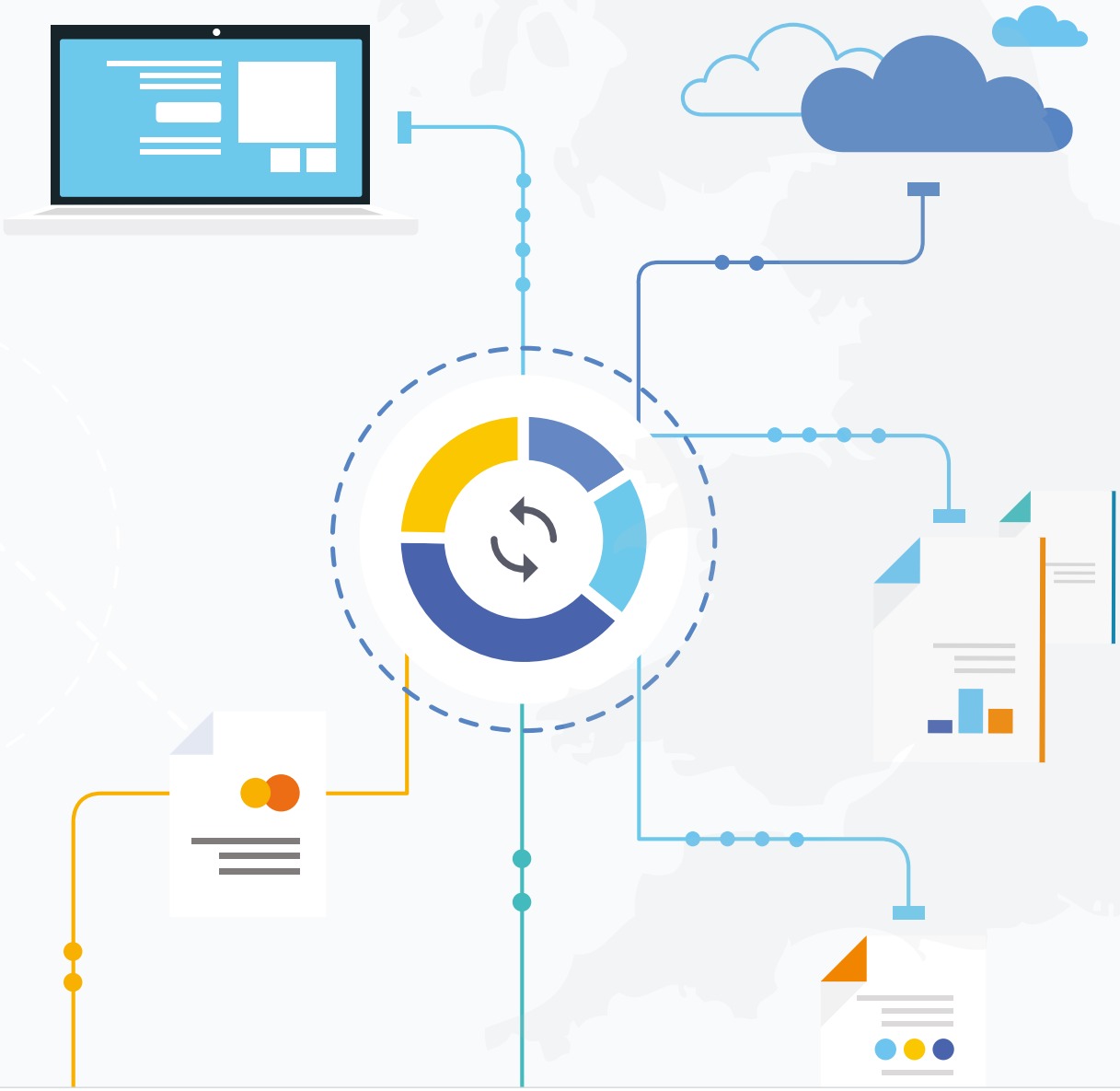
Enabling a Connected Ecosystem



THE Manufacturer

Microsoft

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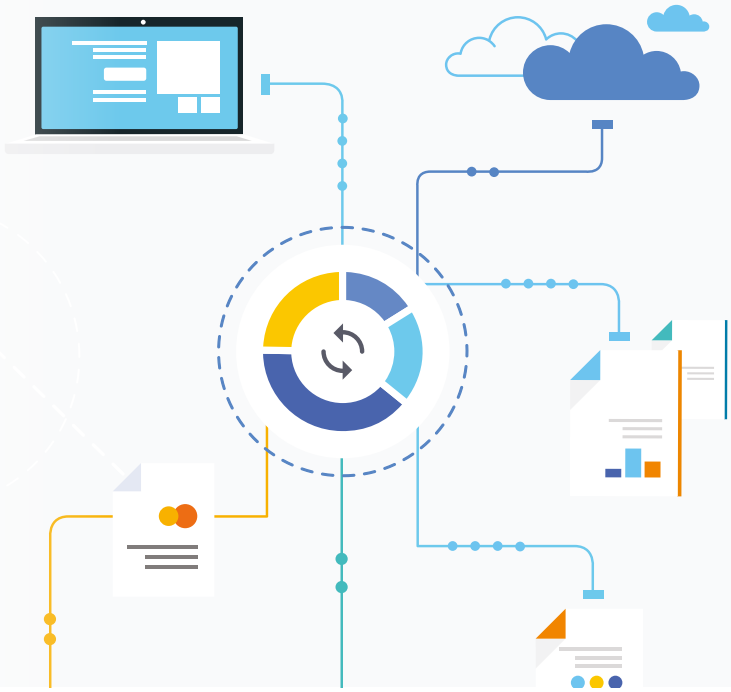

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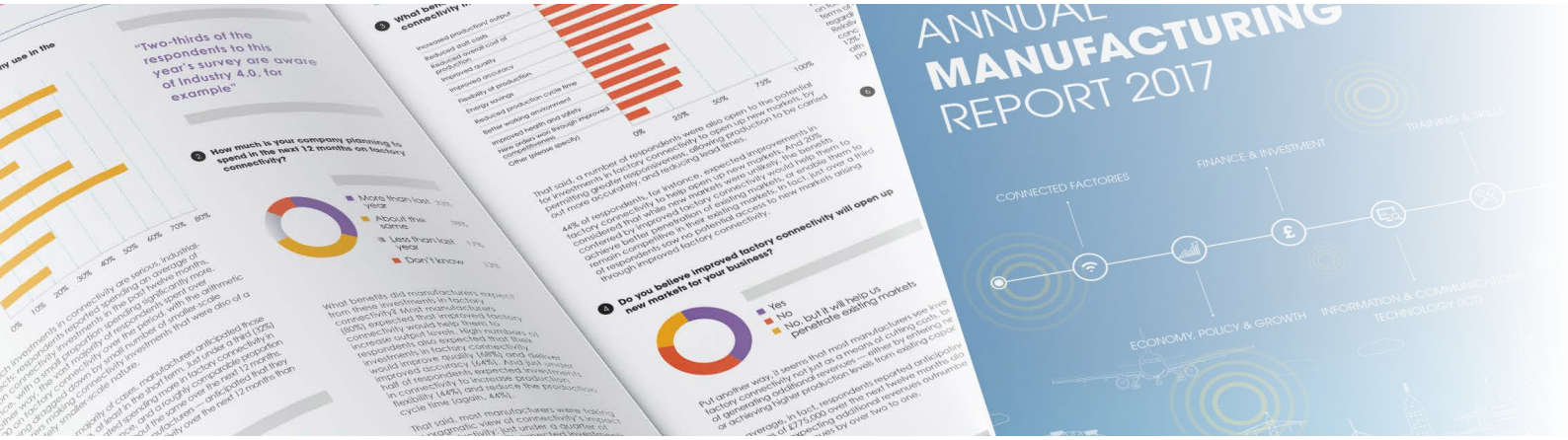

1. Executive summary

It is a period of great change for all manufacturing businesses, regardless of their size, sector and geography. Recent geopolitical and economic events may be creating short-term boons for some, but the long-term outlook can be best summed up by one word: uncertainty.

This uncertainty is impacting almost every aspect of a business, both internally - labour, utilities, materials, investment, innovation, leadership and technology, and externally - customers, exports, supply chains, collaboration and government.

Yet, it's not all doom and gloom. Alongside any period of uncertainty and change, there also lies opportunity – and for manufacturers, the present opportunities are vast. The capabilities of advanced manufacturing technologies are empowering forward-thinking businesses to achieve clarity in the face of uncertainty, agility in the face of change, and responsiveness in the face of leads.

