



The inside track on digital transformation in manufacturing

Lessons from the frontline to make your journey
efficient, secure and sustainable

Introduction

Industry 4.0 presents a once in a lifetime opportunity to modernise and digitise the industrial arena, and that alone should be reason enough to delve further into its possibilities.

However, we believe there's more on offer, that digitalisation is also an opportunity to operate more responsibly and sustainably. As we see it, it's not just about more connectivity and cloud-based working – it's about how we innovate for purpose and connect for good.

As an organisation, we're pushing ourselves to find ways to set our practice in a context that's good for business, for people and for the planet, so we can help our customers do the same. We're committed to acting responsibly by providing better access to new technology that earns trust and transforms lives. We've made big investments in research and development in data, 5G, Artificial Intelligence (AI) and the Internet of Things (IoT). And we want to make this technological future more inclusive and diverse by widening access to technology and drawing people into it equally.

Plus, while we're doing this, we're also reaching for more sustainable ways of production and working to create a net zero footprint.

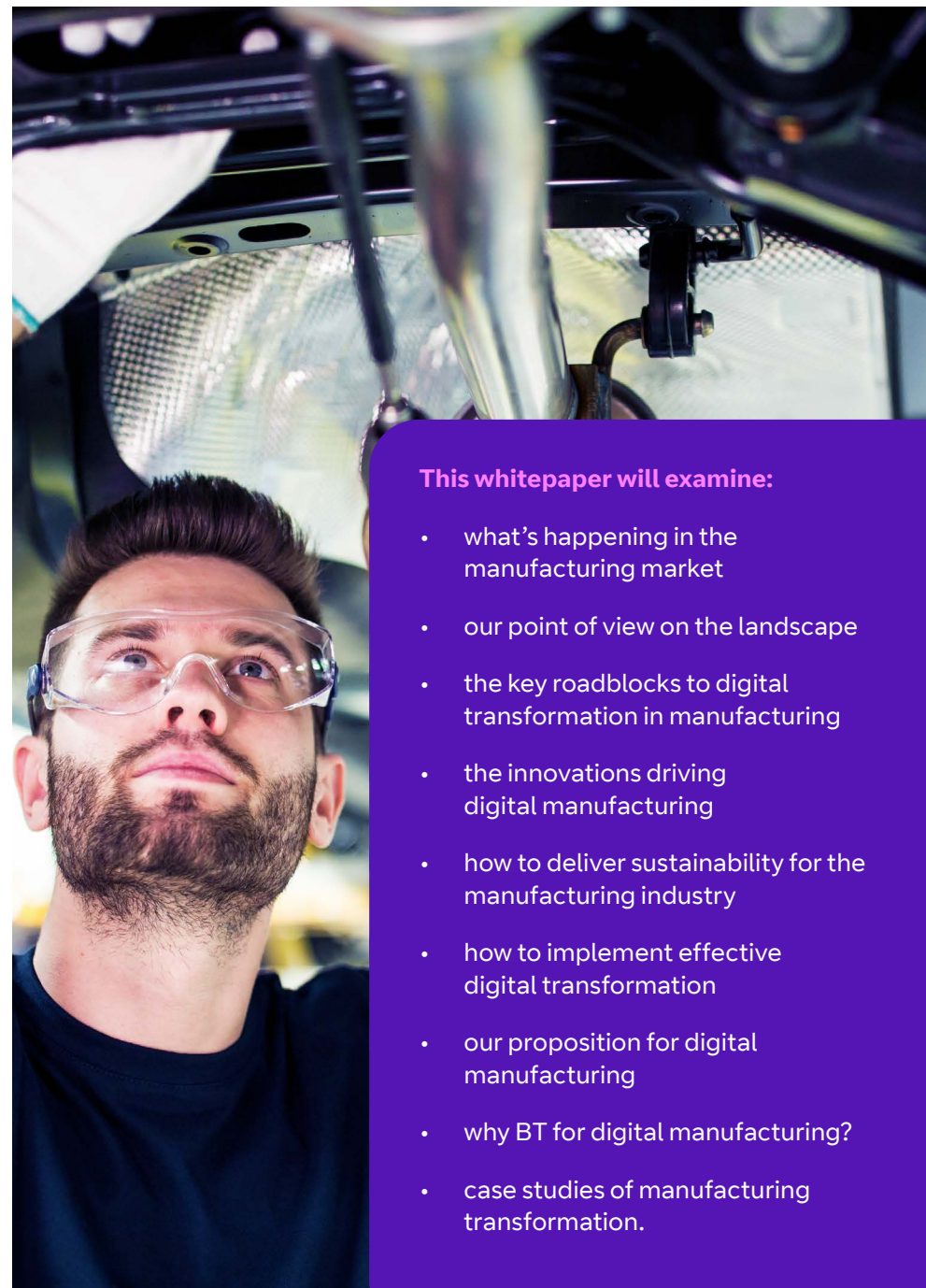
This whitepaper explores the interlinked relationships between how your manufacturing organisation can implement Industry 4.0, how you can improve efficiency and hold down costs, and how you can operate more sustainably. In our vision of digital manufacturing, you can achieve all this with the right strategy and execution.

