Digital Manufacturing Productivity report

FOREWORD

Dr Clive Hickman OBE, FREng, Chief Executive, the Manufacturing Technology Centre

As the UK emerges from the COVID pandemic and we look to reinvigorate our economy and return to growth, there has never been a more important time to consider the role of digitisation in the manufacturing sector.

Manufacturing produces more than 18% of UK GDP, yet as this report shows, 96% of employees at major manufacturers think that UK businesses are not doing enough to reap the benefits of digitisation. Whether it's through cloud computing, data science and analytics, or automation and robotics, digitisation holds the key to future UK competitiveness.

This is not just a British problem. As this report points out, companies all around the world have been sluggish to adopt these technologies. But that means there is a prize available for the country that moves swiftly to embrace the new manufacturing economy. As McKinsey has observed, fear of taking risks is the number one barrier holding back leaders in our field from adopting new technologies. If we are to make Industry 4.0 a reality, it requires bold and decisive leadership from the top.

To empower people with information and tools, and take advantage of the opportunities in our fast-changing world, we must be willing to embrace change. The country that can do so fastest will lead the world's manufacturing sector into the middle of this century. Digitisation is the foundation of that future, and this report's recommendations are a wake-up call for all of us who want to see the UK manufacturing sector thrive in the years to come.

Naveen Poonian, CEO, iBASEt

Working with highly engineered industrial manufacturers on both sides of the Atlantic, it is clear that a lack of digital maturity has been a big blocker for productivity in recent years.

It's true that Industry 4.0 has kept the show on the road while employee access to factories has been restricted, but if you scratch a little below the surface, you start to uncover fundamental problems with the sector's adoption and application of digital tools. Investments in smart factory technology are a case in point – during the pandemic they enabled manufacturers to keep fulfilling orders, but in many cases the data generated, which should be driving business intelligence and informing smarter decision-making, is going to waste.

In the UK, there has been talk of Brexit and the pandemic blocking productivity, leading to decline in recent years, but this report reveals that a reliance on legacy processes and technology represents the major hurdle for many manufacturers.

Many operations continue to be supported by paper-based processes and spreadsheets, when such practices have shown to be unreliable and not very resilient. It's almost ten years since spreadsheet errors contributed to JP Morgan Chase losing $6 billion in the London Whale incident. In the manufacturing industry, this lack of digital maturity is causing equally damaging outcomes.

Of course, it's not all doom and gloom – as well as the above-mentioned increased adoption of Industry 4.0, manufacturers are also now ready to make the shift to cloud computing. The UK has a proud manufacturing heritage and can get ahead of the curve by using the cloud to lay the groundwork, baking in speed, agility and accuracy.

As part of our commitment to the UK, we look forward to continuing to help the industry harness the power of digital to simplify how complex products are built and maintained. We hope you find the report insightful, and look forward to continuing to help discrete highly engineered industrial manufacturers globally to harness the power of data.

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INTRODUCTION

The UK's highly engineered industrial manufacturing sector needs to catch up with its US counterparts when it comes to the adoption of digital technologies. While both countries have work to do when it comes to the discarding of legacy systems, the embrace of data, or its transition to the cloud; it is to the east of the Atlantic where underinvestment is most pronounced.

In the UK, 96% of manufacturers in the aerospace & defence, medical device, industrial equipment, electronics and ship building sectors confirmed that there has been an underinvestment in digitisation, to varying extents. While this figure is slightly lower in the US (91%), the overwhelming consensus when looking at the broader picture is that the industry has missed the early ebbs of a digital revolution.

The above statistics relating to underinvestment derive from an iBASEt report dedicated to understanding how and why this reluctance (or even, resistance) to digital progression has occurred. Interest in the subject has stemmed from years of watching the wider manufacturing sector drag its heels in the face of solutions that are designed to expedite processes, streamline supply chains, strengthen communications, and harness information.

96%
of UK manufacturers* confirmed that there has been an underinvestment in digitisation

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of US manufacturers* confirmed that there has been an underinvestment in digitisation

* in the aerospace & defence, medical device, industrial equipment, electronics and ship building sectors

Although Industry 4.0 is regularly discussed, manufacturers seem a step away from turning talk into action and realising the benefits. And, in turn, the sector has built something of a reputation as a nonprogressive and potentially unattractive area of industry to work in.