The building blocks of the Fourth Industrial Revolution or Industry 4.0 are predominantly technological ones – big data, cloud computing, automation and robotics, the Internet of Things, and business intelligence tools. Combined, these technologies are ushering in a new era of digital transformation.

What the past 18 months have clearly demonstrated is that those most likely to succeed in the modern, connected business environment are those eager to learn how to engage customers, empower employees and successfully leverage these new digital technologies.

As The Manufacturer's *Annual Manufacturing Report* 2017 makes abundantly clear, the days of a factory being a standalone black box are disappearing fast. Two-thirds of the survey respondents are aware of Industry 4.0, for example. More importantly, a significant majority were already undertaking a move to Industry 4.0 (23%), or were planning to do so (62%).

According to the report, the business case behind a large proportion of these Industry 4.0 investments was to achieve greater factory connectivity, with sensors, alarms, monitoring systems, human-machine interfaces (HMI), and programmable logic control (PLC) systems seemingly the most widely implemented.

Interestingly, it would also appear that most manufacturers see investments in enhanced factory connectivity not just as a means of realising cost-efficiencies, but as a way of generating additional revenue streams. This is largely anticipated to be through entering new markets, greater penetration of existing markets, or achieving higher production levels from existing capacity.

These findings are supported in Microsoft's recent *Digital Transformation: The Age of Innocence, Inertia or Innovation*? report, which found that almost two-thirds (58%) of manufacturers see the primary driver of digital transformation as optimising operations, followed by customer experience (43%).
Microsoft's report also revealed what manufacturers considered to be the most significant technology trends for the sector over the coming three years,

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namely: analytics and big data, sensors and machine-to-machine (M2M) communications, cloud computing, and robotics. Similarly, robotics, cloud computing, and sensors and M2M communications were highlighted as the top technologies manufacturers were actively using or experimenting with, mirroring The Manufacturer's findings.

What these snapshots offer is a clear indication that manufacturers are already well on the way to connecting their own operations, whether over a single or multiple location, and leveraging the benefits such connectivity offers. The next step, and one which is beginning to gain momentum, is broadening out that level of connectivity to encompass every aspect of an organisation's ecosystem: suppliers, production, distribution, end-use, repair and maintenance (where applicable), and recycling or disposal. A feat made possible by the highly sophisticated, largely digital manufacturing technologies available today.

If your business has already made the first step towards a connected ecosystem, or is considering taking one, this white paper is vital reading for you and your business' decision-makers to question your existing processes and get the most out of your connectivity journey

This white paper brings together research conducted by **The Manufacturer** and **Microsoft**, alongside the insights gained from two exclusive roundtable events which brought together senior leaders from across UK manufacturing. The digital transformation-focused roundtables took place on November 2 and 3 alongside The Manufacturer's Leaders Conference 2016.

This is the second The Manufacturer and Microsoft co-branded white paper, the first of which is available for download at: **themanufacturer.com/reports-whitepapers/the-road-to-customer-intimacy-through-a-service-centred-approach**

2. Creating your Digital Strategy

As previously outlined, the building blocks of what's being referred to as the Fourth Industrial Revolution (4IR) or Industry 4.0 are predominantly technologically-based – big data, cloud computing, automation and robotics, the (Industrial) Internet of Things, and business intelligence (BI) tools. Combined, these technologies are ushering in a radical new era of digital transformation.

The concept is relatively simple, and indeed many manufacturers have successfully grasped it. What's more difficult however is putting a strategy in place to connect the building blocks and leverage their combined capabilities. An underlying error of judgement for many is the belief that shifting towards a 4IR or Industry 4.0-ready business requires the adoption of every one of these building blocks, which is a fallacy.

As one roundtable delegate phrased it, "Industry 4.0 is largely conceptual, the result of an individual's journey is likely to be different to that of everyone else. Of far greater importance is the technologies behind it and what they represent."

A significant part of the confusion stems from the fact there are still too many misnomers surrounding not only this revolutionary shift itself, but the technologies driving it – regardless of reports to the contrary. Cutting through the noise or hype and educating executive teams is vital to overcoming this confusion, something seen through the rise of senior positions with 'transformation' or 'adoption' in their titles.