I hope you find this paper a useful read in planning your digital future.

Do get in touch if you'd like to discuss anything further. [📧](#)



José Gastey
Director, Manufacturing, BT



This whitepaper will examine:

- what's happening in the manufacturing market
- our point of view on the landscape
- the key roadblocks to digital transformation in manufacturing
- the innovations driving digital manufacturing
- how to deliver sustainability for the manufacturing industry
- how to implement effective digital transformation
- our proposition for digital manufacturing
- why BT for digital manufacturing?
- case studies of manufacturing transformation.

What's happening in your market

The concept of 'digital transformation' has been around for a while, yet we haven't seen a universal uptake in the manufacturing sector. However, three key market developments are increasing the urgency for manufacturing to go digital.

Transformation driver #1 - avoiding a shortfall in supply in the face of increasing demand

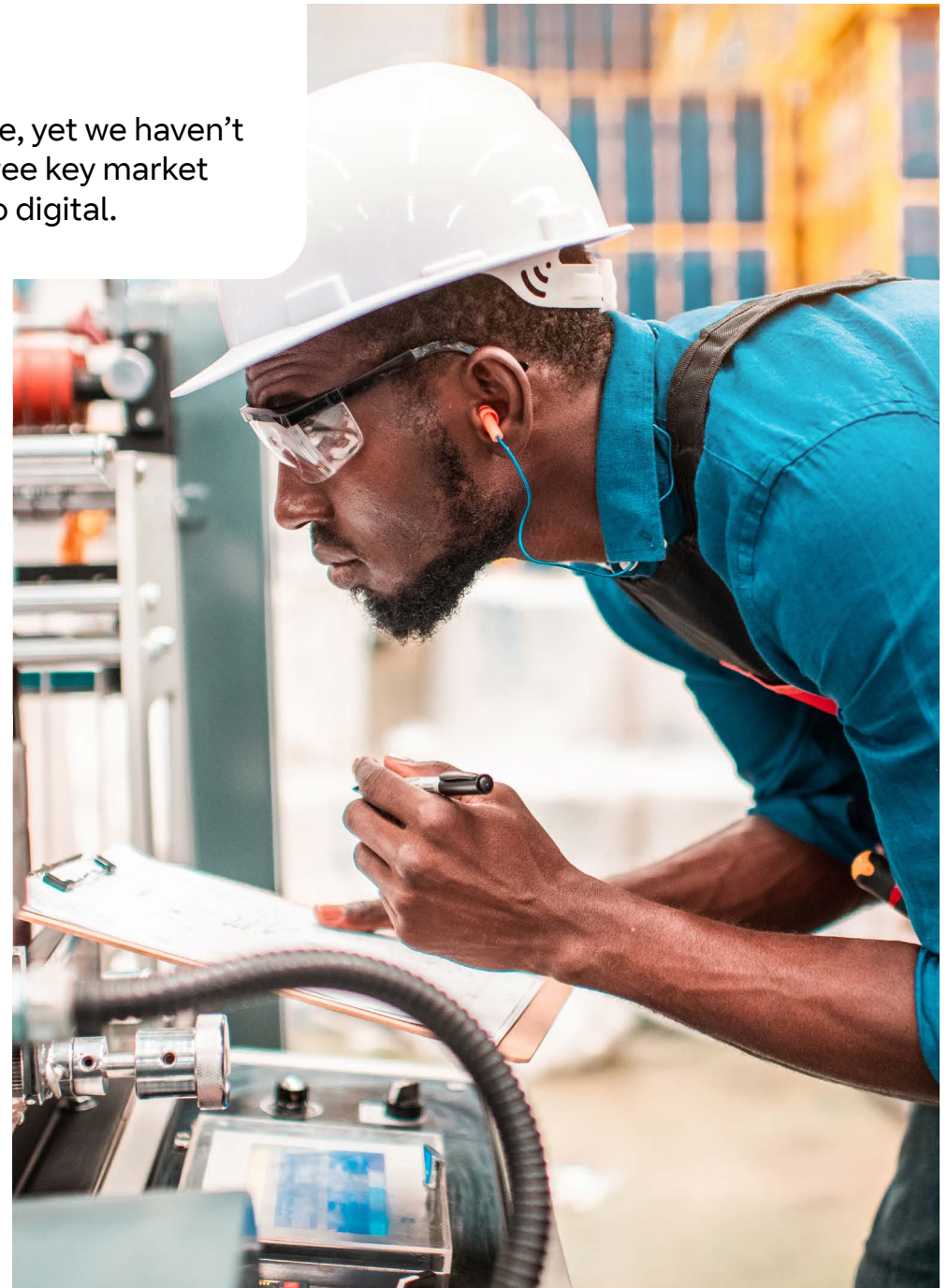
Demand is changing extremely fast. Increasing globalisation means influences on demand are coming from all sides and consumers expect to be able to pick up on and consume the latest on-trend products at will, without delay – before moving on to the next.

Manufacturing supply is struggling to keep up. Those that haven't digitalised find their flexibility is hampered by a dependence on traditional systems. They're unable to use Industry 4.0 technologies to optimise their efficiency, so they're slow to respond. As a result, they're unprepared for today's supply chain volatility and the shift from just-in-time to just-in-case. For some manufacturing industries though, the driver is wider than just the supply chain, and has exposed other weaknesses in their operations.

