on the use of smart sensors. One challenge with sensors, particularly those that are battery powered, is that they generally require power to work. For sensors that need to be constantly active, this can quickly drain a battery. New sensors that reduce the power needed to function have helped resolve this issue. Additional improvements in methodologies for data collection have helped reduce the energy needed for smart sensors to function, including sensors with local memory that

can temporarily store data and transmit in spurts, reducing the need to maintain a constant connection to the Internet.

Smart sensors have also been aided by the ubiquity of Internet connectivity. By definition, IoT devices need to have Internet connectivity in order to transmit data; however, limited Internet coverage and bandwidth has made it difficult to create seamless connections in the past. With advancements in wireless and mobile technologies, it is much easier to connect smart devices to the Internet today.

With an increased number of sensors comes the need for more powerful computers to handle the speed and volume of data. In addition to improved Internet connectivity, smart sensors have got a boost from faster computer processors that are able to manage a growing number of concurrent data streams. And perhaps the final major variable contributing to the proliferation of smart sensor technology would be the increasing comfort level consumers have with data collection.

The opportunities for remote sensing are vast, from sensors that monitor and report bodily functions to a doctor, to automotive sensors that allow cars to communicate with one another. Sensors can also make products and workplaces more efficient by providing real-time monitoring of product usage and behavioural patterns. This data can feed into real-time optimisation engines or provide data points for future strategy and development.
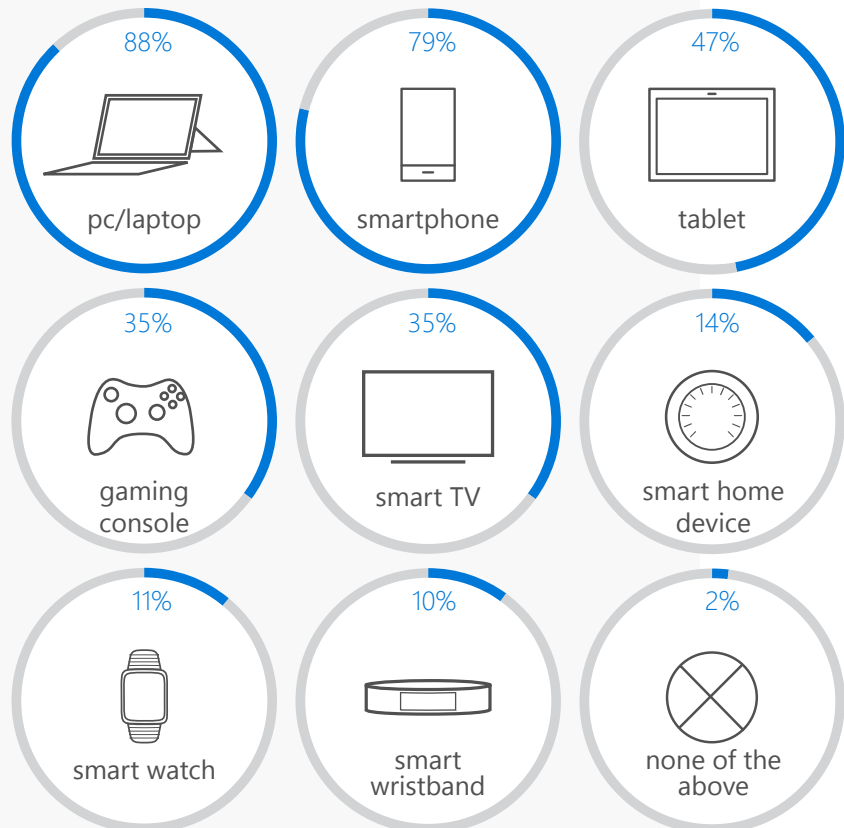
Wearables
As if there aren't enough risks for companies to handle today, new technologies are introducing a whole new set of challenges for businesses. From shop floors to the field, wearable devices are increasingly being used to "offer a witness" in situations that could affect everything from workers compensation claims to data breach policy coverage. To date, the struggles with this type of implementation have primarily been in areas regarding data management, protection and the

reliability of the devices. Questions also remain as to whether the distraction of wearing these devices outweigh the benefits, a particular issue for jobs that pose a physical risk to workers; however, as these devices become more common place, people will become more comfortable with some of these risks.

Wearables also have a bright future in training and support. Technology, like Microsoft HoloLens[5], can use virtual reality to give employees a more realistic view of work scenarios than a video or book could provide, and augmented reality can provide remote assistance, walking employees or customers through maintenance procedures in real time. This will help manufacturers improve employee training and provide better customer support.

Smart device ownership[52, 53]

88% pc/laptop	79% smartphone	47% tablet
35% gaming console	35% smart TV	14% smart home device
11% smart watch	10% smart wristband	2% none of the above

B2B to B2B2C

Executive summary

Brands are trying to manage growing customer expectations by taking greater control over their value chain, from R&D to delivery. This is forcing manufacturers to shift from B2B to B2B2C businesses, placing a greater emphasis on the end user's needs and experience.

Highlights

- *Increased customer demands are forcing businesses to take greater control of their value chain.*
- *Manufacturers need to be more transparent and end-customer focused.*
- *87% of global consumers consider CSR when making a purchase decision.*

B2B to B2B2C

There are benefits and risks – financial, social, security, emotional – involved in every consumer purchase decision. When consumers make a purchase, they're not just buying a product, they are buying an experience. This experience includes their experience with a product, but it also extends to the complexity of purchasing, how they feel in-store, the packaging, the ease of set-up and their confidence in getting the support they need should an issue arise. *"How much stress is this going to cause me?" "What will my friends think?" "What are the chances this will break?"*

While businesses may differentiate their own parts and products from those of their suppliers, consumers don't differentiate. If a fan repeatedly breaks on a car, that consumer doesn't associate the failure to the manufacturer of that part, their experience reflects upon the car brand. Thus many of today's B2C businesses are taking greater control of their value chain, from creation to consumption, to protect their own brand reputation and meet evolving customer standards. This level of ownership across all touch points helps companies better control their brand experience and enables them to ensure greater continuity across the customer journey.

As a result, B2B businesses need to be more end-consumer focused. They can no longer simply focus on their customers needs, they must now consider their customers' customers needs. This transition has turned B2B businesses into B2B2C businesses, causing manufacturers to reassess their products and services based on these evolving demands.

Need for speed has changed fulfilment

Evolving customer expectations are changing the way B2C companies address fulfilment. According to a 2014 study by Accenture, half of customer expect retailers to have options to buy online and pick up in store,[6] and 77% of retailers considered in-store pickup very valuable.[7] Of the customers who said that they use in-store pickup, 25% cited speed as the main reason for doing so.[6] Yet despite the demand, and perceived value, only a third of retailers have operationalised even the most basic services, such as in-store pickup, cross-channel stick visibility and store-based fulfilment, such as ship-to-store.

To improve delivery times, many B2C businesses are moving to a "one supply chain" model, unifying their distribution assets from their online stores and physical store locations. Some businesses that already have a large footprint are converting their retail stores into a network of mini-distribution centres to help them

cut down on fulfilment time without incurring the expense of building and managing new distribution facilities. Unifying their assets also enables customers to see stock availability, as well as find the easiest and fastest options for acquiring a product. Manufacturers are being forced to rethink their logistics to make sure that the right products are making it to the right destinations at the right time.

More supply chain visibility

Changing retail trends have also forced B2C businesses to rethink their supply chains. Many B2C businesses are now selling goods online that they don't even stock in stores, or at all, leveraging third-party logistics providers and fulfilment houses to pack and ship items on their behalf. These businesses must not only track stock from manufacturing facilities to warehouses to stores, but they must also monitor all of the individual shipments to customers. And consumers now expect to have access to more information and services, such as in-store stick information and new fulfilment options, like in-store pick-up. To accommodate this need, manufacturers must have greater visibility into their own operations and supply chain and be able to share this information through to their B2C partners.

Merger with marketing

As businesses become more focused on end-to-end customer experience, marketers are taking greater ownership over everything from product development and packaging to fulfilment and delivery. As a result, manufacturers are starting to work more closely with the marketers who are crafting these experiences.

The growth of social media has also played a large role in the merger between marketing and manufacturing. Social media continues to grow; today, nearly two-thirds of American adults (65%) use social networking sites, up from 7% in 2005.[8]. Through social media, marketers are engaging in dialogue with their customers like never before, collecting feedback on products, styles, trends and competition. As the speed of innovation has accelerated, modern businesses are trading in small focus groups for social data collected from across the globe.