Whether officially titled as such or not, these internal sponsors are vital in demonstrating the business case for change, establishing a robust digital transformation strategy and helping to drive it forward. Modern technologies typically cut across internal siloes, bridging departments, processes and duties. This can pose a challenge when attempting to form your business' connected approach as it isn't immediately clear whose responsibility it falls under. However, the value of leadership shown by an empowered individual or team of individuals cannot be overstated, particularly if they sit outside of a specific silo and have visibility across the entire organisation.

Though termed 'digital transformation', the transformation refers to the effect digital technologies can have on a business' productivity, revenue and, ultimately, growth. It does not refer to the timescale of change. The deep-rooted changes across process, people and culture necessary to get the most out of digital connectivity won't be an overnight transformation. It should be viewed more as an incremental journey, one which will look very different from business to business; there is no one-size-fits-all approach. That is why it is imperative to map out clear objectives – not just the beginning and end goal, but also the people responsible for achieving them and structured timeframes.

During both roundtables, discussions emphasised the importance of having clearly defined targets and the return on investment (ROI) mapped out for each step of this journey, as well as for the project overall. Without having such a robust, coherent business value proposition, it was far more difficult – if not impossible – to achieve buy-in from senior executives and decision-makers.

Several roundtable delegates also noted that they saw great value in creating scalable digital strategies comprised of several smaller transformation projects. These test cases or pilots relate to a specific Industry 4.0 building block or combination, allowing them to be trailed on one process or area of the business to capture experience and knowledge, which in turn informs a broader rollout or a greater level of connectivity across the ecosystem.

3. Data Ownership & Security

Manufacturers have been successfully digitising their operations for decades, but it has predominately been on a micro-scale, benefiting individual production cells or machines. It's only more recently that industry has reached a tipping point where digitisation can be amplified to truly optimise entire ecosystems.

Manufacturing has a great deal to gain from increased connectivity and the data produced, as well as to risk by opting for inertia. Manufacturers are the producers, the suppliers, the maintainers; they are increasingly looking to own every stage of a product's lifecycle and leverage the insights to better inform subsequent product iterations and their wider organisations.

However, a business which spans every stage of a lifecycle raises some profound, yet largely unanswered questions about data ownership. The ecosystem of one of the world's large automotive manufacturers, for example, comprises dozens of Tier 1 and Tier 2 suppliers, third-party logistics providers and sub-contractors, a network of dealerships and thousands of end-users. Who owns the data at any given stage is up for debate, with several parties understandably eager to stake a claim.

Though still largely unresolved, it's a conundrum worth solving as doing so could result in substantial benefits and growth opportunities for all factions involved. There is a growing consensus that many of the challenges facing manufacturers – productivity, skills, optimisation, growth, innovation – will only be solved through greater levels of collaboration and traceability.

One roundtable delegate representing a global aerospace manufacturer explained, "We have started to connect production cell data to the work our service technicians are performing, linking that to our wider manufacturing data and to that of our supply chain, and we are already seeing huge benefits resulting from a more optimised supply chain. There are really exciting times ahead for us."

What typifies industry in the UK is the high complexity and skill involved in what is being designed and manufactured. Consider the nation's global prestige in automotive, aerospace, defence and pharmaceutical, for example. As such there's an inherent value to the knowledge about how a product is made or performs, proprietary knowledge companies are understandably keen to hold on to.

If we return to the two primary reasons why manufacturers are currently undergoing or considering a digital transformation – optimising operations and improving customer experience, these are high-priority objectives for any manufacturer, regardless of whether it is a subcontractor, a Tier 1 supplier or an OEM. It's worth reiterating that those companies realising the greatest and swiftest results are those with a proactive approach to connecting their ecosystem and sharing relevant intelligence with appropriate partners, a tangible embodiment of a rising tide lifting all ships.

This level of intelligence sharing, however, remains a source of anxiety for many. It's one thing to share insights and data internally, but opening your organisation to external parties is still viewed as putting competitive advantage and IP protection at risk, not to mention the potential "regulatory minefield" involved in doing so, as one roundtable delegate phrased it.