Transformation driver #2 - growing demand for collaboration, connectivity and visibility in operations

Manufacturers are grappling with increasingly volatile and disrupted supply networks, and a workforce that's struggling to work remotely. They're turning to digitalisation to unlock new ways of helping employees to collaborate and to add visibility across operations and the end-to-end supply chain.

Industry 4.0 technologies, like 5G and edge computing, are supporting innovations such as Augmented Reality (AR) to allow collaborative, dynamic decision-making in this fast-moving environment.



What's happening in your market

Transformation driver #3 - an increase in cyberattacks and risk

Cyberattacks in the manufacturing sector are increasing, with targeting through the Operational Technology (OT) network's connectivity providing a front door for hackers to the rest of the organisation. The [Florida water treatment facility hack](#) and the [Colonial Pipeline attack](#) grabbed the headlines, reinforcing the seriousness of the situation. Many devices run on old operating systems, lack basic security controls, and have overlapping standards and protocols, which creates security blind spots. Less visible risks are also multiplying. [As covered in our Industry 4.0 whitepaper](#), the Claroty ICS risk and vulnerability report measured an increase of 25% in new vulnerabilities in 2020.

There's also the issue of complexity. The broad range of use cases makes creating a standardised OT cyber operating model problematic. With difficulty in identifying all of the different devices on the network, attacks are coming in from unfamiliar directions. The sheer number of sensors creates an issue of scale for monitoring and detection because nowadays it's not always a person at

the end of a device. With the siloed nature of IT and OT monitoring, two worlds need to work together. Today, manufacturers are realising that they need to be in a position to introduce the latest cybersecurity technology to defend their operations, and that this will involve standardising their approach across their estate.



Manufacturing is now one of the most targeted industries for cyberattacks.

In 2019 it was ranked as the eighth most attacked, but it jumped to the second most attacked in 2020, receiving more than

17.7%

of all attacks on the top 10 industries.

21%

of ransomware attacks in 2021 were against the manufacturing industry.



Source: Security Intelligence 2021 

Our point of view

The days of manufacturing taking an isolationist approach to operations are over. The divide between OT and IT needs to go, and managing factories as individual islands is at an end. This is the era of digital manufacturing, where organisations take a macro view of how their operations fit into the wider supply chain and start making decisions about strategy and technology for the organisation as a whole.

Leading manufacturers are learning to see their operations as part of a wider ecosystem. This involves breaking down silos and seeking out ways to support flexibility and collaboration across the supply chain. Take automotive production, for example. Once, the manufacturer would have solely focused on delivering cars. But today, their focus is on delivering a mobility solution that can interact with other providers and services in a multitude of ways – from automatically downloading any driver's music playlists to providing highway operators with data on road

conditions. The vehicle driving off the production line isn't the end of the manufacturer's role because that vehicle shares performance data throughout its lifetime that can inform the manufacturing process.

How to achieve this macro, unified view is a big focus in our conversations with customers, as they look for ways to improve efficiency and productivity in a highly competitive environment. Manufacturers further down the transformation path have sidestepped any potential conflict between the worlds of OT and IT by building collaborative teams. Their teams work together to establish best practice for the organisation, creating a unified approach that treats the organisation's infrastructure as a whole. The aim is to create consistent and mature sites that can then develop and operate as one.

A big part of this evolution is building security into the process by design. As IT extends into OT and OT systems are connected to the outside world, it can expose long-standing vulnerabilities to cyberattacks. OT, IT and security teams need a unified approach to manage the convergence of systems, but often these teams are siloed groups of people who don't always have confidence in one another.

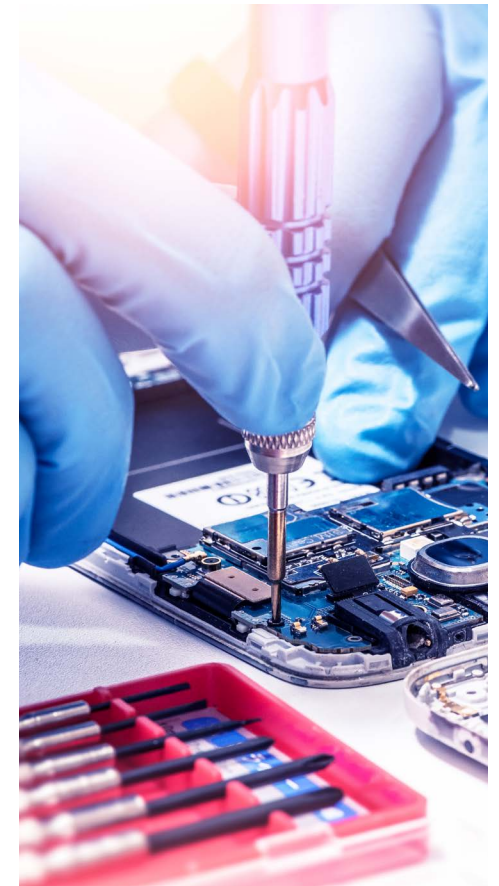
IT people think OT people don't understand security, and OT people think those in IT don't understand plant processes. And yet it's essential that any digital transformation is tightly coordinated between these functions to avoid vulnerabilities or delays as security considerations are retrospectively implemented, potentially at significant cost.