Innovation anywhere

Beyond social media data, the process of innovation is evolving for businesses. Where innovation was once held tightly in R&D departments, businesses are starting to adopt an "innovation anywhere" mentality; it doesn't matter where good ideas come from. New cloud-enabled collaboration software has given businesses the tools to share, vet and accelerate ideas. Now, a sales representative can turn customer gripes into feedback that can be fed directly into the product pipeline.

Furthermore, the IoT is allowing manufacturers greater visibility into how their products are being used. This data goes a long way towards understanding user behaviour, providing insights that will inform future innovation, such as which features are used the most, which features can be removed, where are users getting stuck during their interaction with the product, where is the product failing to fulfil needs, and how are users utilising a product in ways that it wasn't originally intended. And with more agile manufacturing processes, manufacturers are able to modify and improve products faster than ever.

Sustainability

Over the last few years, there has been much debate over the growth in consumer demand for environmentally and socially friendly products. While many people say they want responsible products, purchase behaviours haven't always supported that. That trend is starting to shift.

While there has been a decline in individuals saying they'd pay more for responsible products, there has been an increase in the percentage of individuals stating that a businesses social and environmental record is important to them.[9] A 2013 study by Cone Communications and Echo Research reported that 87% of global consumers consider CSR when making a purchase decision.[10] Interpreted another way, good CSR is the new baseline, and while consumers may not reward those for doing extra, they will certainly turn on those who fail to meet their rising minimums. Businesses need to consider CSR both as a defensive strategy and an offensive strategy.

Today, information is easy to obtain and spreads quickly. Exposed unethical business practices have resulted in swift backlash from consumers. This has forced many businesses to revisit their own practices, as well as the practices of vendors in their supply chain, to become more socially responsible organisations. It has also pushed many organisations to improve transparency.

In 2015, CorporateRegister.com[11] has aggregated CSR reports from over 12,000 companies, up from a mere 20 in 1994.

Additionally, an increasing number of businesses are using CSR to grow their businesses, including American Eagle, who recently reported a 10% increase in sales of their lingerie, Aerie, after a pledge to stop Photoshopping models in their ads[12], and Goldman Sachs, who is investing in training and education for 10,000 female entrepreneurs.[13] Research by the World Green Business Council[14] has shown productivity gains of 8-11% in businesses that have taken initiatives to improve air quality in their offices. The research also suggests that companies with a strong CSR record have an easier time recruiting and retaining workers, and a 2011 study between Harvard Business School and the London Business School showed that businesses with strong CSR performance had easier access to financing.[14] While CSR initiatives have received a mixed bag of reviews in the past, the waters are shifting and the importance – both ethically and financially – of investing in CSR is becoming clear.

Lower tolerance for poor quality

From online reviews to online retailers, the Internet has empowered consumers with more information and more options than ever before. Additionally, many industries – from fashion to technology – are seeing shorter and shorter lifecycle,[15, 16] meaning that dissatisfied customers have an increasing number of opportunities to buy alternative products.

As a result, manufacturers must deliver against a razor-thin tolerance for poor quality, all while being faced with the challenge of an increasing speed of innovation and tighter production deadlines. Customer expectations for new products, even those featuring never-been-done innovation, is that they will work flawlessly out of the box, and manufacturers that fail to delivery will pay the price.

Triple bottom line

People

The impact of an organisation on its people and the community. The TBL model considers all stakeholders, not just those who are financially invested.
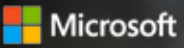
Planet

The environmental impact of the organisation. At a minimum, this means "do no harm;" however, many TBL organisations go beyond this minimum standard.

Profit

The economic value of an organisation. In the TBL model, profit extends beyond the traditional accounting definition to the full impact of an organisation on the global economic environment.

Microsoft

Evolving value chain

Executive summary
Manufacturers are evolving their value chain to provide a stronger focus on customer experience, better support and more transparency.

Highlights
- *64% of companies surveyed said that their ability to negotiate and collaborate with value chain partners will become more important.*
- *29% of businesses reported that personalised service through technology was already disrupting their market.*
- *59% of manufacturers already use robotics technology.*

Evolving value chain

As manufacturers seek to adapt to a business model that has a greater focus on the end consumer's needs, they are being forced to rethink their entire value chain, from R&D to post-purchase support. Manufacturers are needing to work closer with their value chain partners to provide the elevated level of transparency and service required by today's consumers. According to Deloitte's 2015 Supply Chain Talent of the Future report, 64% of companies surveyed said that their ability to negotiate and collaborate with value chain partners will become more important.[17]
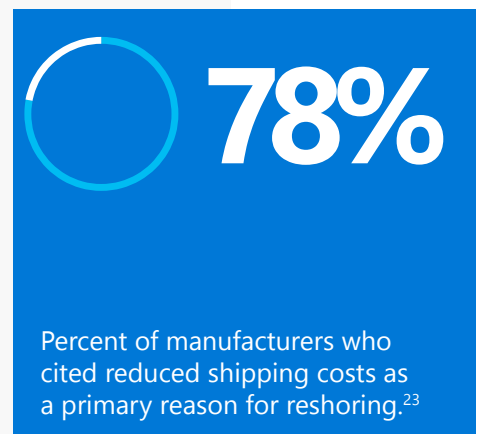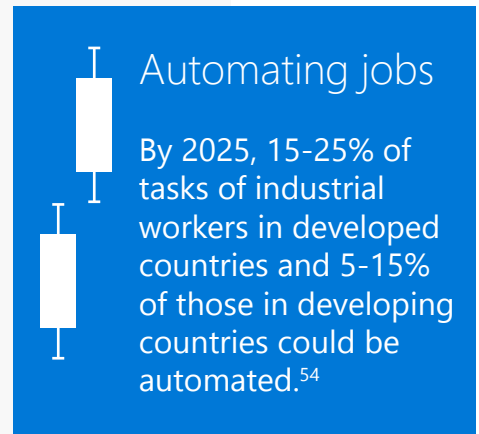
Manufacturing as a service

The evolving value chain, in conjunction with new technology like 3D printing, has created new business opportunities for manufacturers, starting with the ability to personalise. Manufacturers are already starting to offer manufacturing services that are more akin to "on-demand" ordering (often referred to as "real-time demand fulfilment") than traditional manufacturing, and it's impact is starting to be felt. Twenty-nine per cent of businesses reported that personalised service through technology was already disrupting their market.[18] Personalised products are already emerging in impactful ways, including personalised medical devices and customised pharmaceuticals, as well as more playful applications like personalised toys. Technology is enabling these services both from a manufacturing perspective, as well as from an operations and logistics perspective.

The growth of the Internet of Things (IoT) has also played a large role in developing manufacturing as a service. With the added ability to monitor products after they've been sold, manufacturers can gather usage data and use predictive analysis to offer preventative maintenance. This will absolutely revolutionise the service industry in the next few years. Drivers will no longer need to bring their cars in for check-ups. Instead, their car will self-diagnose problems and report when maintenance is needed. Manufacturers can send any needed parts to the auto-shop in advance, and the mechanic performing any work will be able to view a diagnostic report before their customer even shows up.

Some manufacturers, like ThyssenKrupp Elevator, are completely re-envisioning their business models for manufacturing as a service. By installing smart sensors on their elevators, old and new, ThyssenKrupp has been able to use the data that they're collecting to provide predictive and pre-emptive maintenance services to their customers, reducing costs and down time. But not only has this solution enabled them to improve how they service their own elevators, they have expanded this service model to non-ThyssenKrupp elevators, something that is not typical in the elevator industry.[19]

Reshoring

Reshoring is one of the latest, most talked about trends in manufacturing, and it's set to have a major impact on the global economy. According to a late 2014 Boston Consulting Group

Automating jobs

By 2025, 15-25% of tasks of industrial workers in developed countries and 5-15% of those in developing countries could be automated.[54]

78%

Percent of manufacturers who cited reduced shipping costs as a primary reason for reshoring.[23]

report,"11 per cent of small and medium-sized manufacturers in the UK said they had brought production back from overseas in the previous 12 months – twice as many as said they were shipping work abroad."[20]

Reshoring has been driven by several major variables. The first is economic growth in countries that provide low-cost manufacturing, such as China, India and Brazil. This has led to an increase in wages, double-digit gains in some places.[21] While this provides a great economic opportunity for local workers, it offsets some of the costs of offshore manufacturing for some domestic businesses.

