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BOUNCING BACK SMARTER

Innovation Monitor 2020

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EXECUTIVE SUMMARY

Our economy is undergoing a profound digital transformation, that has the potential to transform not just businesses, but our lives and the wider economy, making it more productive, resilient and sustainable.

The adoption of Industrial Digital Technologies (IDTs) has never been so important and we are pleased to report that the vast majority of manufacturers now see IDTs as a reality in their businesses by 2020.

Moreover, an increasing number of companies are recognising the value of digitalising manufacturing and are pressing ahead with their digital journey - taking advantage of the opportunities and benefits associated with the adoption of IDTs.

We already knew that businesses that invest in and adopt digital technologies are more resilient and productive and the pandemic without doubt put that to the test. The quick success of the Government's Ventilator Challenge, which saw industry come together to build life-saving new-style ventilators at speed, was only possible because of 3D printing, virtual reality and augmented reality technologies, which proved key in designing and building the ventilators the NHS so desperately needed to save lives.

However, this latest survey explores the progress manufacturers have made in their digital journey since we last drilled down in detail in our Innovation Monitor 2018 report and how companies have taken on behaviour change to their advantage.

The manufacturing sector is very diverse in the UK. It plays host to some of the largest manufacturers who are great technology adopters and world leaders in innovation. On the other end of the spectrum, we have a vast number of SMEs which are still not adopting IDTs at speed even though they acknowledge the benefits of doing so.

Over the last two years the barriers of adoption remain largely unchanged. A lack of digital skills remains at pole position, with data compatibility still proving difficult. Creeping up the ranks is finance, with more companies telling us they simply do not have the funds available to make such significant investments. Yet, conversely, manufacturers are not taking advantage of the financial support that is available to them, with awareness of many Government finance packages for innovation low.

The good news is that manufacturers have made significant progress in the past two years in adopting IDTs. In 2018, 30% of manufacturers were in the pre-conception stage, essentially doing nothing at all about the adoption of IDTs – this has dropped to just 11%. And whereas just 4% of companies were in the revolution stage, in other words, actively making changes on how companies interact with their client base and supply chains two years ago, this number has gone up to 14% this year.

Awareness of IDTs is growing with an overwhelming 85% saying they are now familiar with IDTs and almost eight in ten (77%) saying that IDTs will be a reality in their business by 2025. However, regional variation is stark. The success of the Government's Made Smarter pilot in the North West is impressive in terms of SME digital adoption – with 20% of small businesses in the area in the revolution phase of adoption, second only to the South East at 33%. The pilot saw small businesses not only supported financially to purchase IDT investments, but they had access to a complete advisory service taking them through the technologies which would best benefit their companies, mentoring in how to optimally utilise them as well as support for change management skill building.

We must build on this momentum, address the barriers that manufacturers face, and accelerate plans for adoption of IDTs so businesses of all sizes can reap the benefits.

Government and industry have a role to play. Industry must lead the way in showcasing best practice and take advantage of the support available to get them further down the digital road. Government must put in place the right fiscal incentives to support digitalisation, roll out its ground-breaking Made Smarter pilot to the rest of the UK and increase R&D spending to help the UK manufacturing power ahead to the top of the global stage.

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PROGRESS TOWARDS DIGITALISATION

Manufacturers are increasingly aware of the productivity and cost benefits digitalisation can bring and have made progress in adoption since 2018. They have focussed particularly on robotics, artificial intelligence (AI) and the Industrial Internet of Things (IIoT).

How is the sector doing?

UK manufacturing is well on the way to a fully digital future. But – given the scale of the changes required, the diversity of the sector, and the fact that most manufacturers are small and medium-sized enterprises (SMEs) – this journey will take time.

In 2018, EEF (as Make UK was then known), identified four stages in the digital transformation of manufacturing, and benchmarked sector performance against these. We've used the same questions in our 2020 survey, to assess progress two years on.

THE FOUR STAGES OF DIGITAL TRANSFORMATION

1. Pre-conception

Doing nothing on digitalisation.

2. Conception

Aware of the concepts and what peers are doing; considering implementation.

3. Evolution

Improving current business processes and practices through introducing technology.

4. Revolution

Seeing a step change in productivity and efficiency through far-ranging changes to technology and processes.

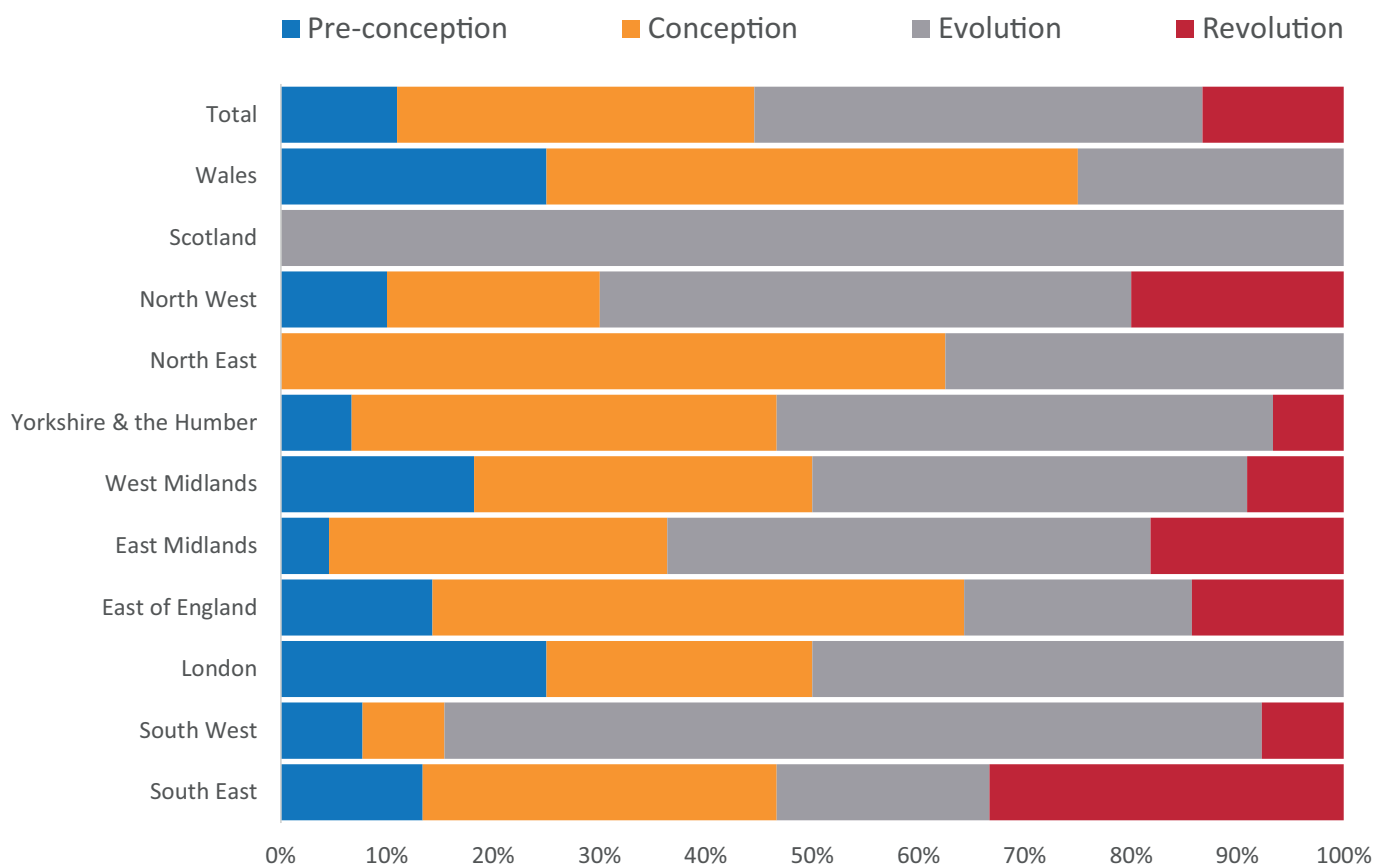
Table 1: % share of manufacturers at each stage, 2018 vs 2020

Stage	2018	2020	change (%)
Pre-conception	30	11	-19
Conception	27	34	+7
Evolution	39	42	+3
Revolution	4	13	+9

These results show significant progress over the last two years, particularly at the two extremes of the journey. In 2018, nearly a third of manufacturers hadn't even started to consider digitalisation as an option; that number has now dropped significantly to just 11%. Similarly an increasing number of manufacturers have progressed to the final stage, which is where the full benefits of digital transformation can be realised.