Developing a manufacturing process fit for the future depends on bringing 5G into the connected factory as a facilitator for innovation. Although there's still a lot of hype around it, manufacturers have an increasing understanding of how 5G can support the flexibility they need by helping them escape from the rigid confines of a fixed network. Increasingly, we're helping customers weave 5G into their digital manufacturing plans.

And running throughout the shift to digital manufacturing is the business imperative to improve sustainability. Consumer consciousness of how manufacturing often uses finite resources and generates carbon emissions is at an all-time high – and there's the very real risk that consumers will switch away from a brand if it's not sufficiently green in its approach.

Digitalisation is the key to more innovative and sustainable ways of production, including those that have a positive effect on OEE scores. [OT / IT convergence alone can cut the cost of energy per unit by 9%.](#) [🔗](#)

[Check out how we make digital manufacturing happen in our short video.](#) [🔗](#)



The key roadblocks to digital transformation in manufacturing

In our experience of working with global manufacturers to achieve digital transformation, we've found that the same issues, concerns and attitudes emerge. Recognising what's holding your organisation back allows you to address the roadblocks in your digital transformation strategy.

1. Tackling your expanding cybersecurity risk and managing your security estate

Digitalised manufacturing calls for enhanced connectivity, which can potentially bring increased cyber vulnerability. The expansion of IT into OT opens the door to the wider internet across a much wider variety of devices and there are increased risk considerations which come with that. High-profile cyberattacks on manufacturers have significantly increased boardroom concerns, and the idea of a connected manufacturing estate going offline at the same time triggers high anxiety and significant caution.

Plus, IT / OT convergence raises the question of what assets and devices are in the OT side of this new, wider security estate – and who is going to take responsibility for managing and securing it. There's a more complicated inventory to deal with, particularly since there's not always a person on the end of every device. And there are big questions about how to keep the expanded estate up to date with the latest operating systems and security controls.

2. Getting compute capability where you need it

The starting point for digital transformation in manufacturing is often an older network that's both disjointed and non-standard. This forces organisations to plan and implement on a factory-by-factory basis, which is time consuming, labour intensive and complicated – and moving compute to the edge where it's going to be essential is a complex process. Plus, sourcing reliable specialist ruggedised compute equipment adds an extra layer of difficulty.

3. Scaling your data management

Accurate, free-flowing data is essential for digital transformation, but many organisations are starting from a point where their data is stuck in silos, and a lot of it is still paper-based. It feels like a gargantuan task to digitalise complicated paper trails to bring the data together across many different systems to create a clear, overall picture.

4. Destabilising your LAN

Many manufacturers are extremely conscious that their networks are older and flat, which makes it practically impossible to limit the blast radius of any cyberattack, should they move forward with digitalisation.

But refreshing the LAN to facilitate digital manufacturing seems risky to them too – particularly given that industrial wi-fi (often believed to be the cornerstone of a connected factory) can be difficult to implement reliably.



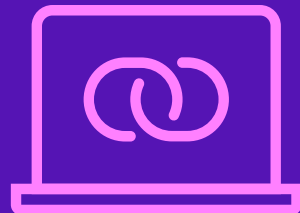
The key roadblocks to digital transformation in manufacturing

5. Funding and creating an end-to-end network

Organisations sometimes hold back because they expect the costs involved in creating an end-to-end network to be prohibitive. However, retrofitting tech often makes financial sense; having relatively cheap wireless technology is advantageous when laying more cables can be prohibitively expensive. Organisations need to connect new IoT devices and retrofit sensors to the industrial network, for example via Bluetooth Low Energy (BTLE), Long Range WAN (LoRaWAN) or Narrow Band IoT (NB-IoT). They need to connect OT and IT networks together to feed algorithms that do things like predictive maintenance, and they need to connect the factory to the cloud or Carrier Neutral Facilities to train algorithms and share data across sites, suppliers or customers.

6. Managing compute capability within your factory

In a traditional manufacturing environment, compute capacity is centralised and the factory itself doesn't have much involvement with it. Digital manufacturing introduces compute capability into the factory and many organisations struggle to source the skills to support or manage it from within the existing workforce. The compute resource is likely to be running critical applications, so concerns about how to keep it going are common.



7. Building trust between your teams

Digital transformation shakes up how the organisation works internally and needs people to let go of territorial, entrenched attitudes such as the lack of trust between teams. OT often sees IT as a threat vector that has the potential to seriously disrupt production, and both OT and IT can see the Security team as a brake on their productivity.

8. Getting internal buy-in for your transformation

Digital transformation isn't an all-or-nothing process. Chances are a manufacturing organisation will have implemented small-scale projects that they've developed in-house. Understandably, the originators of these projects can feel highly protective of their work and resent any plans that don't incorporate what they've achieved.