The cost benefits of offshore manufacturing have also been diminished as of late due to rising transportation costs, which are the highest operational expense for many multichannel merchants. Transportation costs for domestically sourced products typically range from 2-4% of gross sales, compared to imported products, which range from 6-12% of gross sales.[22] Increases in petrol prices, as well as other cost hikes, such as wage increases at parcel carriers, have all contributed to the rising cost of manufacturing abroad. In Boston Consulting Group's Manufacturing Survey, 78% of manufacturers cited reduced shipping costs as a primary reason for reshoring.[23]

Additionally, the growing penetration of robotics in manufacturing is greatly contributing to the increase in reshoring. Robotics already play a large role in manufacturing, with 59% of manufacturers already using some sort of

59% of manufacturers are already using some sort of robotics technology.[24]

robotics technology.[24] Modern robots, equipped with faster processors and connected to the cloud, are able to automate many of the processes that required a human even just a few years ago. One in three manufacturers are currently considering using robotics to automate business and industrial processes.[25] As domestic manufacturing facilities are improved with these intelligent robotics, they're more reliant upon skilled workers trained in robotics and less reliant upon the low-cost manual labour that has been sought after in foreign markets in the past.

Smart-manufacturing and the demand for new equipment

The movement towards smart-manufacturing facilities and digitalised value chains is having a major impact on manufacturing businesses. Today, one third of manufacturers classify their degree of digitisation in their value chain as high and more than 80% expect to have digitised their value chain within five years.[26] And while the opportunities are great, the cost of purchasing smart machines and digitising is expensive. Over the next five years, PwC projects that manufacturing and engineering industry will invest roughly US$31 billion a year in Industry 4.0 solutions.[26] Yet despite the cost to implement these new technologies, the cost of not implementing will likely be much higher.

The impact of the sharing economy

With current revenues around US$15 billion globally, a recent report by PwC predicts the sharing economy market will grow to US$335 billion in revenues by 2025.[27] Companies like Airbnb and Lyft have changed the rental and transportation markets, but already, this sharing economy model has spread to include boats, storage, pets, workspaces, and even energy.

With such growth, the sharing economies impact on manufacturing is inevitable and signs are already starting to emerge. The true risk for manufacturers remains to be seen, but it is not a stretch to conclude that if individuals are able to "share" products that they might otherwise need to buy, it could have a negative impact on sales. But the sharing economy creates some interesting opportunities for manufacturers as well. Several companies, including Amazon, are already exploring the prospect of having community members deliver products and materials to customers, reducing shipping time and costs. And between businesses, the sharing economy opens up some unique propositions, from shared overhead to resizing shared warehouse space between companies who have alternating seasonal demands. While this trend is still new, it is destined to have an impact on manufacturers' businesses.
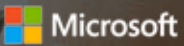
Greater visibility

Executive summary
With better data collection and cloud-enabled analytics platforms, manufacturers have greater visibility into their businesses and operations than ever before.

Highlights
- *45% of organisations said that gaining access to data from different areas of the business was a top pressure driving their need for analytics.*
- *47% of global businesses feel they have insufficient access to the data they need.*
- *SMAC-stack (Social, Mobile, Analytics, and Cloud) is changing the way manufacturers do business.*

Greater visibility

One of the biggest challenges for big data has been managing the volume and speed. A 2015 study by IBM reported that 2.5 quintillion bytes of data are created every day, so much that 90% of all data in the world has been created in the last 2 years.[28] Without the tools to better leverage data, its uses have remained relatively niche, but with more intelligent and powerful cloud computing, big data is finally becoming more useful, helping manufacturers improve production and build more intelligent operations and supply networks.

New technology, from smaller sensors to more ubiquitous Internet access, now provides manufacturers access to faster, more reliable data. These advancements allow manufacturing businesses to collect data from a much wider range of sources than was previously possible, including user product usage data, machine shop capacity, energy consumption levels, parts stock, machine maintenance status and quality control metrics. The Aberdeen Group's 2015 Data-Driven Manufacturing in the Age of Insight report, 45% of organisations said that gaining access to data from different areas of the business was a top pressure driving their need for analytics.[29] With better, more holistic data, manufacturers can gain a more comprehensive understanding of their business and allow them to optimise operations and address prospective mechanical or safety issues before problems arise.
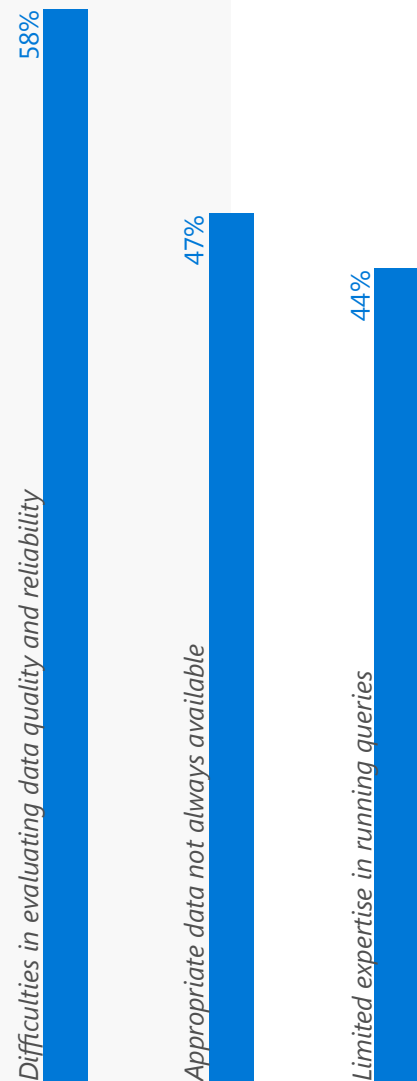
Big data

While faster, more reliable data is a stride in the right direction for big data, it also creates new challenges, what IBM has coined, "The Four V's of Big Data".[30] The four V's include volume (scale of data), velocity (analysis of streaming data), variety (different forms of data) and veracity (uncertainty of data).

With the growth in big data, organisations are definitely feeling these challenges. In KPMG's 2015 Going Beyond the Data report,[31] 58% of global businesses cited data quality and reliability as a big challenge to making decisions based on data and analytics, while 47% felt that they had insufficient access to the data they needed. In short, big data is too big. To date, a company's ability to leverage their data has been limited due to a lack of internal knowledge, limited tools, and prohibitive costs, but corporate capabilities are finally catching up.

Manufacturers are now relying on a new breed of analytics tools designed to make big data more easily accessible, including machine learning, predictive analytics and automation tools. Big data, in and of itself, is not useful; it becomes useful when it can provide knowledge, make processes more efficient and allow manufacturers to operate more efficiently. These tools help manufacturers with detection, classification, probability and optimisation.

Detection involves identifying patterns (trends), targets and outliers. Data visualisation tools that convert large

Biggest challenges to making decisions based on data and analytics[31]

58% — Difficulties in evaluating data quality and reliability

47% — Appropriate data not always available

44% — Limited expertise in running queries

sets of numbers into charts and graphics makes trends much easier to identify, and allow for simple, visual comparisons that can make outliers jump out. The addition of real-time data adds speed to the simplicity that data visualisation provides. Manufacturers can use these tools to track quality control changes, maintenance issues, detect emerging market trends or to identify potential supply chain issues before they materialise.

Classification allows businesses to isolate, sort, filter, sequence and compare data. Classification helps manufacturers become more agile by enabling them to isolate and/or rank stock, parts or production needs. Tools that provide the ability to automate the classification process can streamline production and allow manufacturers to be more adaptive to changing demands. This also empowers manufacturers to create more customised products and conduct more intelligent cross-selling.

Understanding the probability of future events is critical to making strategic decisions. Probabilities can be used to demonstrate the likelihood of an occurrence, to compare multiple events or to show distributions of potential outcomes. Predictive analytics tools help manufacturers master stick management, determine optimal pricing for new products, conductive predictive and preventative maintenance, predict sales and support needs, and better manage cash flow.

SMAC-stack = Social, Mobile, Analytics, Cloud

As agility is becoming increasingly important for manufacturers, optimisation is an important use of analytics that helps them become more nimble. This can be done by optimising the three pillars above: faster and more accurate detection, categorisation and probability. As more real data becomes available, new machine learning tools help manufacturers improve performance by comparing the expected results against their actual results and optimising their algorithms accordingly.