Chart 1: Regional performance on digitalisation

% companies at stages of digitalisation adoption by region



Source: Make UK/Infor, Innovation Monitor (2020)

However, these figures do mask significant variations in sector and regional performance. Some sectors have embraced digitalisation more eagerly than others, and this then feeds through into the relative economic performance of different regional economies.

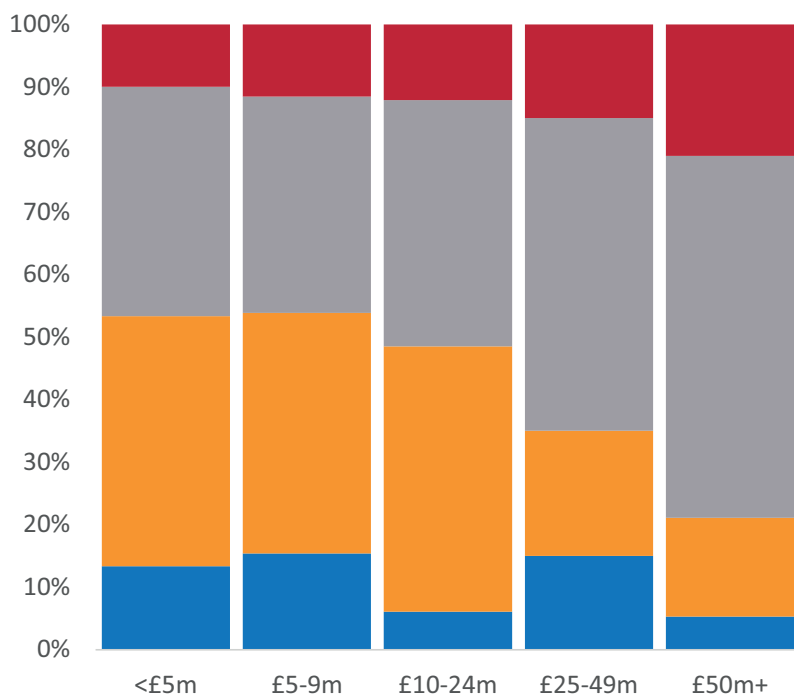
The North West, for example, where aerospace and pharmaceuticals predominate, and where specific help to SMEs has been made available through the Made Smarter initiative, shows a high proportion of manufacturers in the 'revolution' stage (20%), second only to the South East at 33%.

However the West Midlands, where a high proportion of traditional, engineering-based manufacturers are based, has a very high proportion of companies still in the pre-conception stage (18%) with only 9% achieving 'revolution'. Performance in Wales is notably below average, with a quarter of manufacturers not yet considering digitalisation, and none considering themselves to be at the 'revolution' stage.

Chart 2: Performance on digitalisation by turnover

% companies at stages of digitalisation adoption by turnover

■ Revolution ■ Evolution ■ Conception ■ Pre-conception



Source: Make UK/Infor, Innovation Monitor (2020)

Make UK has many examples of SMEs who have embraced digitalisation, and who are reaping the rewards. But there remains a perception – which we would challenge – that digitalisation is something that only larger manufacturers need to consider. Our survey data backs this up: with twice as many large manufacturers (defined by turnover) achieving the ‘revolution’ stage compared to the very smallest. As sector bodies and Government work to improve the uptake of digitalisation this perception will need to be addressed, with particular help and support being focused on smaller manufacturers. Digitalisation is for every business.

One of the main drivers for digitalisation is the need to retain the international competitiveness of the UK manufacturing sector. Other countries – such as Germany and Japan – have extensive support systems in place to help their manufacturing SMEs modernise, and it is important that their UK counterparts are not left behind. But only 9% of respondents agreed that the UK was in a leadership position compared to other countries when it comes to the adoption of IDTs. Perhaps reflecting this, only 15% of manufacturers agreed that it would be possible to realise the full potential of IDTs without government support.

These results suggest that more needs to be done to accelerate adoption if the UK is to attain a leadership position in digital manufacturing, and that the public sector has a critical role to play in ensuring that this happens. We discuss this issue in more detail later in the report.

Which technologies are manufacturers investing in?

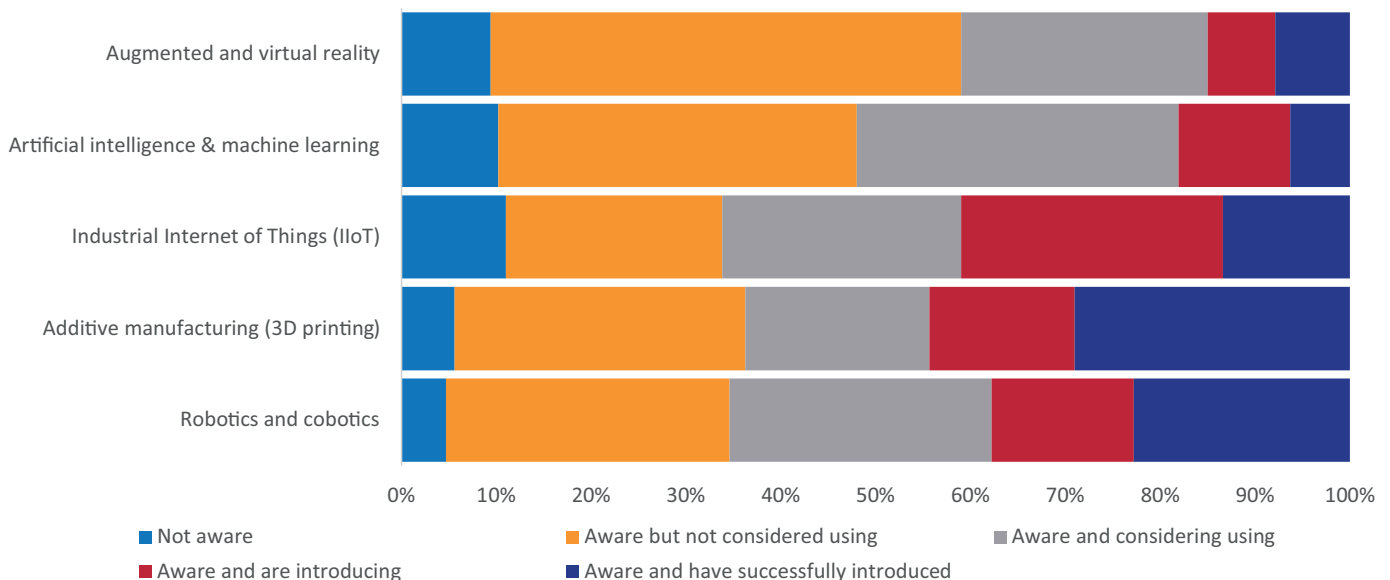
There are a broad range of technologies which can contribute to digitalisation of manufacturing, and various lists and definitions are available. For this survey, we have concentrated on looking at five Industrial Digital Technologies (IDTs) as identified by the Made Smarter Commission, an industry-led group (including Make UK) which advises the sector and Government on this issue. We have also assessed progress against a range of other digital technologies which have a broader application across many sectors, but which manufacturers may find useful.