9. Progressing your pilots to successful whole-organisation transformation

There's a very real risk that, without strong commercial models and clear ways of demonstrating a rapid Return on Investment (ROI), the organisational mood will be against wider digital transformation, and nothing will get past pilot stage. Often manufacturers don't have board-level sponsorship for wider change or clear proof of value data to support the business plan and haven't included using efficiency savings to fund innovation in their strategy.



Innovations to drive your digital transformation

5G is, without a doubt, the technology of the moment across all digital industries. However, we see it as a facilitator for other innovations rather than as a standalone technology. Its latency is approximately half that delivered by 4G, and it provides consistent connectivity without the dropouts that can happen with 4G. This combination of low latency and high reliability minimises the likelihood of a safety failure and opens the way for new advances.



91%

of enterprises looking to deploy a private network in the next two years are considering 5G as the main technology for their deployments. @

Innovations to drive your digital transformation


Here are three innovation areas that are critical to digital transformation in manufacturing:

1. Autonomous vehicles and cobots

The depopulation of the warehouse and factory floor is well underway, accelerated by the social distancing requirements of the pandemic and increased absences due to coronavirus. Underpinned by the lower latency and highly sensitive location accuracy of 5G, autonomous vehicles like forklift trucks will increase in popularity. Constant connectivity and rapid sensor feedback ensure safe behaviour and mean that robotic technology doesn't have to live in cages anymore. This is promoting the growth of autonomous collaborative robots (cobots). Connected via 5G, they're specifically designed to interact directly with humans in close proximity.

Cobots are growing at a rate of

40%

year-on-year, while market revenues are predicted to reach \$1.94 billion by 2028, accounting for 15.7% of the total robot market. 

2. Augmented Reality (AR) and Virtual Reality (VR)

AR today is an extremely useful tool in any situation where expertise is needed, but it's difficult to get the expert there. When the pandemic grounded all the expert teams who would travel out to plants and factories to carry out servicing and fixes, AR proved itself as a viable alternative. AR can increase the speed of repair as well as reducing its costs. Operatives can carry out guided maintenance and operations with the remote support of experts who can guide them on unfamiliar equipment or configurations. The headsets also give the wearer access to up-to-date and accurate information.

With VR, you can create more realistic training environments for situations where it's too hazardous to train people with physical simulations. Staff can play out worst-case scenarios safely, and they learn more effectively because they're working in a replicated 'real' environment and can see the consequences of not following procedures.

Worldwide, almost

23.5m

jobs could be using AR and VR by 2030. 

3. High-definition computer vision

Traditionally, computer vision was a trade-off between a high resolution rate or a high frame rate – you couldn't have both. As a result, human checking remained a vital part of production. However, with today's innovative technology, high-definition cameras that can provide both high resolution and a high frame rate are stepping in to replace human checks on production line quality. Enabled by 5G, the technology increases efficiency and can spot issues rapidly, minimising the effect of errors on the production process.

It's also an increasingly popular way to free up human operatives for other tasks during times of labour shortages.

On average, predictive maintenance increases productivity by

25%

and reduces breakdowns by

70%

and lowers maintenance costs by

25%



Addressing sustainability through digital manufacturing

Manufacturing, as an industry, is highly conscious that it can be a heavy user of energy – and that use generates carbon emissions. Unlike many other industries whose emissions are largely generated by the wider value chain, the bulk of manufacturing's emissions are generated by the organisation itself. Because most of a manufacturer's emissions are under its control, there's strong regulatory and public pressure on operators to cut energy usage to increase sustainability.

How can you manage if you can't measure?

Accurate, centralised data is the foundation of increasing sustainability through reducing energy use. Your first stage is to capture all essential information, in terms of your energy usage, your operations and your productivity. Without up-to-date data, you can't work out why it's taken more energy one day to produce the same amount of goods that you produced the day before.

How to reduce your energy bill

Efficient energy usage depends on achieving the optimum mix of factors such as the quality of raw materials and machinery settings, and AI and machine learning have a significant role to play here.

AI looks at your past operations, models the best outcomes, and gives recommendations to help you achieve your efficiency 'sweet spot'. You can then identify best practice by plotting an Energy Efficiency Index (EEI) to look at past production runs and comparing them to see which were the most energy efficient and why.

The AI can then provide predictions and recommendations for specific production runs, suggesting optimal operational parameters and indicating how much you could save in costs and carbon consumption. Every time the AI's used, it learns, continually refining its recommendations. And when you've learnt to trust it, the AI can make adjustments automatically, within the safety limits you've defined, becoming a closed loop solution to optimise energy and carbon emissions.

Algorithms exist that deliver energy savings of between

6-12%

within

1-2

months. [↻](#)

Looking beyond reducing energy usage

The potential to manufacture more sustainably is increasing as innovation and digitalisation grows within the sector. The critical point is to stop thinking of sustainability as a separate topic. Instead, leading manufacturers are seeing sustainability as a thread that runs through all aspects of production.