A recent article in The Manufacturer [i] cited the views of Mike Wilson, Chief Automation Officer at the Manufacturing Technology Centre (MTC), who went as far as to suggest that there had been very little change in attitude or approach since 2014.

"

To be honest it hasn't changed all that much. In the UK, we're still relatively slow at adopting robotics and automation. The International Federation of Robotics (IFR) collect data on robot density which analyses the number of robots per 10,000 workers. The UK's position on that table has slowly but surely been falling and we're now 24th."

Mike Wilson, Chief Automation Officer at the Manufacturing Technology Centre (MTC)

iBASEt has seen the UK stalling its adoption over the last decade, with the sector falling behind other key UK industries in the move to digital

"With manufacturing accounting for 18% of UK GDP, now more than ever, UK manufacturers need to invest in digital technologies to move beyond Covid-19 and compete effectively on a global stage with rising material costs, inflation, and labour shortages all threatening to hamper future success," a recent blog [ii] **posted.**

iBASEt's latest report explores the reasons and implications around underinvestment on both sides of the pond, through the eyes of those working in the sector. The research explores this unwillingness to let go of legacy technologies that continue to harm productivity; the role of the pandemic as a catalyst, only without aim; and whether cloud transitions are happening quickly enough.

Across all frontiers, it is clear that while the UK may be lagging behind, a lack of digital maturity is very much a global industry-wide concern.

THE UK AT A GLANCE:

Despite a lack of action at boardroom level, there does seem to be strong acknowledgement from the core workforce in the UK about where the industry is, and the digital progress it needs to be making. As well as calling out an underinvestment in digital, employees in the country's discrete manufacturing sector pinpoint the importance of tech amid surrounding issues like Brexit, while also forecasting extreme repercussions if the situation doesn't change soon.

— 94% of respondents agree to at least some extent, that underinvestment has led the country to fall behind the US – an assertion that 88% in the US also agree with

— 93% would go as far as to say that underinvestment will lead to many UK discrete manufacturers ceasing to exist in the next 10 years, should they fail to take action and invest in tech moving forward

— Despite Brexit being an oft-used excuse, 73% think that legacy technologies have had more of a negative impact on business than Brexit has (67%)

56%
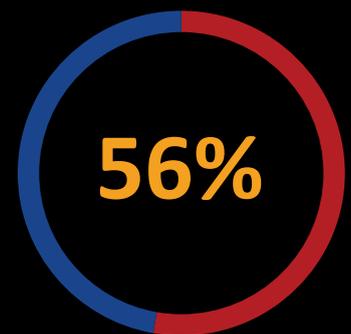
More than half (56%) have lost a lot of sales as a result of digital shortfalls, with 96% experiencing this loss at least once

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To what extent do you think there has been an underinvestment in the UK discrete manufacturing industry over the last 10 years?