While many of these methods are not new, new tools, like more powerful processors paired with cloud computing, are now enabling manufacturers to take full advantage of their data.

SMAC-stack

SMAC-stack, which stands for Social, Mobile, Analytics (i.e. big data), and Cloud, is a growing product and service package designed to help give manufacturers greater visibility into operations and enabling them to be more agile. Perhaps the next evolution of SaaS, what distinguishes SMAC-stacks is that they work together as a cohesive system. New capabilities aren't simply "added on" via plug-ins and APIs that enable tangential software to work together. Instead, the entire system is built and updated to work cohesively together; the addition of a new feature is an improvement to the entire stack.

In the SMAC-stack, social capabilities, empowered by the cloud, enable businesses to share data more efficiently, improving collaboration. Not only do these social capabilities provide better internal communication, they also improve communication between suppliers and other vendors in the supply chain.

The mobility trend has been in motion for a while, but within the SMAC-stack, mobility is making it easier for employees to sync their devices through the cloud to gain access to social and analytics data wherever they are. The use of mobile technology on the shop floor can improve production flow and help communicate issues to speed remediation.

Not surprising, analytics is a driving force behind the SMAC-stack concept. As described above, big data is having a major impact on manufacturing. Connecting analytics via a SMAC-stack provides several valuable benefits, perhaps the most important of which is a consistency of measurement that comes through using a single platform, opposed to a mash-up of sources that use different data collection methodologies.

Last but not least, the cloud acts as the thread that ties all of these pieces together. The cloud is changing how businesses operate. By allowing businesses to store data remotely, it reduces the need for on-premise data centres and all of the associated costs. Businesses no longer need to worry about the security of the physical location of their data, and by centralising resources in the cloud, employees can gain easier, more secure access to the tools and data they need to do their jobs, anywhere and at any time.

IT and finance

The increased penetration of technology in manufacturing is leading to a much closer relationship between manufacturing teams and IT. And as the role and cost of technology in businesses as a whole has expanded, finance has taken a larger role in managing IT, and thus, by extension, in manufacturing operations as well. Big data is providing both IT and finance professionals greater visibility into manufacturing operations and supply chain at their business. This shift is adding a level of financial accountability throughout the value chain as finance leaders seek to better understand the impact of the investments and expenses.

2.5
quintillion

Bytes of data created every day.[28]

Microsoft
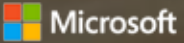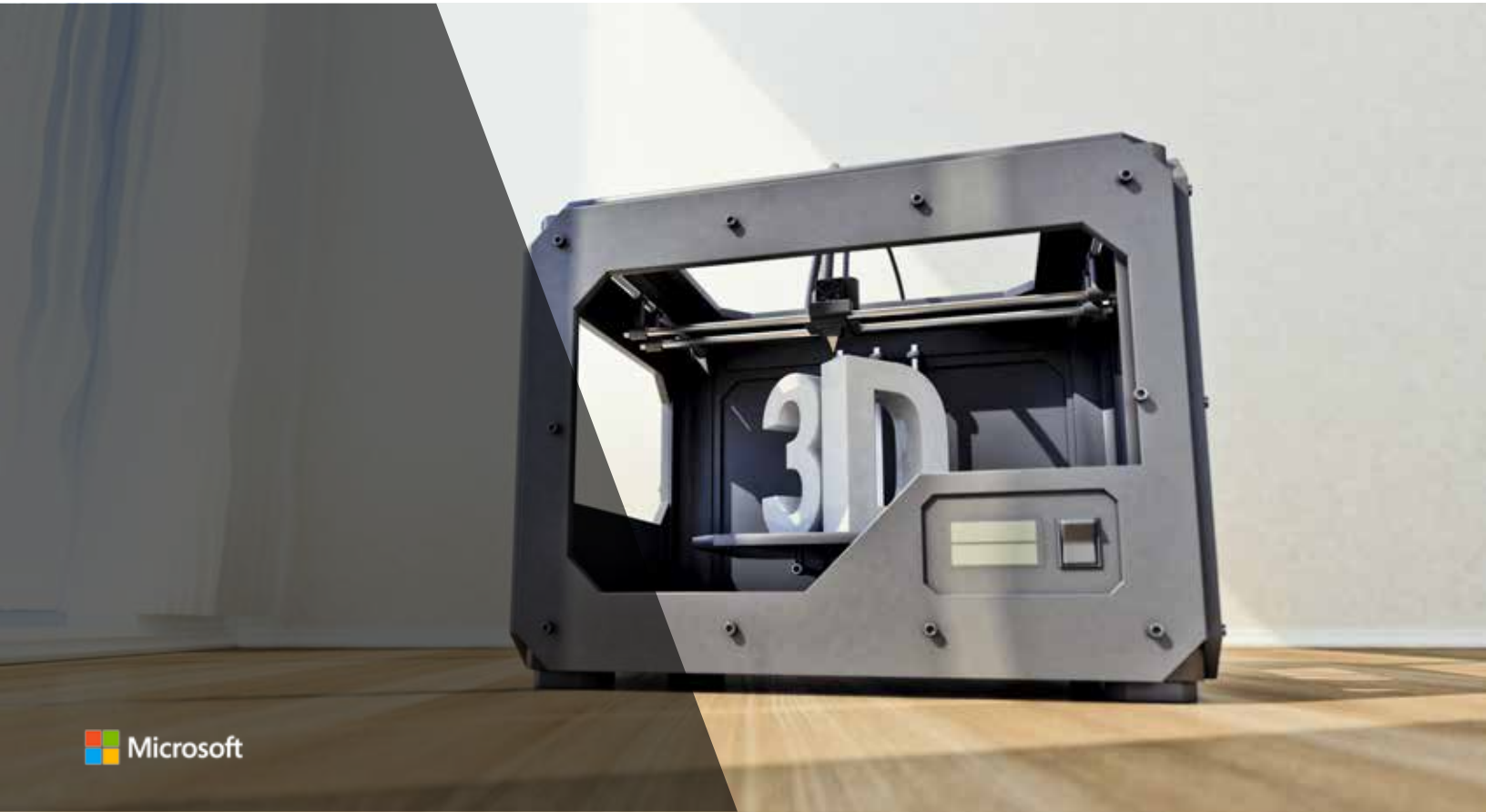
Emerging technology

Executive summary

Technology has always been a driver of innovation in manufacturing and today's emerging technologies are no different. From 3D printing to nanotechnology, these cutting edge tools and techniques are changing how products are made.

Highlights

- *66.7% of US manufacturers have deployed 3D printers in some capacity.*
- *Autonomous devices are on the cusp of revolutionising manufacturing operations.*
- *Nanotechnology is enabling atomically precise manufacturing (APM).*

Emerging technology

The history of products has largely been parallel to the history of manufacturing technology. The first leather belt bucket elevator and belt conveyors in 1785; the introduction on interchangeable parts in 1801;[31] the first moving assembly line, introduced by Ford, in 1913;[32] the creation of the Televox robot in 1926;[33] CNC machining; Six Sigma in the 80s; RFID tags; all of these technologies have enabled manufacturers to create new materials, new processes and assemble the products that we rely on today.

So as we look at trends in manufacturing as a way to better understand the future of manufacturing, it is fitting that we take a close look at some of the latest technology that is driving that future.

3D printing

3D printing is one of the most exciting emerging technologies in business and manufacturing today. Through an additive layering process, it allows manufacturers to print virtually any 3D digitally rendered image in physical form. Currently, two-thirds (66.7%) of US manufacturers reported deploying 3D printers in some capacity, and that number is growing, with nearly 15.5% expecting to start using it within the next 3 years.[34] This growth has been driven by technological improvements that have resulted in lower machine and material costs, as well as faster printing times. While 3D printing is not new, these improvements have made 3D printing much more practical for a larger set of manufacturers. In fact, 3D printing adoption among small companies is quickly catching up to adoption among large companies, 59% compared with 75% respectively and the gap is closing.[34]

The applications for 3D printing are expansive, including customised medical devices, personalised products and packaging and printed replacement parts that allow ships to make repairs while at sea. Uses have already emerged allowing users to print their own beauty products in custom shades, and pharmaceutical companies are testing 3D printing technology as a way to produce more customised medicines for patients. In manufacturing today, 3D printing is primarily being used for prototyping. Thirty-four per cent of manufacturers report using 3D printing for prototyping,

28.9% say they're still experimenting with how to apply it, and 2.6% report using 3D printing to build products that cannot be made from traditional methods.[34] As 3D printing technology it becomes faster and less expensive, it will inevitably enable new applications for manufacturers.