Find out more about how to use AI to make manufacturing sustainable in our blog post. [↻](#)

Digital transformation can support sustainability by:

- reducing travel by using AR to connect experts with workers on the ground
- cutting equipment downtime by using 5G, IoT sensors and high-definition computer vision and predictive maintenance to spot and fix issues before they stop production
- reducing waste and repeated work, by using computer vision to detect quality issues sooner than manual '1 in 100' checks can
- increasing production efficiency by pooling data centrally, breaking down siloed operations, and allowing best practice to be identified and shared
- reducing travel and equipment downtime by using on-site 3D printers to create spare parts as they're needed, rather than waiting for them to be shipped.

How to implement effective digital transformation

Digital manufacturing looks slightly different for every organisation, but there are seven core principles which guide effective digitalisation.

1. Where are you starting from?

Your journey to Industry 4.0 must start with a thorough understanding of where you are right now. Any strategy needs a baseline to limit the unknowns that could hamper progress later down the line. Look at your infrastructure holistically, starting at the Industrial Control Systems and ending at the cloud or data centre, reviewing everything in between to see if it's suitable. This would include the fixed factory LAN, 5G and other wireless technologies, edge computing, collaboration tools and cybersecurity.

2. End-to-end cybersecurity

Working out what's connected to what in your factory networks and where there might be malware is an essential part of successfully connecting OT and IT. The majority of malware that gets into factories comes from the IT world and many current manufacturing systems have vulnerabilities that make them susceptible to cyberattacks.

Plus, adding in IoT functionality lengthens system borders and increases the potential attack surface, and once data leaves the factory you need to know it's distributed securely. To counteract these potential vulnerabilities, it's essential to build cybersecurity into your transformation by design.

3. Getting network-ready for digitalisation

Digitalisation requires a network that's resilient and able to collect and process data locally, as well as sharing data securely across the organisation and into the wider ecosystem. Make sure your local infrastructure is architected and designed to support the increasing number of connected 'things' on site and the increase in data that will follow.

From there, consider what's the right network connectivity for your data. For remote locations it's worth considering LEO (Low Earth Orbit) satellite services to provide improved low latency performance.

When you're connected to the cloud, consider private connectivity services for that critical, latency sensitive data. And, to ensure key application performance, consider an SD-WAN solution.

Make security a priority by adding in behaviour monitoring and introducing zoned areas with firewalls to reduce the blast radius of any malware intrusion.

Your digital future depends on a holistic picture of your organisation. So, as part of your network refresh, identify where additional sensors would provide useful data and incorporate them. At this point, evaluate how much processing power you're going to need locally, and plan in the edge computing capability you need.

4. Tackle your problem sites first

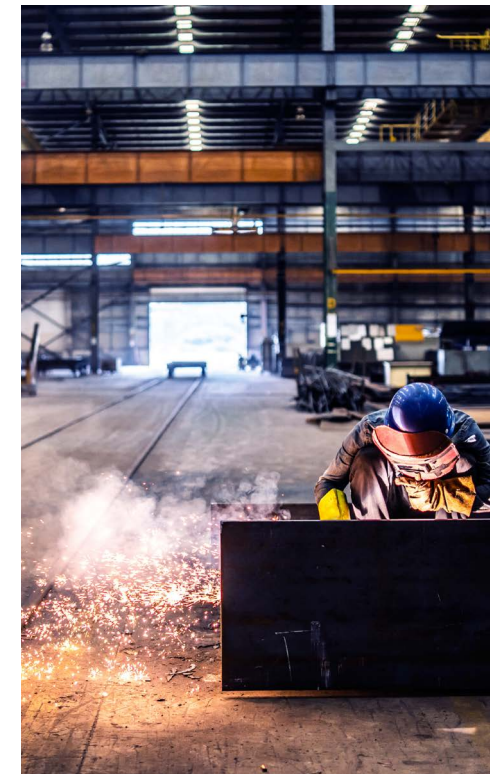
The most effective implementation of digital manufacturing tackles the sites with the greatest opportunity for – and ease of – replicability. This creates a template of what success looks like, that can then be rolled out as a standard format across other sites.

5. Business planning versus technology planning

Beginning with a proof of value exercise that can demonstrate a rapid ROI is essential to get buy-in and to show how refreshing your network will unlock savings that can be offset against your initial investment.

6. Collaboration, collaboration, collaboration

The rapid collaboration that emerged as a response to the pandemic is going to be a permanent part of a digital future in manufacturing, so it's important to plan how you're going to support collaborative working. AR technologies are now mainstream, and your transformation must factor in their support. Tools such as Microsoft Teams first line worker will be essential.





Our digital manufacturing proposition

As organisations globally accelerate their plans and up their investments to digitalise their business, they need effective partners. These partners must understand the challenges and opportunities manufacturers face, and have a clear vision of how the products and services they offer can be deployed to support their customer's journey.

By working closely with our customers across a range of industries, we've developed a digital manufacturing proposition that helps to address the three key barriers to scaling:

1. Getting the supporting infrastructure right

Ensuring that devices can be connected, and data can be collected to drive the valuable business insight that's foundational to digitalisation and Industry 4.0.

2. Getting the insight data from distributed assets

Ensuring that data can be transported and accessed wherever it's needed to provide the insight and decision-making required for effective digitalisation.

3. Addressing cyber threats in the face of an ever-increasing attack surface

Providing end-to-end security to ensure that the business and its data is fully protected as it's collected, transported, stored and used.