Too often manufacturers are described as being 'risk adverse', yet the roundtables represented manufacturers as being 'risk proactive' – assessing various factors to make informed decisions. If this is truly the case, then any latent fears which persist around IP security, cloud computing, off-site data storage and compliance can be dispelled through engagement and education – an area where vendors have an important, active role to play.

There is no universal answer, and indeed some aspects will require globally agreed legislation, but the landscape is changing. The need for competitive differentiation is greater than ever, much of which is being realised through a connected ecosystem, data, servitization and real-time insight – all of which are predicated on a digital backbone.

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4. 'Customer 360'

Whether a sub-assembly builder, an OEM, a component supplier or anyone in between, the needs of any one manufacturer's customer base are ever-evolving, requiring greater business agility and responsiveness. Meeting these needs, not just now, but in the future, remains challenging for almost all businesses.

Customers' experience of digital technologies and seamless connectivity in their personal lives is now being demanded from businesses and their employees, with a strong emphasis on businesses to deliver. How a business creates engaged and sustained customer relationships through its digital assets is of paramount importance, with clear evidence demonstrating that those offering superior customer experiences are outperforming laggards in terms of attaining and retaining customers, i.e. direct business growth.

In the modern, ultra-competitive industrial landscape, it is simply not enough to deliver a product to schedule. That does not equate to excellent customer service, in fact it represents the bare minimum, in the words of one roundtable delegate.

Another delegate highlighted the difference between 'customer service' and 'customer focus', adding, "It's vital that you understand your customers' desires, wants and needs, rather than your own. Theirs are what is important and understanding them is the key to unlocking the future growth of both parties."

To meet the needs of customers and deliver an excellent level of service, manufacturing is witnessing a convergence of traditional customer relationship management (CRM) and enterprise resource planning (ERP) systems. Bringing these two historically separate siloes together enables a connected experience to be delivered, flowing from field service in to operational optimisation and the broader supply chain.

> "By bringing CRM and ERP systems together into one platform, businesses can benefit from a true, real-time 360-degree view of customers and their orders – what Microsoft calls 'Customer 360'"

While an activity such as onboarding a new customer, or generating an order are typically CRM-driven, determining when that order could be delivered, monitoring the order fulfillment, through to invoicing are all accepted ERP functions. By bringing these systems together into one platform, businesses can benefit from a true, real-time 360-degree view of customers and their workflows – what Microsoft calls 'Customer 360'.