CNC machining

Unlike 3D printing, which is generally an additive process, machining is a subtractive process, cutting larger blocks of raw materials into a desired final shape and size by the controlled removal of material. This means manufacturers can create a single component out of a single piece of material instead of creating multiple parts to achieve the same outcome. This reduces time assembling multiple parts, reduces weaknesses common at connection points and reduces weight and size by eliminating additional parts and materials needed to connect multiple pieces together.

While CNC machining is not new, advancements in the technology and processes have recently put CNC machining in high demand. Today's CNC machines offer improved automation, precision, speed, and the ability to work with more materials, like the high-grade metals that are commonly used in cars,medical devices and tech devices. As a result, CNC machining is being used to make stronger and smaller products, and is the technique behind many of the unibody construction seen in products today.
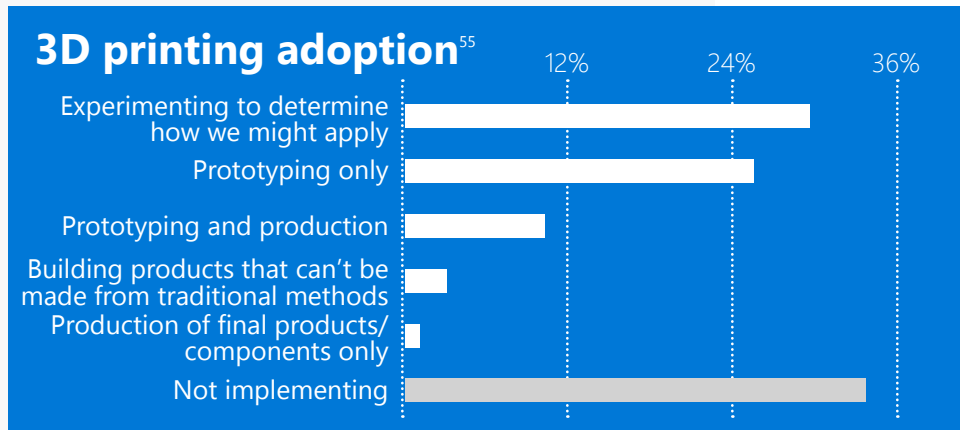
Autonomous devices

While autonomous devices, like self-driving cars and drones, may seem like a fantasy of the future, the truth is that these devices are already here. Many automakers, including Mercedes-Benz[35]
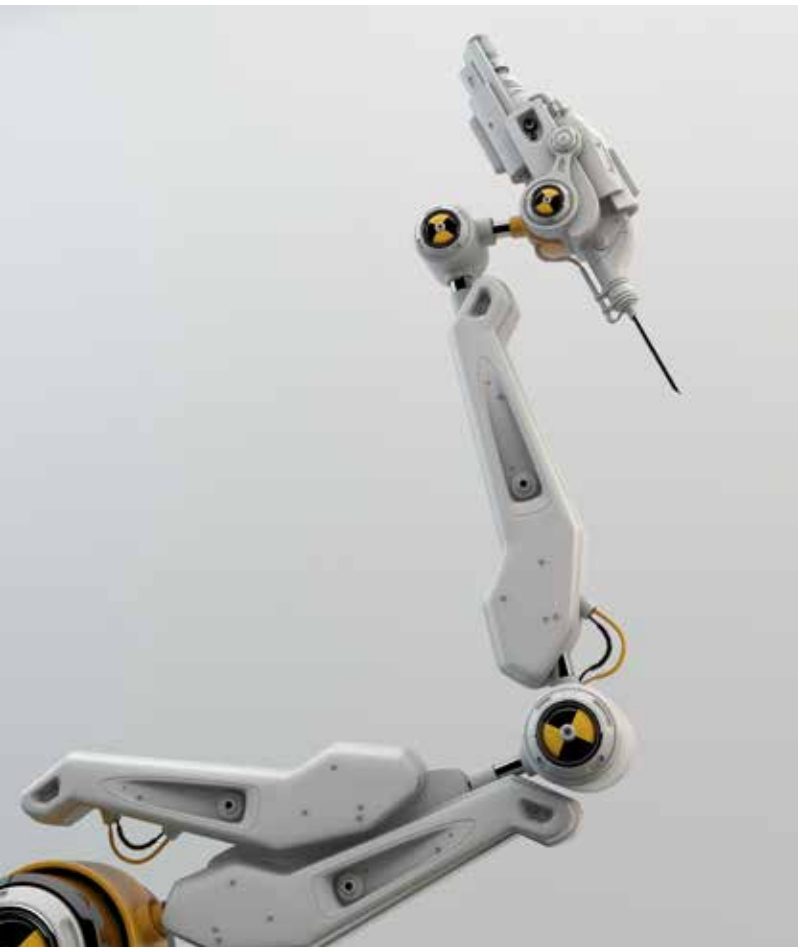
and Telsa,[36] have already rolled out cars with autonomous capabilities and in a recent interview, Tesla CEO Elon Musk predicted that self-driving cars would be the norm in 20 years.[37] Perhaps the biggest hurdle will come in the form of regulation and not the technology itself.[38] The total number of published patents for robotics and autonomous systems has grown 264% from 2004 to 2013.[24]

Robots have been common place in manufacturing for a long time – probably more pervasive than in any other industry – but a new generation of artificially intelligent, autonomous devices is primed to change the manufacturing landscape in three major areas: production, operations and maintenance.

Like robots of the past, robot-assisted production in the future will continue to help make tasks more efficient and will continue to do things that humans are incapable of doing, such as lifting heavy materials, but the addition of artificial intelligence and autonomy allows these machines to operate more independently. Although it hasn't been done at full scale, autonomous drones have been programmed to build buildings and even bridges, finding the parts and pieces that they need and working together to assemble the structure.[39]

Autonomous devices are on the cusp of revolutionising manufacturing operations. European robotics company Kuka[40] is producing autonomous robots that are able to interact with one another and automatically adjust their actions based on the next unfinished product line. These types of autonomous machines can connect to centralised stick data and dynamically change what they're

3D printing adoption[55]

	12%	24%	36%
Experimenting to determine how we might apply			
Prototyping only			
Prototyping and production			
Building products that can't be made from traditional methods			
Production of final products/ components only			
Not implementing			

producing based on marketing needs. Autonomous drones and robots can be used to locate and transport materials around warehouses, and even deliver products to customers. We are not far from seeing shop floors where drones gather parts, assemble products based on stock needs, and automate delivery of those products via autonomous vehicles.

Lastly, autonomous vehicles will dramatically shift maintenance. With smart sensors, machinery will be able to self-diagnose potential maintenance issues, while autonomous devices be able to visually confirm the issue, determine a solution, assemble the correct tools and parts and perform the fix. This will be especially useful in places where maintenance is difficult to perform, like telecommunication towers and bridges. This type of predictive maintenance will help manufacturers increase the speed of doing business, reducing down time and costs.

Emerging technology overcoming a unique challenge

One of the under-discussed challenges that businesses face in going global is delivery: moving goods from point-A to point-B. In the US, the conversation surrounding delivery is one of speed, but in order to make a timely delivery, or a delivery at all, you must first have a point-B.

Roughly 75% of the worlds population "suffers from inconsistent, complicated, poor, or no addressing systems", according to start-up what3words.[41] Four billion people in the world have no address at all, and even in developed countries, addresses can be a complicated issue. For example, in London, there are eight different Lonsdale Roads and many houses don't have numbers.

what3words,[41] a London-based start-up, is tackling this issue by creating a global grid of 3mx3m squares, 57 million of them, each with a unique 3-word address. In a sense, it acts as a simplified geographic coordinate system. They are gaining a lot of attention from manufacturers and shipping companies as this targeted address system could allow customers not just to have a product shipped to their warehouse, but to specify which door or area on their property they would like a shipment delivered to. This could also help manufacturers pinpoint where a maintenance issue is occurring in their facilities, where materials need to be delivered to, and improve safety on their shop floors. And paired with drone technology, this coordinate system could open the door for fast and easy delivery of food, medicine, and supplies into hard to reach places, like extremely rural areas or disaster areas during an emergency. While still on the cusp, these emerging technologies are working to make the world a smaller place.