Our digital manufacturing proposition

We provide industry-specific, global managed services that enable secure data distribution across global supply chains, operations and businesses.

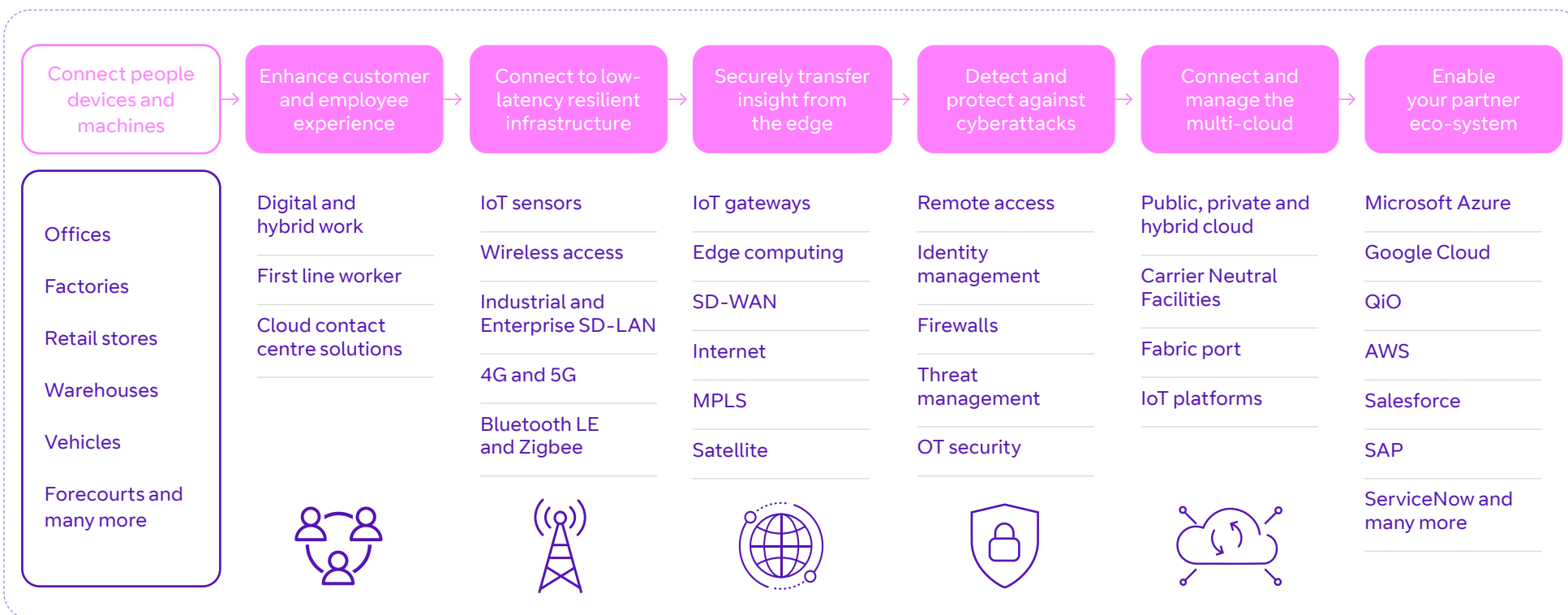
Our ambition: to become the world's most trusted connector of people, devices and machines.

To power the digitalisation of your business, we can help you with:

- an end-to-end-infrastructure design, based on composable architectures
- the products, tools and services to support your digitalisation globally
- a service framework supporting your business on a scalable basis
- a security-by-design approach that protects your data, assets and business.

What your business can achieve with our digital manufacturing solutions:

1. ensure your network infrastructure is digital-ready
2. resolve your cybersecurity challenges
3. deliver your data securely and globally to improve business outcomes.



Industry-specific global managed service across **infrastructure, security and digital workplace**

Why BT for digital manufacturing?

We put manufacturing front and centre

Our digital manufacturing portfolio is the result of hundreds of conversations with our manufacturing customers that our experts have used as the bedrock for developing their solutions. Even with this manufacturing-centric approach, we remain open to the fact that we may need to further tailor our solutions to precisely meet your requirements.

We're experts at building successful business cases

Our experts combine the right solution for you with proof of value exercises, a drive to establish excellent returns on investment and support to build a winning business case. **This consciousness of cost extends to our partner choices in a marketplace where 89% of UK organisations run open source code to manage costs.** 

We build trust before solutions

We understand that solutions that feel imposed upon factory teams are rarely as successful as those that are co-created. Recognising that your people know more about your business than we do, we value the trust of your teams on the ground and work collaboratively with them to develop a solution.

We're security specialists

Our experience and expertise in protecting governments, nation states, critical national infrastructure and large global corporations from over 6,500 cyberattacks each day gives us a ringside seat on the complex security threat landscape. We use this unique position to support organisations to detect and respond to threats in a Zero Trust world with real-time visibility and monitoring, drawing on the expertise of our 3,000 security experts and 350 consultants based in our security operations centres around the globe.