KEY INDUSTRIAL DIGITAL TECHNOLOGIES

- Robotics and cobotics
- Additive manufacturing (3D printing)
- Industrial Internet of Things
- Virtual and augmented reality
- Artificial intelligence

Chart 3: Take up of IDTs differs, with robotics and additive manufacturing most commonly used

% companies citing awareness of various IDTs



Source: Make UK/Infor, Innovation Monitor (2020)

This breakdown shows us that awareness of all five key IDTs is relatively high, but the rate of successful introduction differs considerably. Nearly a quarter of manufacturers report having successfully introduced robotics and cobotics, and 28% have introduced additive manufacturing.

But technologies like artificial intelligence (which can transform areas like predictive maintenance) or virtual reality and augmented reality (which can transform sales and service activities) have seen a much lower uptake.

CASE STUDY



Artificial Intelligence to aid predictive maintenance. Senseye is a software provider for Predictive Maintenance from Southampton.

Nissan, Senseye's client, manufactures vehicles in 20 countries and areas, around the world. Its global vehicle production volume exceeded 5.6 million in 2016, with products and services provided in more than 160 countries. With an abundance of data and insufficient skilled resources to perform analysis, Nissan were keen to expand the benefits of using data to influence maintenance. It decided to embark on a condition-based maintenance programme to reduce production downtime by up to 50% across thousands of diverse assets. It was attracted to Senseye by its strong prognostics offering underpinned by machine learning.

Senseye is providing predictive maintenance capability across multiple Nissan global production sites where models such as the Qashqai, X-Trail, Leaf and Infiniti are produced. Over 10,000 connected assets including robots, conveyors, drop lifters, pumps, motors and press/stamping machines are remotely monitored using Senseye's proprietary machine learning algorithms. More than 450 maintenance users actively use Senseye to optimize maintenance activities and make repairs months before predicted machine failure.

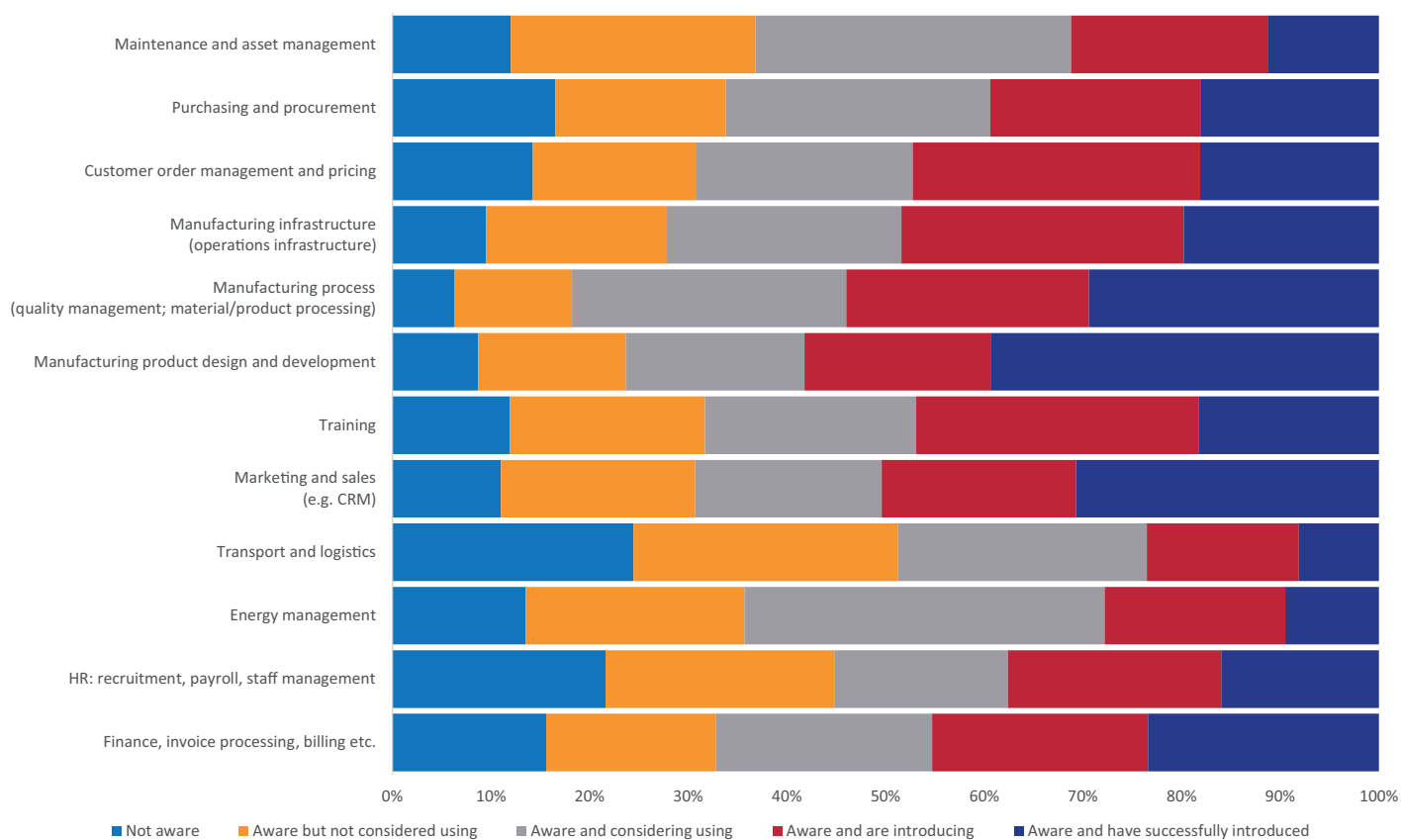
- **MULTI-MILLION DOLLARS OF UNPLANNED DOWNTIME SAVED TO DATE**
- **RAPID RETURN ON INVESTMENT OF LESS THAN 3 MONTHS**
- **2 WEEKS TO 6 MONTHS ADVANCE WARNING OF ASSET FAILURE**
- **YEAR-ON-YEAR OEE IMPROVEMENTS**



Looking beyond manufacturing-focussed technologies we see a similar picture. While awareness levels are generally high, the uptake differs considerably depending on the area of the business concerned.

Chart 4: There has been progress of digitalisation in other parts of manufacturing businesses too

% of companies citing awareness of use of IDTs across the business



Source: Make UK/Infor, Innovation Monitor (2020)

This shows a great degree of awareness, and use, of digital tools in areas such as product design and development, marketing and sales, and process and order management. Areas where manufacturers are making less use of digital tools – despite these being widely available – include HR, transport and logistics, and purchasing and procurement.