Advanced materials

Smart materials are about to change the world more than we can imagine. New smart materials continue to emerge, from materials that can repair themselves to materials that alter their shape based on changing light, temperature or electrical charge. As these materials become less expensive and more readily available, manufacturers will be eager to bring these technologies to new and existing products to create things we never thought possible.

One example of these advanced materials is a bio "smart tag" developed for products having a limited shelf life, such as food and medicine. These gel-like smart tags can be made as small as a kernel of corn and provide an indicator when the food has spoiled. The indicator, generally a change in colour, is induced when the tags react with specific chemicals and microbial growths created when a specific food spoils.

The opportunities for this technology are broad. For starters, it could be applied to various food and medicine packaging to alert consumers of when their food has spoiled, and it is likely to be ground-breaking in testing for bacteria like e. coli and salmonella, which is currently done in relatively small sample sizes due to logistical challenges. In time, this type of technology could help address issues like food shortages, helping reduce the immense volume of unspoiled food that is thrown out due to uncertainty over freshness, as well as food born illnesses.

While this type of technology is still new, there are exciting opportunities that present themselves for manufacturers, from creating products with advanced materials to reducing waste and improving quality control within their own plants.

Nanotechnology

Nanotechnology is poised to be a game-changing innovation. While nanotechnology is a broad bucket, defined as the manipulation of matter at a molecular or atomic scale, nanotech's next phase aims to deliver atomically precise manufacturing (APM).[42] Literally speaking, this means manufacturing with every atom in its proper place. Already, through this level of precision, nano-electronic technology has been able to store data in DNA, creating the possibility of storing 1 petabyte of data in an area the size of a grain of rice.[43]

The science already exists to develop this technology; however, its development is being monitored closely. APM promises to radically lower the cost and expand capabilities in computing, materials, medicine, as well as many other areas, but with such reduction in cost and capabilities, it opens the door for those who may wish to abuse the technology, for example, to produce inexpensive advanced weapons at scale with only a small manufacturing base. There is also a scenario in which it would be possible for such machines to create tiny self-replicating machines which could consume the Earth's resources, known as "grey goo", a remote but legitimate risk.[44]

While the full promise of nanotechnology remains on the horizon, the impact will undoubtedly be huge.

50%

Investment increase in industrial robots between 2008 and 2014.[56]

Agile manufacturing

Executive summary
Many manufacturers are moving towards an agile manufacturing approach to stay responsive to evolving customer demands and to meet the need for greater product customisation.

Highlights
- *Product release cycles are decreasing across many industries.*
- *Many businesses are moving from larger releases to smaller, iterative updates.*
- *Speed-to-market was the top motivation for manufacturers to collaborate on innovation (25%).*

Agile manufacturing

In the high-cost manufacturing sector, lean manufacturing has dominated the conversation for a long time. Over the last few years, technology has given business leaders greater visibility into their manufacturing operations, helping them become more lean by identifying areas to costs, reduce waste and improve efficiency.

But technology has also created new customer demands and expectations for personalisation and speed, both in delivery and rate of innovation. As a result, agile manufacturing has become a fast growing trend in the industry. Agile manufacturing is all about quickly responding to changing customer demands. With adaptive production processes, equipment, tools, labour and materials, agile manufacturing is designed to adapt and create new and custom products dynamically.

Faster product introductions

As the rate of innovation increases, the desire to stay ahead of the curve has pushed many consumer goods companies to accelerate their product release cycles. Many industries that used to have 18-24 month release cycles, like technology, have now compressed their product cycles to 12 months or less, and seasonal categories, like soft goods, that once had semi-annual collections are now pushing out new products all year long.

These new product cycles have an obvious impact on R&D but also affect many other areas of business, such as pricing and materials sourcing. In soft goods, for example, clothing companies are adapting their business models to meet faster product cycles. Part of this evolution has been driven by social media and the new speed at which trends emerge and fade. A fashion designer may have a photo of their dress go viral and immediately need to increase production of that garment. Customers expect to see the latest fashions online and buy them in store that day. Clothing chain Zara has reported that they "are so fast, they can design, manufacture, and get clothing onto store shelves in a month".[45]

Retailers like H&M have created booming businesses out of making fashionable clothing very cheap; this is the only way most customers can afford to buy new clothes at the rate at which trends are changing.[45] And many of these goods aren't only cheap in cost, they're cheap in quality, but that may not be as bad as it sounds.[46] These manufacturers are able to keep costs low by lowering quality; however, under the assumption that a garment may only be worn once or twice, the low quality doesn't diminish the value of the product much. In an interview with NPR, Simon Collins, Dean of Fashion for Parsons The New School for Design,

explains, "You see some products and it's just garbage. It's just rubbish, and you sort of fold it up and you think, yeah, you're going to wear it Saturday night to your party – and then it's literally going to fall apart."[45] As an accelerated rate of change increases the rate at which products become obsolete, it has turned some durable products turn into perishable goods.

Iterate is the new validate

Before the digital age, most products had semi-regular release schedules where finished products were released to the public as final. Companies tested heavily to ensure the products were ready for release, validating every possible detail. If consumers didn't like something, they either had to wait for the next version of the product to be released or buy an alternative product from another company.

Today, with Internet connected products that rely heavily on software, companies are able to update products throughout their lifecycle. This has been particularly visible in the software industry, with the growth of Software as a Service (SaaS) solutions.

With a SaaS business model, software companies are focused on keeping customers happy and engaged by making consistent improvements to the products. As businesses seek to keep their products updated, they're relying less on major releases and more on iterative or incremental

updates. Many companies are even implementing new features into sample markets to validate ideas and collect data before finalising and rolling out to all customers. Iterate is the new validate.

On-demand manufacturing

On-demand manufacturing – largely aided by advancements in 3D printing – will drastically change some businesses. Imagine a part breaks on a washing machine. Instead of finding the part online and ordering it, a customer could simply print out a barcode, take it to a local shop and have the part printed for them there. Or better yet, it could be delivered via autonomous drone.

Speed and convenience aside, this evolving model will have large implications for manufacturers, including a diminished need for high volume manufacturing facilitates. It would also allow manufacturers to reduce stock demands, as well as simplify logistics for fulfilment and delivery.

Greater collaboration

In their quest to be more agile, many manufacturers are looking to become more nimble by improving collaboration. In a Forbes survey, manufacturers reported that their primary motivation for collaborating on innovation was speed-to-market (25%).[47]

Technology is playing a major role in easing the friction of collaborating with remote teams. The cloud has enabled an array of new collaboration and productivity tools that are making it easier for people around the global to work together. And 3D printing is improving the speed of collaboration by making it easier for teams to share ideas. Team can now share designs with colleagues across the globe, who can immediately have those designs printed.

As the speed of doing business continues to accelerate, manufacturers must become more agile to meet new demands and technology paired with agile processes is enabling them to do just that.

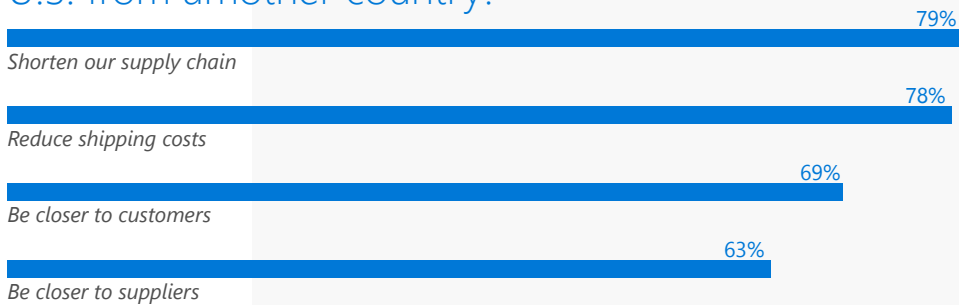# Iterate is the new validate.

Small is the new big

Executive summary

Advancements in manufacturing technology, lower cost of entry, a need for speed and the demand for more customised products is leading to growth in smaller, more localised manufacturing.

Highlights

- *The top reason for localising manufacturing was to shorten supply chains (79%).*
- *The artisan trend is impacting many industries.*
- *A lower cost of entry is enabling a tier of small scale, low volume manufacturers.*

Why did your company move production to the U.S. from amother country?[23]

79%

Shorten our supply chain

78%

Reduce shipping costs

69%

Be closer to customers

63%

Be closer to suppliers

Small is the new big

Since the Industrial Revolution, manufacturing has largely sought efficiency – "lean" – which has lead to optimising processes within larger, centralised facilities. For the first time in 250 years, this is starting to shift. Improvements in manufacturing technology and transportation have helped reduce the cost of manufacturing, diminishing the value of large, centralised manufacturing plants. It has also reduced the cost of entry, making more room for small and medium-sized manufacturers that may not have been able to secure enough capital to open a shop in the past.