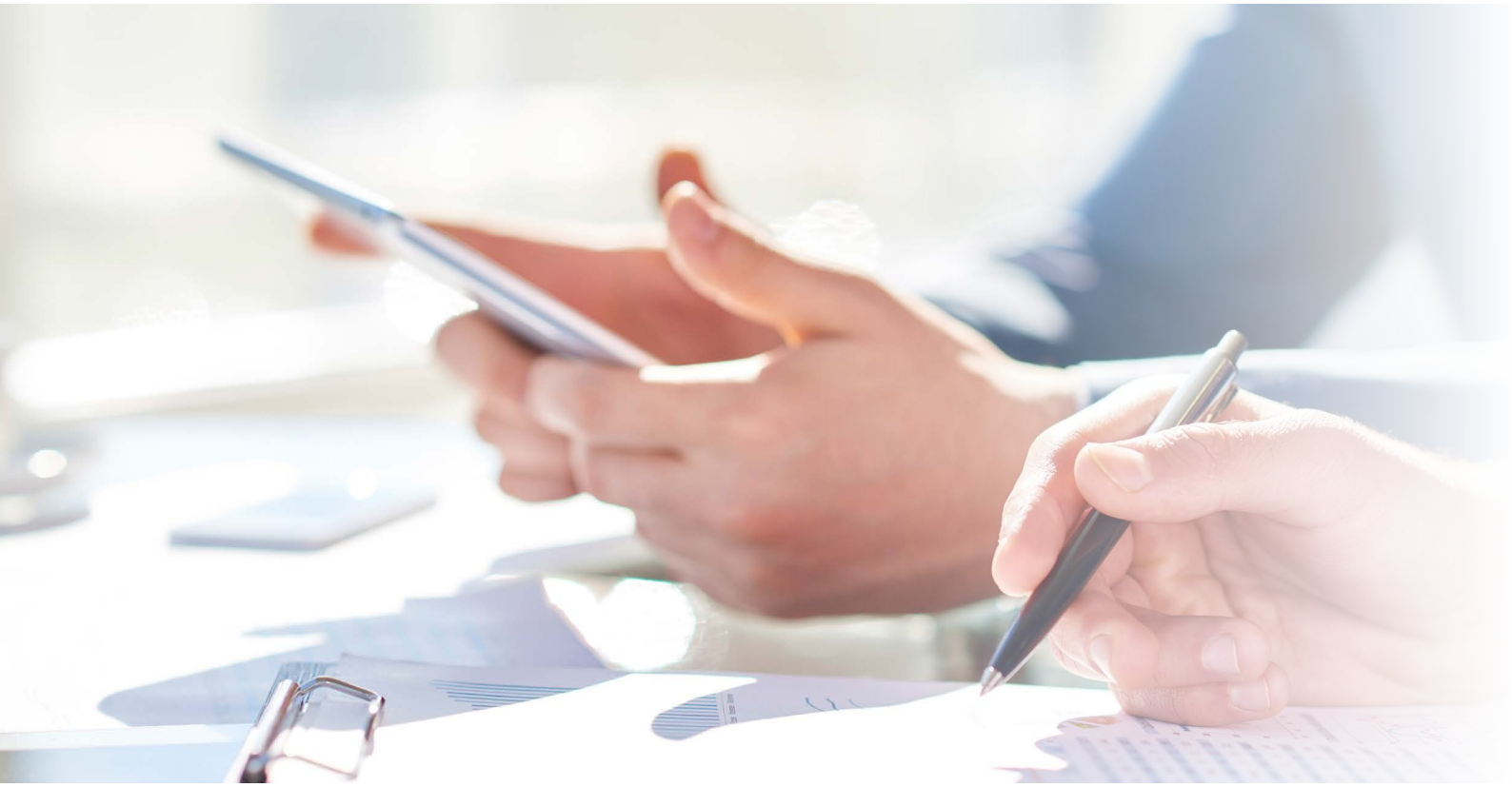
Such a perspective offers a myriad of direct and indirect benefits to both the manufacturer and its customer base. A manufacturer can leverage total clarity and visibility to optimise and manage the workflow for every one of its assets, be they ordered, under production, awaiting delivery, in transit or installed out in the field, alongside connecting disparate systems together to form one ecosystem.

Data relating to the performance, usage and uptime/downtime of each asset can also be collated and aggregated to move a manufacturer from purely reactive maintenance to proactive and eventually preventative. This represents a significant change in terms of a manufacturer's business model, but also offers a reliable and consistent source of revenue, as well as the chance to forge deeper customer relationships.

In regards to achieving customer excellence, much of the roundtable discussions centered on what could be generally termed as 'outward' facing initiatives and barriers. However, the importance of 'inward' focused changes was also raised, particularly employee engagement. People are a company's greatest asset and should feel empowered to question any process without repercussion, regardless of seniority or duration of service.

Implementing seemingly small changes such as these can cumulatively have a significant impact on employee satisfaction, a statistically proven metric in raising productivity which in turn drives up customer service levels.

To learn more about how servitization can bring benefit to your manufacturing business, read the first The Manufacturer and Microsoft co-branded white paper, which is available for download at: **themanufacturer.com/reports-whitepapers/the-road-to-customer-intimacy-through-a-service-centred-approach**



5. Generating Actionable Insight

The phrase "data is the new oil" may have been coined more than a decade ago by Sheffield mathematician, Clive Humby, but it is only in more recent years that the ability to collect, combine and analyse vast amounts of data has been within arm's reach of every business.

Yet, manufacturers have arguably been more sluggish than other industries in appreciating the vital role data plays in future-proofing organisations, offering substantial optimisation, competitive advantage and growth opportunities. There are still widespread instances of leadership teams relying on gut instincts and 'feelings' in making their decisions, which in a modern, technology-reliant manufacturing environment is concerning.

One roundtable delegate explained how his business, like many others, currently uses data predominantly in a reactive sense, only interrogating it once an issue had presented itself. "We need to become much better at enabling the data to inform us prior to something actually happening, allowing us to conduct a preemptive fix before it becomes a failure or affects quality," he said.

This isn't to say that businesses should succumb to "analysis paralysis", however. Collecting data for collection sake is only going to create more issues than it solves as data on its own, most people would agree, is relatively worthless. The true value of data can only be unlocked once actionable insight is teased from it and shared with relevant teams or individuals.