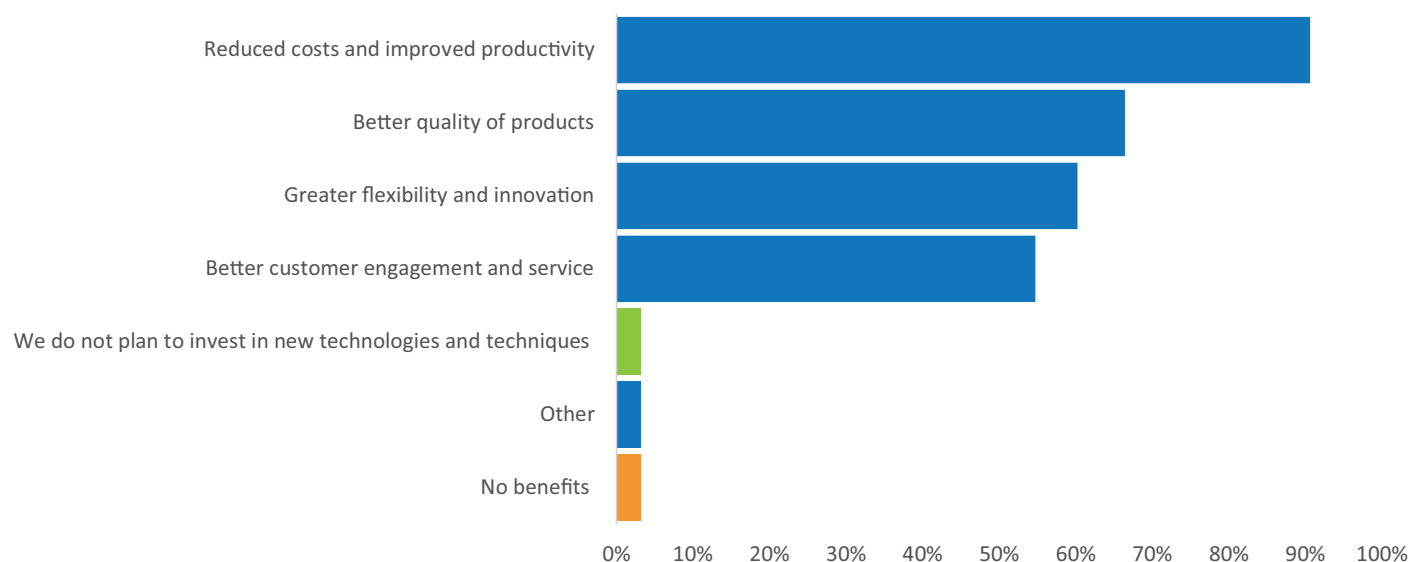
The results for energy management are particularly noteworthy: while numbers for adoption are low, significant numbers of manufacturers have identified this as an opportunity area – perhaps in line with an increasing awareness of energy efficiency and the move to a net-zero carbon economy.

Benefits from investing in IDTs

Finally, we asked manufacturers what benefits they expected to see from investing in IDTs. 'Reduced costs and improved productivity' was the overwhelming response (at 91%), but two-thirds also expected to see better quality of products, and over 50% improved flexibility and customer service. Only 6% saw no benefits, or did not plan to make any investment in this area.

Chart 5: Manufacturers see real benefits to their business in investing in IDTs

% of companies citing benefits, if any, of investing in IDTs



Source: Make UK/Infor, Innovation Monitor (2020)

OVERCOMING BARRIERS TO ADOPTION

Key barriers to adoption have remained consistent over the past two years. Action on skills, change management, impartial advice and financing models are needed to overcome them.

If the benefits from adopting IDTs – in terms of cost savings, productivity improvements and resilience – are so great, then why haven't larger numbers of manufacturers taken them up? We know that many manufacturers feel that Government help and support is needed, but what specifically should this support address?

In March 2020, Make UK undertook extensive stakeholder research across England to look into this issue and to consider how best to design and deliver publicly-funded support programmes for SME digitalisation.¹ As part of this, we looked at an existing programme in North West England – the Made Smarter SME Adoption Pilot – to see how it had decided to tackle the issue.

MADE SMARTER SME ADOPTION PILOT

In 2017, the industry-led Made Smarter Commission considered how best to tackle low IDT adoption rates amongst manufacturing SMEs. Alongside a national work on leadership and innovation, it recommended an integrated, regional approach, bringing together four strands of advice and support.

These are:

- a strengthened and expert advisory service, to engage with SMEs and provide them with credible, impartial advice;
- small-scale grants to provide financial support for IDT investments by SMEs;
- mentoring support and improved university links to ensure improved networks for SME owners and managers;
- support for change management skills.

This integrated, blended approach does not currently exist outside North West England. In our conversations and workshops with manufacturers, stakeholders, and providers, the majority agreed that these recommendations are still useful, and these four strands remain the right ones for effectively supporting SMEs. Participants agreed that wider adoption efforts across the country would best be based on an extension of this approach.

¹ 'Make It Smart' – How to improve productivity and resilience by digitalising our manufacturing base. Make UK Policy Paper, May 2020 (<https://www.makeuk.org/insights/reports/make-it-smart>)



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Our survey findings broadly reflect the barriers identified by Made Smarter. These have also changed little since our previous analysis in 2018 – in fact the top six barriers are exactly the same, albeit with some slight reordering. The main change is that more manufacturers reported finance as a barrier in 2020 than 2018: this may be because the 2020 survey was carried out during the COVID-19 pandemic when manufacturing – and the economy as a whole – was experiencing a profound economic downturn.

LEAGUE TABLE

Barriers to adoption of IDTs (2018 vs 2020)

2018 Position	2020 Position
1 Digital skills	1 Digital skills
2 Data compatibility	2 Data compatibility
3 Technical knowledge	3 Finance
4 Change management culture	4 Technical knowledge
5 Finance	5 Change management culture
6 Cyber security	6 Cyber security

As we can see, concerns about skills and access to impartial information predominate, as they did two years ago. When we look into the data in more detail, this suggests that – while helpful – existing support initiatives have not made significant inroads into addressing these barriers, and that further work is required if UK SMEs are to reach their full potential.

One of the barriers which is often overlooked – but which comes out clearly in this survey – are concerns about change management skills. Manufacturers appreciate the scale of the change needed – not just in terms of technology, but also working practices – to reap the full benefits of digitalisation. But they are concerned about how to encourage their workforces – who may have produced the same products in the same way for a long time – to embrace new ways of working. Equipping manufacturing leaders with the skills to give them the confidence to implement change successfully has to be part of any effective programme of public support. The Made Smarter initiative, in conjunction with Lancaster University Management School, has developed a programme available in North West England, but similar initiatives are thin on the ground elsewhere.

CASE STUDY

Overcoming financial barriers to create a digital twin MSM – aerospace fabricators, Manchester.

MSM is an aerospace fabrication company based in Greater Manchester. Having outgrown their current factory they needed to move to new premises, taking the opportunity of the move to redesign and overhaul their production processes.

With an integrated package of support from the Made Smarter North West Pilot they received advice and financial support to develop and invest in a digital twin virtual reality simulation of their new factory. This enabled them to quickly and easily simulate different options for the layout and operation of the premises and to identify the most efficient and effective solutions – before a single physical alteration was made.

CASE STUDY



Contracts Engineering LTD, Sittingbourne, embedding culture change alongside digitalisation in a traditional fabrication SME.

Contracts Engineering (CEL) is one of the Southeast's largest contract steel and aluminium manufacturers and fabricators. They have a healthy culture of teamwork and customer-centric service, high levels of investment in people, a management open door policy, and high job satisfaction with low staff turnover of between 5-10% per year versus a UK manufacturing average of over 25%.¹

This culture has helped the company move forward when investing in new technologies and training. Over the years, these have included a fibre optic laser, CNC turret punch, new CAD and enterprise resource planning (ERP) software, and an annual training programme that switches between soft and hard skills.

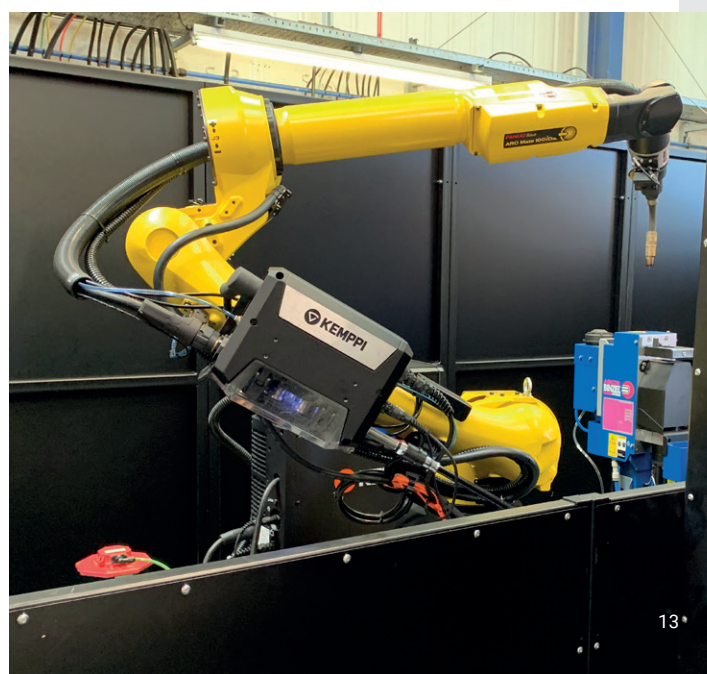
Employees sometimes fear the adoption of automation as they are concerned the new technology may take their jobs. At CEL, their commitment to creating a culture of learning, openness and dialogue with employees helps remove the concern over lost jobs. In particular, every investment made by CEL includes upskilling the team. The numbers speak for themselves; since BAMUK Group acquired CEL in 2012 employment has grown by +50% and average pay is up over 20%, including a bi-annual company profit share.