Need for speed demands localisation

A major reason for the movement towards smaller, more localised manufacturing facilities has been the need for speed. As customers seek faster fulfilment and more customisation, smaller localised manufacturing facilities have become a lot more efficient at handling these demands.

Hyper-local on-demand manufacturing – like a customer ordering a part online, printing a barcode, then using that barcode to have the part 3D printed at a local shop – will not only help customers get products faster, it will reduce shop floor demands, as well as simplify stock management.

Next-shoring

While costs and speed have played a large role in the increase of reshoring, another reason for the increase has been a growing demand for next-shoring. Next-shoring, which moves assets and suppliers in closer proximity to demand and innovation. As customers require faster fulfilment, greater customisation, and more frequent innovation, having a value chain close to the source helps cut time and costs, while improving collaboration and productivity. According to Boston Consulting Group, the top reason for localising manufacturing was to shorten supply chains (79%) while 69% said to be closer to customers.[23]

Next-shoring has benefited greatly from improvement in technologies such as advanced robotics, 3D printing and digital production. As these technologies have improved, they have also become less expensive and smaller, which has reduced the financial investment and physical footprint needed to create manufacturing facilitates. This is key, because otherwise, the prospect of creating multiple small and localised manufacturing facilities, instead of centralising resources, would not be feasible. Seventy-one per cent of manufacturers believe that advanced manufacturing will improve the economics of localised production.[23]

Reduce risk

Another reason many manufacturers are moving towards smaller more localised facilities is to reduce risk. According to The National Bureau of Asian Research, in 2013, IP theft cost US businesses more than US$300 billion, with China accounting for roughly 80% of all IP theft from US-headquartered companies.[48] As businesses move into these new markets, they often fail to fully understand local laws and legal systems, and how IP is viewed in the local culture. In China, for example, IP theft and imitation is widely accepted, as it is viewed more as "adoption" than theft. The Chinese government has even coined the phrase "re-innovation" in describing this practice.

Companies who set up offices abroad may also face new security risks, particularly if these offices reside in parts of the world where technology and infrastructure is less advanced or less controlled. To help mitigate risk of IP theft, many manufacturers are decentralising and disaggregating knowledge, particularly if it pertains to proprietary processes or confidential information.

By decentralising, manufacturers are also diversifying, and in doing so, reducing risk should they lose the ability to manufacture in a given facility for some reason. According to PwC's 2015 Global CEO survey, 72% of CEOs are concerned about geopolitical uncertainty;[49] however, other events, such as natural disasters or war can also impact a company's ability to do business in a particular region.

72% of CEOs are concerned about geopolitical uncertainty.[49]

Artisan is in

From bread to beer to ice cream to fizzy drinks, artisan foods have been growing in popularity around the world. Even large food and drink manufacturers like Pepsi[50] are trying to capitalise on the trend by releasing new products that are branded as artisanal products. But the interest in artisanal has grown beyond food to encompass all homemade, handcrafted goods, include bikes, clothing, jewellery, home decorations, cookware and more.[51] This trend has been driven, in part, by a fatigue for the passive consumerism that is driven by the mass production of products – consumers want a chance to own something unique in a world where the same products are in every home – as well as the perceived higher quality and healthiness of locally-sourced, handmade goods.

The micro-manufacturer

The growing demand for artisan goods has sparked an increase in "micro-manufacturers," aka, very low volume manufacturers. But beyond the demand for handcrafted goods, several other variables are adding to the micro-manufacturing trend.

While new technology is making manufacturing less expensive for big manufacturers, it has also reduced the cost of entry for new manufacturers. High quality 3D printers can be purchased for just a few thousand pounds; CAD software that once cost thousands of pounds to licence only cost a few hundred pounds now, and it no longer requires expensive speciality machines to run; many of the processes that once required expertise and training have been automated; and the Internet has given individuals easier access to less expensive materials. While a person with a 3D printer in their garage might not be competing directly with large manufacturers, at scale, the growth in micro-manufacturing is already having an effect on manufacturing. And with the growth of the sharing economy, there is a real potential for a network of privately-owned 3D printers to turn into a major force for manufacturing goods.

Additionally, the growth of e-commerce has helped resolve one of the largest challenges of manufacturing: distribution. From Amazon to Alibaba to Etsy to Foodoro, there are now dozens of marketplaces, large and small, for micro-manufacturers to distribute and sell their products.

$300 billion

Estimated losses in the United States as a result of IP theft.[48]

Microsoft Dynamics AX

Connected operations

Microsoft

Connected operations

Manufacturers can take a leap forward in margins and differentiation through rapid prototyping, agile manufacturing and servitisation of product-centric business models. But the 4th industrial revolution – or Industry 4.0 – needs modern enterprise software to enable these new business models. Delivering consistently on brand, sales and services promises entails fulfilment through connected manufacturing and supply chain operations. Sales people and service representatives, product engineers, production/warehouse workers and delivery drivers, need insights to be able to put the customer first in every decision. Connected operations must connect front-office and back-office processes, be easy to deploy, intuitive to use and intelligently guide manufacturers talent and experience starved workforce on delivery of personalised and proactive experiences, along with new products and services. Manufacturers can validate and scale new Industry 4.0 business models and fulfil customer promises with modern connected operations solutions from Microsoft, that accelerate new product introductions and enable agile and intelligent manufacturing and supply chain execution.

Accelerate product introductions
Engineering and marketing can reduce risk and rapidly validate new product ideas with simulation models and 3D printed prototypes, increasingly confident in their ability to fulfil demand using insights from their smart connected products, intelligent automation and digital manufacturing. Don't let your enterprise software be the critical barrier to new product introductions. Rapidly model, cost and release new products to production and procurement, with guided experiences and workspaces for discrete, lean and process manufacturing and replenishment.

Agile shop floor execution
Manufacturers are facing significant skills shortages on the shop floor, and yet are expected to produce more product variants with shorter ramp up times. Its your workforce that has to operate and fill the gaps between machines. Manage your production floor with workspaces, task guides and work instructions tailored for operators and supervisors, that can adapt to the display on any device, enhancing local productivity and global visibility with operational insights.

Intelligent order fulfilment
Even if you've invested in the latest intelligent automation and digital manufacturing on the shop floor, supply and demand exceptions can threaten your ability to meet promised delivery dates to customers. With global visibility of stock, manufacturing and logistics, and a role tailored workspace accessed anywhere, on any device, your customers service representatives can proactively explore production, warehouse and transportation remediation options for your customers.

Microsoft Dynamics AX

Increase the speed of doing business

Microsoft Dynamics AX is the Microsoft's business solution for enterprises that enables people to make smarter decisions quickly with access to real-time insights and intelligence on nearly any device, anywhere. It enables business to transform by enabling them to redesign their business processes faster so they can innovate and get quick time to value to stay ahead of the competition. It also gives businesses the flexibility to grow at their pace through the choice and flexibility of the cloud, allowing them to scale their operations globally to meet business needs.

Grow at your pace

Helping businesses grow at their pace is all about giving them the choice and flexibility to modernise their business. We are giving businesses the ability to leverage the power of the cloud to scale their operations globally. A solution that easily integrates with their legacy systems and data so they can continue to benefit from their existing investments and removing any barriers to growth. It is also about giving them the peace of mind that their information will be secure and compliant in a trusted cloud from Microsoft.

Transform business faster

Transforming business by easily redesigning processes is crucial for organisations to stay competitive. It's a way for them to challenge the status quo, but they need to do it quickly in a predictive way and without business disruption. We are enabling businesses to transform by simplifying and speeding up their ability to redesign business processes.

With AX they will get faster time to value from their technology, improve business planning and execution with predictable implementations – getting them up and running faster. And when they want to customise processes, support for technologies like Visual Studio gives them a large pool of talent, resources and solutions to meet their specific business needs.

Make smarter decisions quicker

We're enabling people to make smarter decisions quicker, so they are ready for anything and make dreams a reality. We are empowering people by delivering tools built for the modern workplace – business solutions that are mobile, familiar, easy to use and foster collaboration so people can be more productive, faster. And with real-time views into business operations they can make better data-driven decisions to have a positive impact on their business.

Microsoft Dynamics AX
What's new?