Our renowned global network

We're a reliable partner with global experience and credentials, and the research and development capabilities to turn the latest innovations into resilient and trusted services on a global scale. We've delivered thousands of solutions globally with our ever-increasing choice of secure services and solutions. Our approach means that multiple technologies and legacy systems can be easily managed to create a single, secure global network infrastructure for your business.

The breadth and depth of our portfolio

Through our broad portfolio of solutions, we can easily integrate with the collaboration applications, data and third-party cloud providers you need globally. Then our end-to-end management of your entire solution simplifies operations for you – and improves user experience for your team and your customers. Our portfolio combines our deep expertise and extensive capabilities in cloud, networking and security services.



Our extensive and experienced partner ecosystem

We offer an ecosystem of partnerships to transform the way you run your operations. Our links with leading public cloud providers delivers flexible connectivity into hyperscalers and regional datacentres. And, through leading industry partnerships, we blend the latest specialist technologies into what we offer.

Our investment in R&D and innovation

A commitment to innovation is part of our DNA. We've invested £2.5bn in research and development over the last five years, making us the third largest investor in R&D in the UK. Our 13,000 scientists and technologists worldwide have filed over 10,000 patents since 1990 to push forward the boundaries of what we can help our customers achieve. We have a particular focus on technologies that will shape manufacturing, such as blockchain, quantum computing and the security around them.

We take an open approach to innovation, working in close collaboration with our customers and strategic partners or specialist innovators such as universities, government organisations, standards bodies and technology companies. Our innovation scouting teams are always scanning the horizon for ideas and expertise generated by



third party organisations that we can incorporate into our search for the next technological breakthrough. Our own BT Labs at Adastral Park is a globally recognised centre for telecoms research and a key source of UK Intellectual Property, and our 4,000 scientists, IT experts, engineers and collaboration partners based there continue to push the boundaries of innovation.

Our long-standing commitment to sustainability

We've been on a climate action journey for over 25 years, since setting our first carbon reduction target in 1992. Since 2016/17, we've reduced the carbon emissions intensity of our operations by 57% and have reduced carbon emissions by 19% in our supply chain over the same timeframe. We've pledged to be a net zero and circular business by 2030, and 2040 for our supply chain and customers.

Make digital manufacturing happen

Our experts are ready to help you bring digital manufacturing to life in your organisation. To find out how to unlock the potential of digital manufacturing, get in touch with your account manager today or visit our webpage. [🔗](#)

Digital industry in action

A network that can flex to what's next

The challenge

Supporting agile cloud working and new online services was affecting our CPG manufacturing client's network performance. They couldn't expand at the speed they wanted, and it risked impacting customers experience online while sending their IT maintenance costs spiralling.

The solution

They needed a digital transformation to make its network smarter, faster, more secure and more reliable. To handle the increased traffic flow, we added intelligent connectivity and added control makes it easier to scale systems. We added layers of cloud cyber protection to defend the network and to detect and respond to threats on individual devices faster.

The result

It's now easier for our client to expand, embrace new technologies and keep pace with the ever-changing business landscape.

The connectivity that makes digital industry possible

The challenge

A leading global technology company wanted to keep pace with a dynamic digital landscape by evolving its communications infrastructure to support its digital ambitions in a sustainable and responsible way.

The solution

Using the latest software-defined networking technology, we provide a choice of connectivity options for each site, including 5G access. A new software-driven platform delivered over Wi-Fi 6 enables mobility and digital manufacturing concepts, such as robotics, IoT and Big Data technologies at production sites. Our use of 100% renewable electricity with a commitment to achieving net zero emissions across all our operations by 2030 reinforced their sustainability credentials.

The result

The digital-first communications infrastructure reliably and securely connects people, devices and machines at over 600 facilities in 60 countries, and a co-innovation fund prepares the company for the future.



Digital industry in action

Delivering the network visibility essential to digitalisation

The challenge

A global provider of systems, equipment and services for the mobility sector wanted to accelerate its 'move-to-cloud' strategy with a network refresh that would give visibility of network traffic so that it could optimise their end-user experience.

The solution

Our consultants used our Smart Transformation process to align the right solutions to business needs, settling on a managed network service based on the VMware SD-WAN solution delivered over our digital service platform. This gives the manufacturer the flexibility to take control of individual aspects of change management.

The result

The new global network uses the latest cloud-optimised connectivity solutions to connect operations at 350 locations in 60 countries, including manufacturing plants, offices, depots and data centres. It provides agile and secure access to company applications and services used by remote-working employees.

Building 5G private networks for Industry 4.0

The challenge

Industry 4.0 needs robust and effective 5G Private Networks, wearable devices, IoT, data analytics and mobile edge computing to make digital industry a reality.

The solution

We switched on the UK's first 5G factory installation at the Worcestershire 5G Testbed, to explore ways of boosting productivity through robotics, IoT, big data analytics and AR. We've built on this with a live 5G private network covering the 2,000-acre Belfast Harbour to enhance safety, security and sustainability across the estate. The network drives operational efficiencies and optimising processes across transport, logistics, supply chain and shipping, as well as streamlining the port's operations.

The result

These 5G private networks bring digital industry to life, supporting the creation of a sophisticated digital ecosystem comprising of 5G, AI, IoT and connected vehicles.





Offices worldwide

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