THE ROBOT IS OVER TWO TIMES FASTER ON HIGH VOLUME PRODUCTION THAN A MANUAL WELDER, SO IT WAS CRUCIAL THAT THE DIRECTORS SPOKE WITH STAFF ABOUT THE INVESTMENT AND ITS POSITIVE IMPACT ON CEL.

In April 2020, the company received delivery of its first robotic MIG welding plant. The robot is over two times faster on high volume production than a manual welder, so it was crucial that the Directors spoke with staff about the investment and its positive impact on CEL. CEL's Operations Director is leading a two-part training program where several welder fabricators have learnt how to program and run the robot, while others are being upskilled in more advanced welding techniques that will not be done by the robot.

Specifically, he has organised to have The Welding Institute send an aluminium welding specialist to upskill staff who are no longer involved in high volume welding. Meanwhile the MD is busy pursuing new contracts to serve CEL's existing customers and prospects who require more advanced welding in their products and projects.

Troy Barratt, Managing Director of BAMUK Group and CEL, says: "We started with a culture of openness so that all staff knew very early on that we would be investing in a robot for the high volume work, and crucially that we would train and upskill staff on the robot or in more advanced welding. This collaborative approach allowed us as a collective team to focus on a smooth install and upskilling, as well as letting us focus on winning new work for the fabricators and for the robot. I'm pleased to say we already have several new projects for the folks being upskilled and for the robot.



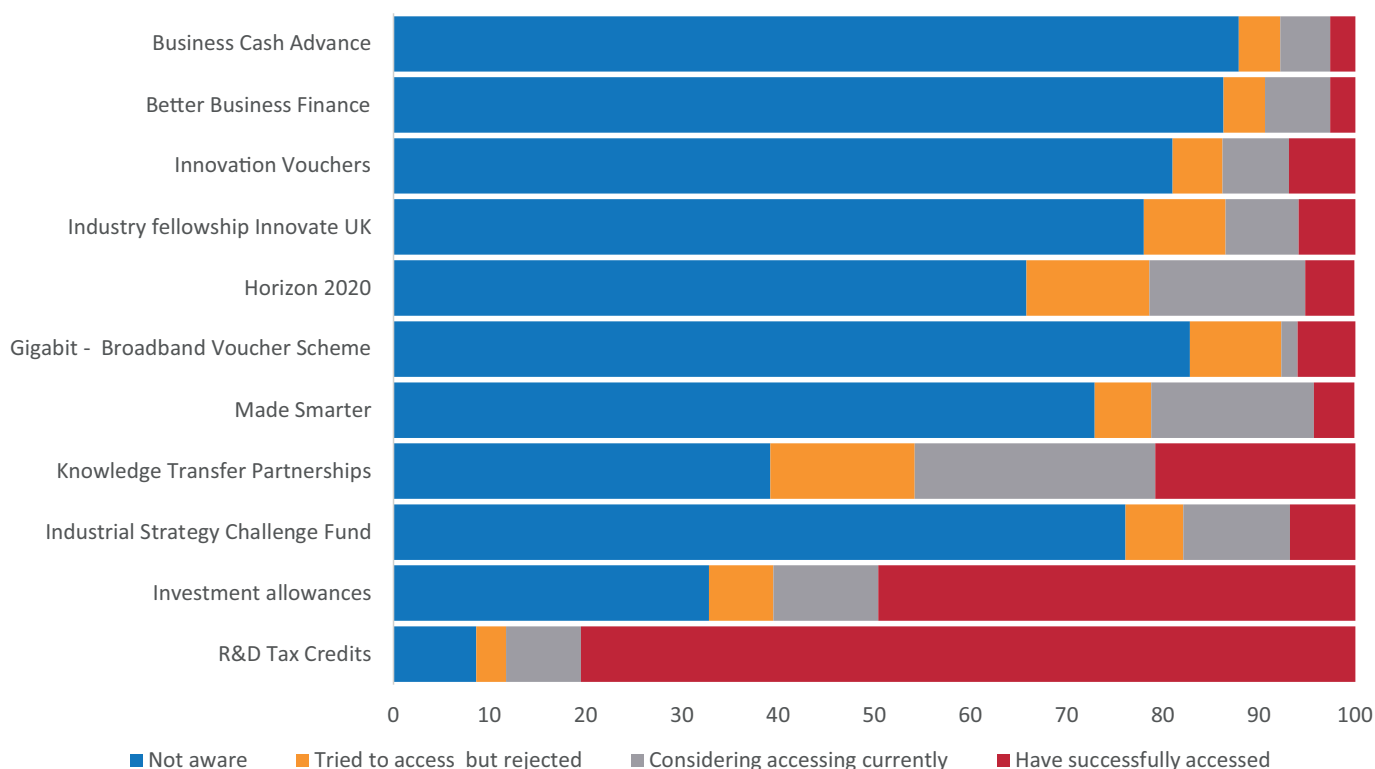
¹ Office of National Statistics Report for 2018. <https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/adhocs/10685employeeturnoverlevelsandratesbyindustrysectionukjanuary2017todecember2018>

Some manufacturers are turning to innovative new financing models, which can help overcome some of these issues. For example, if the upfront costs of investing in new, digital equipment are prohibitive, it may be worth exploring a leasing or 'equipment as a service' contract. This requires no initial commitment of capital expenditure, and allows the cost of the investment to be paid over time from current expenditure budgets. As such investments usually produce operating cost reductions and/or productivity improvements, these savings can be used to meet the service payments over the lifetime of the service contract.

The Government provides financial support for innovation in various ways, principally through fiscal incentives (such as tax credits or allowances) and through grants channelled through bodies such as Innovate UK. Make UK's policy work has identified that SMEs have difficulty engaging with Innovate UK, due to the complex and highly competitive nature of its grant allocation process. Fiscal measures – or more locally distributed grants – are likely to be more effective means of support.

Chart 6: Awareness of different funding schemes for innovation

% of companies citing awareness and use of innovation funding schemes



Source: Make UK/Infor, Innovation Monitor (2020)

And the need for this support is greater now than ever. The achievement of the UK Government's target of 2.4% of GDP being invested in research and development requires both the public and private sectors to increase significantly their R&D investments.

But this kind of discretionary spend is often threatened during an economic downturn. Our analysis suggests that only 28% of manufacturers will spend more on R&D in the next two years, presenting a huge challenge for policymakers.

CASE STUDY



Liberty Steel UK forges ahead with Infor CloudSuite Industrial Enterprise.

Liberty House Group is a fully-integrated steel manufacturer and distributor, with capabilities ranging from liquid steel production to high-value, precision-engineered products - sold around the globe. The organization prides itself on creating a sustainable and balanced, international business that is environmentally conscious and socially responsible - with an integrated and agile business model.

In May 2017, Liberty House Group acquired Speciality Steels from Tata Steel UK. This acquisition included steel manufacturing and service centers in both the UK and China, bringing new manufacturing capabilities along with 1,700 additional employees to the company.