Manufacturing

Production floor management workspace

This feature lets the production supervisor check whether materials for scheduled production orders are available on the required date. In the workspace, the production supervisor is informed how many production orders are in the scheduled state and are pending release. Based on the dynamic master plan, the information about material availability is updated if material requirements are met by on-hand stock for actual orders, or planned orders. Based on the information about material availability, the supervisor can release the orders on the Material availability page. During the process of releasing production orders to the shop floor, the feature helps the production supervisor make correct decisions about the allocation of materials to orders.

Scenario: <…add some context here…. > Perform a check of material availability on production orders in a separate page that is called from the Production floor management workspace.

Job card device page

Although the new Job card device page is designed with simplicity, it's also designed for touch. The page fits well on mobile devices, such as tablets and phones. The shop floor worker will find less information overload and more intuitive ease of use. The worker can perform the traditional tasks, such as starting, ending and reporting progress on a job. Besides working on the actual job, or logging and clocking out, the worker can view attachments, break for lunch and perform other activities. Jobs will be queued to the worker

Manufacturing

in a planned sequence, but they can also be picked by the worker. The page is primarily targeted at discrete manufacturing operations, where materials are prepared for production.

Scenario: For scenarios that are related to reporting of co-products and by-products, and materials picking by tracing dimensions, use the Job registration page. Also, by introducing an alternative UI that is designed for touch and can be accessed from all types of devices, such as terminal screens and mobile devices, this feature could help to reduce the implementation costs for a traditional rollout of shop floor registrations.

Master planning

Master Planning Workspace

The Master planning workspace offers at-a-glance information about when the last master planning run was completed, whether it had any errors, what the urgent planned orders are, and which planned orders cause delays. Gain quick insight into the status of a master planning run, the urgent planned orders and the planned orders that cause delays.

Scenario: < >.

Action graph

The action graph provides a better overview, and has options to show only applied and directly related actions. When actions are applied, they appear dimmed but are still displayed to keep the overview. Additional information is added to the action graph to display the data on one page.

Scenario: Using this new action graphic you could potentially optimise the order date and quantity based on a visual overview of related actions that are pulled from the master planning run; letting you focus only on the relevant actions.

Demand forecasting

Microsoft Excel Integration

Now you can use Microsoft Excel to update your demand forecast helping you to increase efficiency and productivity by accelerating the process of updating directly from a spreadsheet. You can now take advantage of the integration with Excel when working on your demand forecast. Update, delete directly from Microsoft Excel before submitting it to Microsoft Dynamics AX.

Scenario: During your demand forecasting process, you originally could export your historical data to excel. With the new updates, you will now be able to update and edit your demand forecast based on your analysis and additional variables based on exceptions or market conditions and upload it back to Dynamics AX.

Demand forecasting

Azure machine learning integration

Estimate future demand by using the power and extensibility of a Microsoft Azure Machine Learning cloud service. The service performs best-match model selection and offers key performance indicators (KPIs) for calculating forecast accuracy. Generate more accurate forecasts by using the machine learning techniques and tools to estimate future demands forecast based on historical transactions.

Scenario: Based on historical data and defined variables based on your requirements such as weather, traffic conditions that you can integrate Azure ML into your demand forecasting process to help you better predict and anticipate potential issues that could impact your product delivery or availability to customers.

Procurement and sourcing

Purchase order preparation workspace

The Purchase order preparation workspace provides an overview of orders from the time when they are created as a draft and traced, through workflow approval states, and onwards towards confirmation. Your purchasing department no longer has to seek information from multiple pages but benefit from the overview that the workspace provides.

Scenario: Use the Purchase order preparation workspace to gain quick insight into the status of purchase orders that are being prepared.

Purchase order receipt and follow-up workspace

The Purchase order receipt and follow-up workspace provides an overview of confirmed purchase orders that have pending receipts or shipments. This workspace includes lists of post-due receipts and pending receipts to help with proactive review and follow-up by the supplier. Purchase orders for which arrival registration has occurred in the warehouse are also listed to help ensure that the receipt is posted. Purchase order returns that haven't yet been shipped are also available for review. Your purchasing department benefits from the overview that the workspace provides. Relevant information is put together to guide follow-up and help improve productivity.

Scenario: Use the Purchase order receipt and follow-up workspace to gain quick insight into purchase orders that are pending receipt, to help with follow-up.
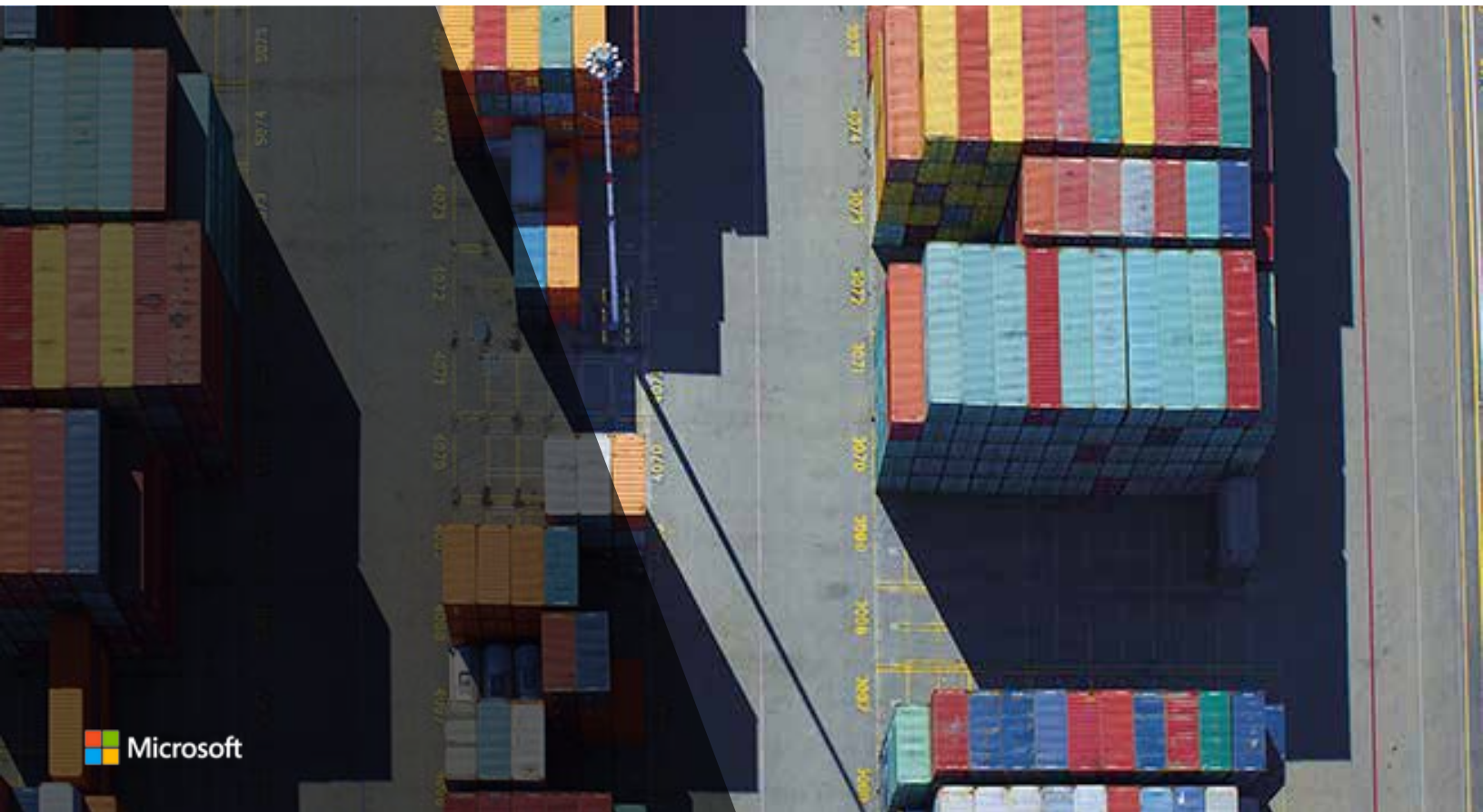
Why Microsoft?

Use the cloud your way
Run your business and operations across mixed IT environments in a secure and trusted cloud from Microsoft.

Simplify your application lifecycle
Change the economics of deployment, operations and support.

Reinvent your productivity with intelligence
Boost productivity with broad adoption and real-time operational insights on nearly any device, anywhere.

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