It's a situation many manufacturers currently find themselves in, diligently gathering and storing data with no agreed strategy as to what to do with it. The challenge, therefore, lies in helping businesses well-versed in making widgets to become data analysts, something which historically hasn't been a necessary skillset.

Irrespective of individual scenarios, all delegates were in agreement that data quality was of paramount importance. They also agreed that the responsibility of ensuring data quality is maintained shouldn't fall solely to IT departments. A business must create a culture where every member of staff comprehends the importance of data and is able to track it from creation, gathering, visualisation and actionable insight.

A business' data may hold the answer, but you first need to ask the right question. The solution lies in not only having a clearly defined digital strategy internally, but linking your objectives to those of your customers. What capability are customers searching for, and what information would be useful to them to achieve their goals?

Answering those questions will help define what data your business should be collecting and analysing, the insights from which can then be fed forward into your service provision or backwards to support new product development.

In turn, as a business becomes more interconnected, the data it generates will become increasingly more valuable and will drive digital transformation in a constant feedback loop of improvement and innovation.

The next step will be to extend this level of insight and connectivity out into the supply chain and broader customer base. Failure to do so will only ever unlock a small proportion of the total value a true digital transformation offers.

Microsoft summed it up eruditely within its *Digital Transformation: The Age of Innocence, Inertia or Innovation?* report, "Perhaps the term 'digital' itself is the cause for confusion, with people attaching the term to the IT department and therefore focusing on internal practices. In reality, organisations should be viewing this as business transformation in a digital world. In this context, the need to bring suppliers, customers and end-consumers much more into focus is much more apparent."

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6. Microsoft's Concluding Observations

Today, technology is omnipresent, and the access to digital services is playing an increasing role in everything we do – shaping growth, disrupting industry landscapes and providing the catalyst for new business models, products, services and experiences... for businesses to transform themselves. Capitalising on this phenomenon is the key to innovation and growth. From the rise of connected devices, the Internet of Things (IoT), the emergence of advanced analytics, machine learning and artificial intelligence, the challenge and opportunity for all companies is to harness the disruptive force of technology.

In manufacturing, the transformation is to a "connected everything," from how products are designed, manufactured and sold to the development of value-added business services delivering a connected consumer experience. Digital transformation is fundamentally changing business models where the sale of engines for example is replaced by the sale of engine availability to airline operators, auto companies deliver personalised mobility services and utilities providers predict issues and fix them before they impact their customers.

Advanced technological capabilities require manufacturers to transform their business processes to enable systems of intelligence that help draw better insight out of data and convert it to intelligent action. Previously businesses designed, built, produced, and shipped a product, then customers bought it—that was the end of the cycle. Now organisations are building in continuous feedback loops - sensors in product, after-market services, customer feedback from a variety of channels. Transformation requires these rich systems of intelligence, which represent the combination of technology, people, and process that enable these feedback loops. These systems define an organisation's competitiveness and ability to change the entire landscape of the industries in which it participates.

Manufacturers need to enrich their market offerings to deliver not just a manufactured product but also value-added business services, to provide a complete connected customer experience. Connecting people, processes, things, and data securely across the company is the cornerstone of digital business. Technology can not only help you accomplish specific goals, but it can also enhance the fundamental agility and insight of your organisation by empowering your people to recognise and act as quickly as today's fast-changing world requires. Enabling your people to work where they want - in the office, on the go, and at home - and easily collaborate with colleagues, partners, and even customers around the world is key to innovation. When everyone in the company embraces what is now digitally possible, the business can respond faster and deliver the experiences customers expect.

Business value comes from how you define digital transformation within your traditional business functions of designing, manufacturing and selling products, to aid the development of new business models around a digitised product platform.

At Microsoft, we are focused on a set of holistic solutions that target these key areas in your business and let you deliver a better product and experience to the customer. As manufacturers make the shift to thinking and operating like a digital business, Microsoft's solutions and technologies are helping create a culture of innovation that connect people and information in a way that's intuitive, relevant, natural and time-sensitive.

To find out more about Microsoft Business Solutions for Manufacturing please go to:
enterprise.microsoft.com/en-gb/industries/manufacturing/

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