New division, new ERP system

According to the terms of the acquisition, Speciality Steels needed to immediately remove its business operations - including all supply chain, inventory management, asset management, financial management, payroll, and time tracking - from Tata Steel UK. As a result, Speciality Steels joined Liberty House Group without an enterprise resource planning (ERP) system and with limited ERP expertise. With aerospace, automotive, and oil and gas customers relying on its products, Liberty House Group needed to maintain production levels with its new acquisition, now known as Liberty Steel UK. Liberty Steel UK still needed to fulfil customer orders, receive raw materials on time, pay vendors, and keep employees engaged and productive within the new organisation. Liberty Steel UK needed an ERP system and knowledgeable people to manage it. And needed it fast.

LIBERTY STEEL UK CHOSE INFOR CLOUDSUITE INDUSTRIAL ENTERPRISE. THIS CLOUD-BASED, ERP SYSTEM MET ALL THE NECESSARY CRITERIA.

Up and running quickly with cloud-based ERP

Liberty Steel UK began an immediate search to find an easy-to-maintain ERP system that could become operational as soon as possible. The system also needed to include the unique business processes and industry best practices required for a steel manufacturer. After a competitive, three-month search and evaluation, Liberty Steel UK chose Infor CloudSuite Industrial Enterprise. This cloud-based, ERP system met all the necessary criteria, including:

- Fast deployment - Infor CloudSuite Industrial Enterprise was up and running for 900 users in 13 months. This timeframe included the time it took from product evaluation through deployment.
- Managing people and production - The new software includes human resources (HR) capabilities to help Liberty Steel UK attract, recruit, and retain employees. The solution helps HR staff identify candidates for open positions; provides managers information to help their direct reports succeed; and gives 2,000 users access to their benefit and other HR-related information online, whenever they need it.
- No extensive ERP knowledge required - CloudSuite Industrial Enterprise is deployed offsite, freeing up the company's internal IT staff to support more strategic business initiatives and delegating all ERP software and hardware management to Infor.
- Meeting the unique needs of steel manufacturers - CloudSuite Industrial Enterprise includes dashboards to monitor energy usage, sensor integration to capture product quality data throughout the production process, and predictive maintenance capabilities to keep machinery up and running.
- Business best practices built in the newly acquired Liberty Steel UK division successfully moved its mission-critical finance, procurement, plant maintenance, and human resources business processes into CloudSuite Industrial Enterprise and optimized its operations based on the business expertise Infor built directly within the software.

Creating the standard for digital transformation

The integrated industry functionality and best practices have positioned Infor CloudSuite Industrial Enterprise as the business software standard for Liberty House Group. The company has decided to replicate Liberty Steel UK's Infor-based, software framework across the company's ten steel manufacturing operations within the UK.

[Liberty Steel Case Study from Infor >](#)
[CloudSuite Industrial Enterprise >](#)



TECHNOLOGY AND RESILIENCE – A NEW OPPORTUNITY

Manufacturers want to continue to improve the resilience of their operations. Technology has an important role to play in securing supply chains and delivering secure workplaces.

Manufacturers are increasingly focused on building resilience within their businesses. Whereas previously a relentless focus on cost had led to the emergence of highly globalised, just-in-time supply chains, the pandemic has shown how easily these arrangements can be disrupted. In fact, during the height of the crisis, only 12% of manufacturers were operating at full capacity, despite being allowed to continue working by the Government.²

This shows the significant impact that reductions in demand, and interruptions in supply, can have. So it is not surprising that the vast majority of Make UK members report that they are now looking at their supply chains and customer base again, with a greater focus on 'just in case' rather than 'just in time'.

While making supply chains shorter and more diversified can help improve their resilience, IDTs also have an important role to play. It is important that this is not overlooked as policymakers and industry continue to learn to protect our economy against future shocks.

² Make UK, Covid-19 Manufacturing Monitor (2020)

CASE STUDY

VENTILATOR | CHALLENGE | UK

How additive manufacturing and virtual reality (VR) and augmented reality (AR) helped design and build ventilators at short notice during a period of lockdown and supply chain disruption.

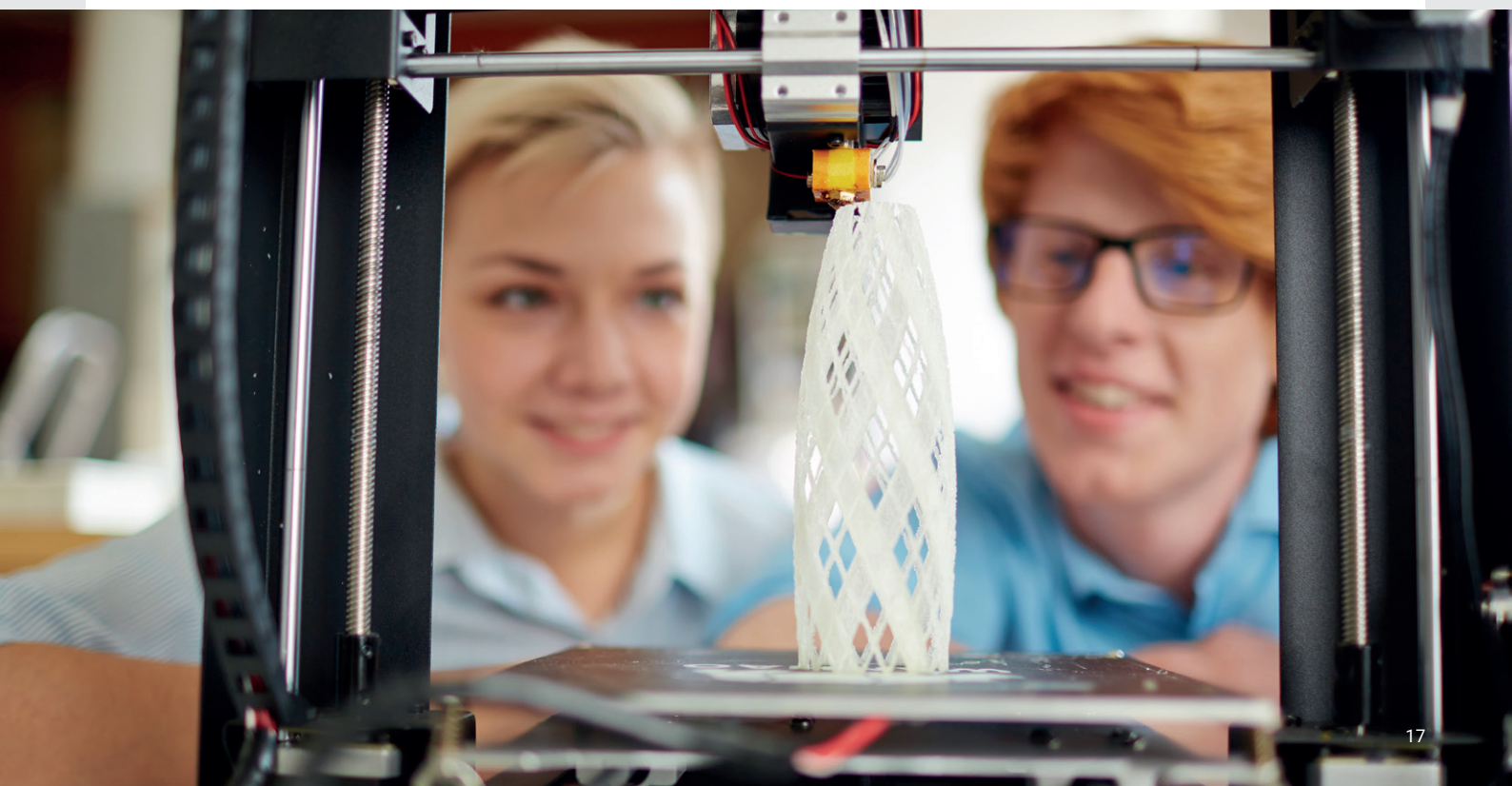
Ventilator Challenge UK

While it was not a core activity of the Ventilator Challenge UK, it was used when speed and flexibility was required. 3D printing was particularly used at the beginning as the consortium came together, to rapidly prototype dummy parts, and test manufacturing set-ups. It was also used to support rapid training of assembly teams which were drawn from other sectors and had no experience in assembling life saving devices. Within 12 hours, the consortium teams could have the part in their hands and be able to understand it – this was really important to keep the programme moving at the necessary pace.

Penlon ES02 workstream

When the Government 'call to arms' came in mid-March, Penlon proposed the ES0 2 Emergency Ventilator, based on its existing AV-S anaesthesia ventilator platform, Prima 440 desktop anaesthesia workstation and the A200SP absorber. As this was an all-new device - the sub-assemblies were taken from other machines but had never before been put together as one unit – the consortium didn't know if they had the correct design. Against a backdrop of life or death urgency the team 3D printed the parts for test purposes to ensure they had an assembly that worked, enabling rapid re-work if required.

3D PRINTING WAS PARTICULARLY USED AT THE BEGINNING AS THE CONSORTIUM CAME TOGETHER, TO RAPIDLY PROTOTYPE DUMMY PARTS, AND TEST MANUFACTURING SET-UPS.



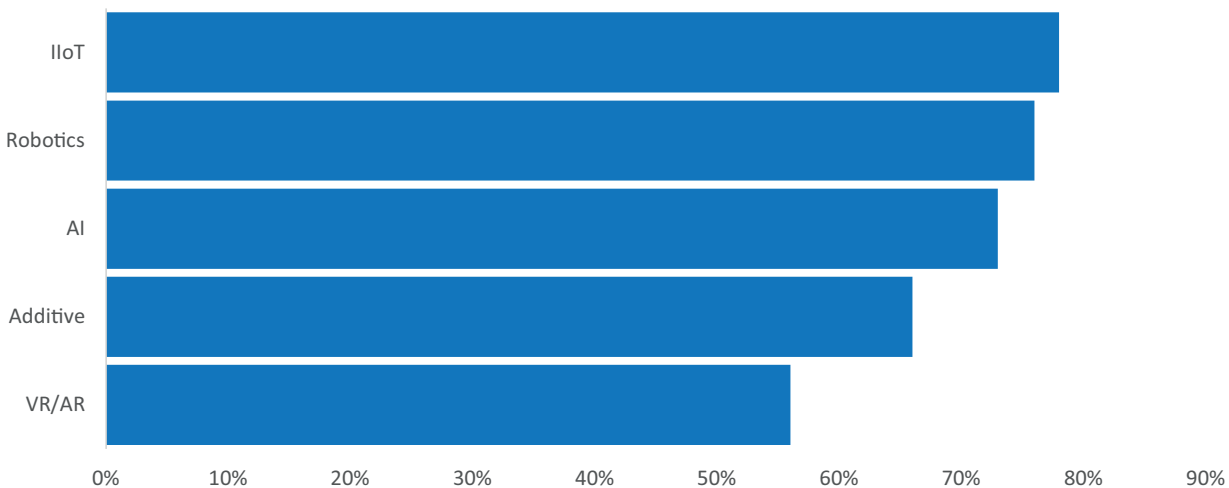
Manufacturers agree that this focus on resilience provides an additional incentive to move forward with digitalisation. Only a third disagree when asked whether a greater investment in IDTs would have helped them to be more resilient during the COVID crisis.

71% OF MANUFACTURERS THINK THAT THEIR INVESTMENTS IN IDTs WILL INCREASE OVER THE NEXT TWO YEARS.

Manufacturers also see potential across the range of IDTs to help improve their resilience, but seem most likely to consider robotics, artificial intelligence and the Industrial Internet of Things.

Chart 7: The potential for types of IDTs to maintain or improve resilience

% of companies citing whether IDTs will maintain or improve resilience



Source: Make UK/Infor, Innovation Monitor (2020)

The relatively low scores for additive manufacturing and virtual and augmented reality stand in contrast to the Ventilator Challenge case study above, where these technologies were used extensively.

This suggests that more needs to be done to explain the benefits that they bring and look into whether there are specific skills, cost or technical barriers that are standing in the way of the adoption of these particular IDTs.

Making workplaces secure

While service sector industries have adapted readily to home working, it is much more challenging for the manufacturing sector to do so. While office functions – aided by investment in cloud computing services – can be performed away from the factory, core production functions cannot. As a result, manufacturers are investing heavily in delivering secure workplaces, to allow their workforces to return to full operations safely and securely.

Manufacturers who had invested in digital skills have also benefited. Of those companies whose employees had undertaken digital training in the last 12 months, nine in ten said this had helped their company to adapt when COVID-19 struck. This included the use of 3D avatars for sustainable sampling, virtual commissioning and attending virtual trade exhibitions in addition to more office focused functions including use of Zoom and other virtual meeting platforms, remote data gathering and enterprise resource planning.³

Maintaining safe social distancing is a key element in any safe return to work strategy, and is emphasised in the Government's guidance to employers. But even this can be a challenge in a manufacturing workplace. Increasingly, manufacturers are turning to technology to help with this – reducing the number of workers that have to be in physical proximity at any one time while maintaining high levels of output.

Manufacturers' ability to quickly adapt to digital processes during the pandemic paid off. Nine in ten manufacturers said it took under two weeks to adapt. Almost all companies said this made it easier to adhere to social distancing guidelines. Two-fifths of manufacturers said the new way of working has improved communications and over a quarter that it has boosted productivity. Only one in ten said they have seen no benefits.⁴



³ Make UK, Boosting Digital Skills Survey (July 2020)

⁴ Make UK, Boosting Digital Skills Survey (July 2020)

CASE STUDY

KUKA

Using robotics to deliver a secure workplace.

KUKA - The social distant robot scientist

University research facility utilises mobile robotics and AI to continue essential research and development during physical distancing.

The Royal Society of Chemistry, based out of Liverpool University, has developed a robot scientist. The KMR iiwa, a flexible and autonomous navigation platform equipped with an LBR iiwa sensitive robot, will be instrumental in maintaining vital research and development processes during a time when social distancing prevents developers from working on premise.

The development of the robot has been hailed as 'a new digital age for science' by the organisation, as the robot has continued to operate throughout lockdown, undertaking a series of tests on the behaviour of solar cells. It could, according to Prof. Andy Cooper, Materials Scientist at Liverpool University, also be used in the fight against COVID-19.

An identical process, if undertaken by manual means i.e. a human, would incorporate far fewer variables. The robot is essentially allowing the artificial intelligence to produce many more

variables (variations in testing data) as it can undertake tests far more quickly than a human. As it is also able to operate 24/7, with cycle breaks only to visit the floor charging dock, many more variables can be produced - essentially the programmable researcher learns from its results to constantly refine its experiments.

The autonomous, mobile robot is fully HRC compatible (human robot collaboration). A combination of the sensitive LBR iiwa lightweight and the location-independent and highly flexible KMR (KUKA mobile robot). Seven special joint torque sensors on each axis of the LBR iiwa make it highly sensitive to its environment, and a compliant gripper enables it to execute the many delicate tasks within the laboratory, such as the movement/placement of numerous vials in between testing stations.

Once humans can enter the facility, the collaborative nature of the KMR will enable man and machine to work alongside one another. Laser scanners mean the mobile platform can navigate fully autonomously, as it monitors its environment as it works, reacting immediately if a person or object is in the way, and continuing upon its route once the coast is clear.



THE DEVELOPMENT OF THE ROBOT HAS BEEN HAILED AS 'A NEW DIGITAL AGE FOR SCIENCE' BY THE ORGANISATION, AS THE ROBOT HAS CONTINUED TO OPERATE THROUGHOUT LOCKDOWN, UNDERTAKING A SERIES OF TESTS ON THE BEHAVIOUR OF SOLAR CELLS.

Financial resilience

In the previous section we looked at the concept of equipment as a service, and how this can be used to overcome some of the financial barriers to investing in new technology. This 'servitisation' concept can also be applied to product innovation, often with data acquisition, storage and analysis as the driver. This can lead to more competitive product offerings, but also greater financial resilience – as revenue arises from service contracts as well as upfront orders. Make UK members who have innovated in this way have seen greater income stability during challenging economic times, as service contract income has remained broadly constant, while those relying on a traditional ordering model have seen significant declines.



CASE STUDY



Financial resilience through servitisation

This 160 year old globally trading company makes precision instrumentation that measures temperature, pressure and level for wide range of sectors including the defence, food industry and LPG. Rototherm is a company with a strong culture build around excellence, striving for continuous improvement.

In 2018 Rototherm looked into how to digitalise their product offer and following market analysis, they launched a Remote Tank Monitoring Solution. Designed in house the system uses telemetry and a digital portal connected to a cloud solution that provides (real time) data from the tank to any device that can be accessed remotely including mobile phones. This service was sold to a client on a subscription basis and as a result provided Rototherm with a stable reliable revenue platform.

This has enabled Rototherm to:

- Add value to a customer
- Deliver a required high service
- Provide easy bolt on additional services
- Like compound interest, increase revenue in size month to month

Sales predictions: due to lockdown and restrictions on movement, there has been increase of enquiries, explaining the sizable forecast jump.

Data monitoring business is a servicing business and delivers a 24hr response to clients. Owing to the introduction of the monitoring service, Rototherm has seen a growth in finances during the lockdown and has prevented issues arising from clients who couldn't physically check their tanks.

DESIGNED IN HOUSE THE SYSTEM USES TELEMETRY AND A DIGITAL PORTAL CONNECTED TO A CLOUD SOLUTION THAT PROVIDES (REAL TIME) DATA FROM THE TANK TO ANY DEVICE THAT CAN BE ACCESSED REMOTELY INCLUDING MOBILE PHONES.



INFOR VIEWPOINT: BOUNCING BACK SMARTER: TIME FOR INNOVATION

UK productivity has been relatively flat since the 2008 financial crisis and lags the majority of the G7 countries. The research, undertaken by MAKE UK in partnership with Infor, shows that the current crisis has had a significant economic impact on some UK manufacturers. Others have adapted quickly and found new revenue streams. It's time for UK manufacturing to up its game and regain its position as a UK growth engine.

As manufacturers strive to achieve a step change in productivity levels, the need to invest in industrial digitalisation technologies has never been greater and provides new opportunities for growth and efficiency. While the data indicates 89% of UK manufacturers have started to consider or implement digitalisation, only 13% are in the 'Revolution' stage, which is the 4th of the four stages and where the step change normally occurs. The opportunity is there, it's now a case of innovating and adopting the use of modern, industrial digitalisation technologies.

Strategic Imperative

In today and tomorrow's data-driven world, industrial digitalisation technologies can help companies become more competitive and differentiated through providing new levels of customer experience. There are opportunities for new and innovative product and service revenue streams, as well as improvements in productivity, higher product quality and cost reductions.

This calls for supply chain tools that deliver network-wide partner connectivity to enable real-time visibility, demand and supply planning, and production scheduling insights. Modern tools deployed in an organization's technology stack can digitally transform the supply chain and customer experience through automation, optimisation and analytics.

UK manufacturers cannot sit back and wait for Government help and support to arrive, the time to act is now. Those companies that have embraced and invested in industrial digitalisation are gaining a competitive advantage and are likely to capture a larger share of their market. They are reshaping markets and are likely to be the most agile, efficient and competitive as the UK adapts to Brexit and the new global marketplace.

Getting Started

The barriers to getting started on industrial digitalisation technologies can be relatively low. There are usually many areas where a company can start with smaller prototype style projects to experiment and potentially achieve a return on investment in a short period of time. Though many companies do choose to start by putting a cloud platform in place as foundation to support their critical business process and enable easier and faster innovation in the future.

Muddling along with legacy software, manual systems, and outdated tools is a direct route to obsolescence.

Start thinking differently:

- 1 Embrace the potential for value-added services
- 2 Evaluate how you can improve customer service
- 3 Fine tune supply and demand forecasting
- 4 Leverage IoT sensors to monitor and protect equipment, products, etc.
- 5 Optimize your marketing and sales process and build loyalty
- 6 Enable anytime, anywhere business

In today's marketplace, industrial digital technologies simply can't be an afterthought, they are impacting businesses of every kind, size and location. It must be a part of your company's overall strategy.

Andrew Dalziel

VP Industry & Solution Strategy, Infor



CONCLUSIONS AND RECOMMENDATIONS

Our survey clearly shows that progress is being made on industrial digitalisation. But stubborn and predictable barriers to adoption remain - with access to skills and finance repeat offenders.

But the need for stepping up the pace on industrial digitalisation has never been greater. As our report shows, the international comparisons are not favourable. Only 9% of manufacturers think that the UK is in a leadership position when it comes to the adoption of IDTs, and only 25% consider themselves ahead of their peers.

In order to move forward and accelerate the adoption of IDTs, industry and Government must work in tandem and indeed together. The diversified nature of our manufacturing base, and the very high number of SMEs, means that concerted action is needed to ensure our economy, and our sector, can take full advantage of the huge benefits IDTs can bring.

POLICY RECOMMENDATIONS TO GOVERNMENT:

Bespoke, dedicated support to manufacturing SMEs should be made consistently available across the country:

In England, the best way of doing this is the extension of the Made Smarter SME adoption programme to all regions.

Fiscal incentives to support digitalisation and research and development spend must be increased:

Starting in the forthcoming budget. Additional investment allowances for technology related investments would be a good way of doing this.

CALLS TO ACTION FOR INDUSTRY:

Manufacturers, particularly SMEs, must accept that digitalisation is for everyone, and make it a strategic priority.

Without full commitment to invest in IDTs, across all sub-sectors and all sizes of business, our manufacturing sector will see its international competitiveness further eroded and will face an increasingly uncertain future.

Peer-to-peer best practice must be encouraged:

There are many great examples of companies that have successfully adopted IDTs and are reaping the benefits. To help address the barriers associated with adoption, peer-to-peer best practice must be shared and showcased.

SUPPORT FROM REGIONAL STAKEHOLDERS:

Regional stakeholders should co-ordinate their efforts:

To support their economies. Streamlining the overlapping and competing initiatives in many parts of the country will help to overcome the confusion that SMEs often currently experience.



About Infor

Infor is a global leader in business cloud software specialized by industry.

Providing mission-critical enterprise applications to 67,000 customers in more than 175 countries, Infor software is designed to deliver more value and less risk, with more sustainable operational advantages. We empower our 17,000 employees to leverage their deep industry expertise and use data-driven insights to create, learn and adapt quickly to solve emerging business and industry challenges. Infor is committed to providing our customers with modern tools to transform their business and accelerate their own path to innovation.

To learn more, please visit:
www.infor.com/en-gb

Make UK is backing manufacturing - helping our sector to engineer a digital, global, and green future. From the first industrial revolution to the emergence of the fourth, the manufacturing sector has been the UK's economic engine and the world's workshop.

The 20,000 manufacturers we represent have created the new technologies of today and are designing the innovations of tomorrow. By investing in their people, they continue to compete on a global stage, providing the solutions to the world's biggest challenges.

Together, manufacturing is changing, adapting and transforming to meet the future needs of the UK economy. A forward thinking, bold and versatile sector, manufacturers are engineering their own future.

makeuk.org

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