A lot	46.8%
Somewhat	47.3%
Not very much	5%
Not at all	1%
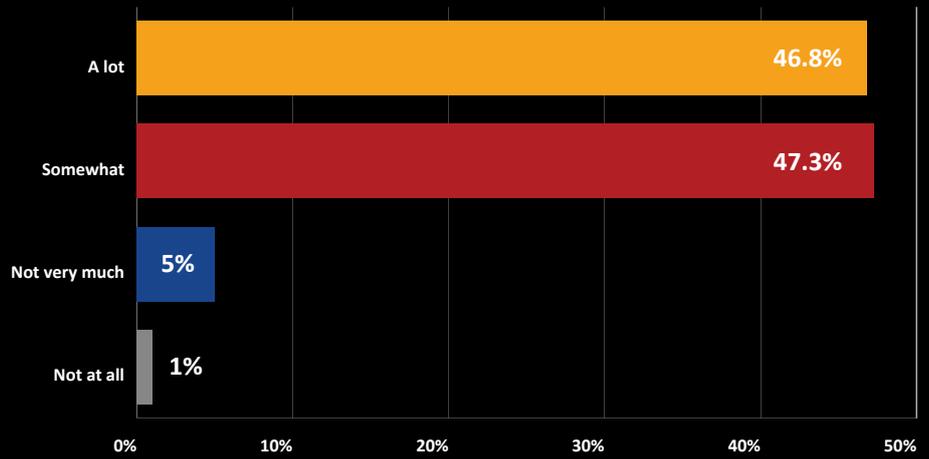
To what extent do you agree with the following statement? UK discrete manufacturers are behind their counterparts in the US when it comes to adopting new technologies and processes:
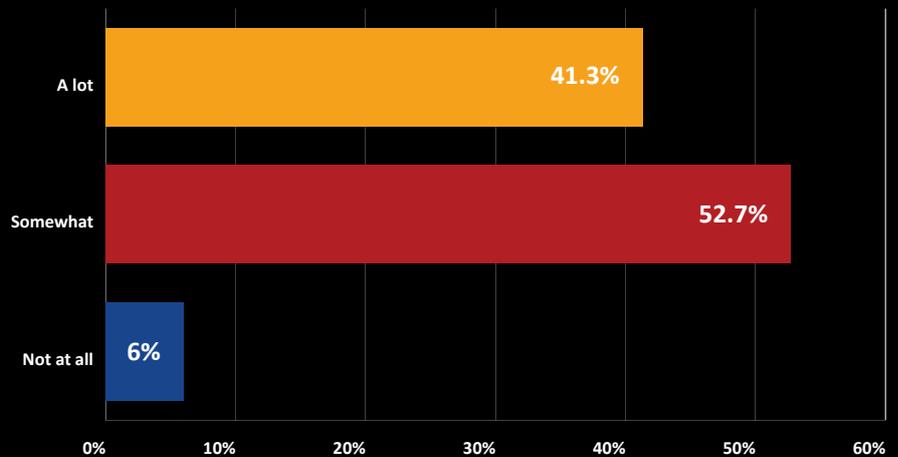
A lot	41.3%
Somewhat	52.7%
Not at all	6%

To what extent do you agree with the following statement? A lack of investment in new technologies and processes has resulted in lost sales:

|	
A lot	56.2%
Somewhat	39.8%
Not at all	4%

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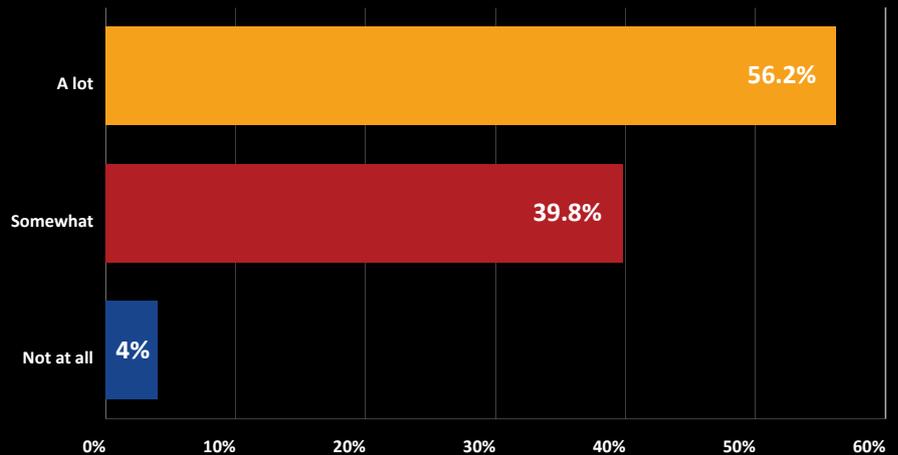
To what extent do you agree with the following statement? Many UK discrete manufacturers will cease to exist in 10 years unless they invest in new technologies and processes:

Response	Percentage
A lot	50.2%
Somewhat	42.8%
Not at all	7%
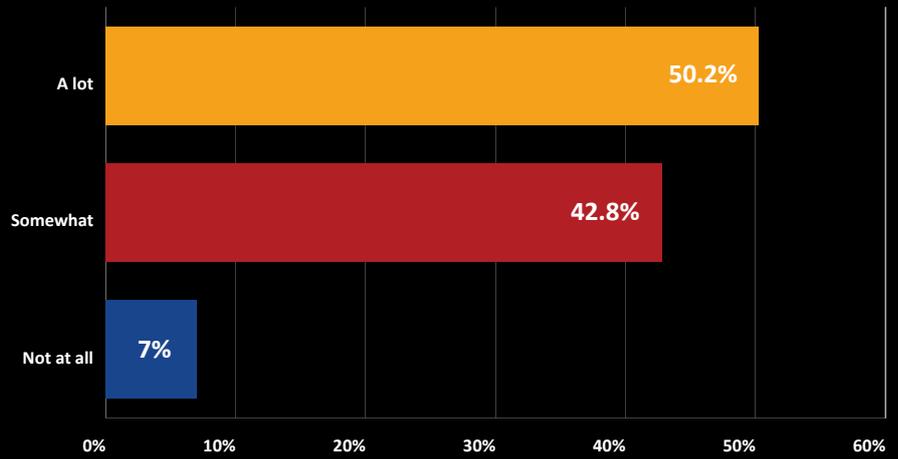
To what extent has the following had a negative impact on your business over the last 12-18 months? Legacy technologies:
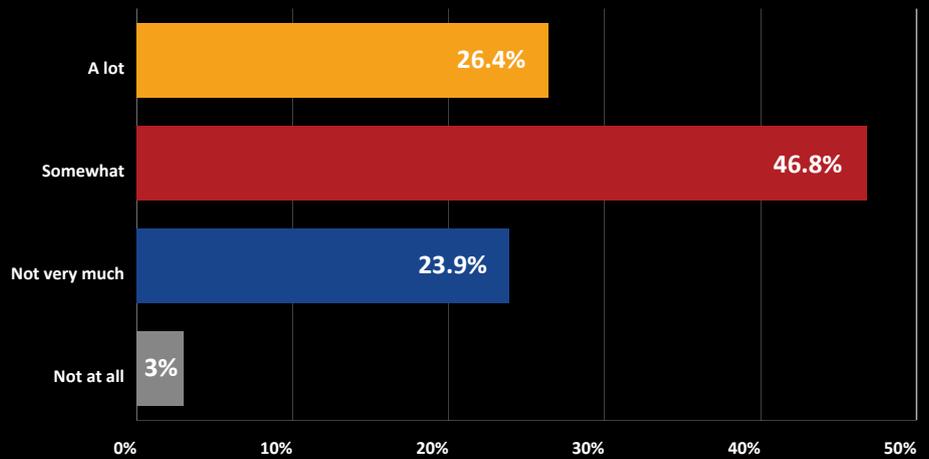
Response	Percentage
A lot	26.4%
Somewhat	46.8%
Not very much	23.9%
Not at all	3%

To what extent has the following had a negative impact on your business over the last 12-18 months? Brexit:

| Response	Percentage
A lot	25.9%
Somewhat	41.3%
Not very much	25.4%
Not at all	7.5%
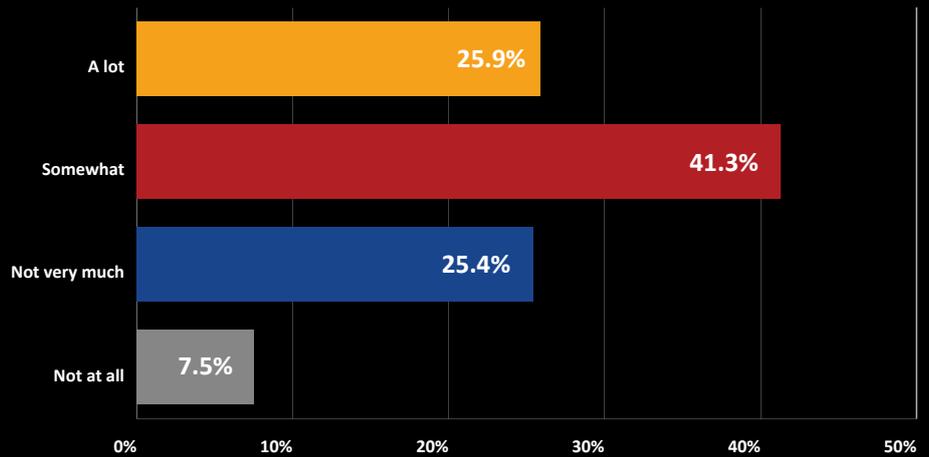
THE US AT A GLANCE:

In the US, all the same signs are there as in the UK, only to slightly less dramatic extents. Again, the link between inaction, underinvestment, lost sales and potential business demise is made. While the percentages of agreement among employees don't quite hit the same heights as in the UK, there is still a strong consensus in each case that confirms a trans-Atlantic issue when it comes to digital adoption in the discrete manufacturing sector.

— **Lost sales as a result of dated technologies are still prevalent in the US, although not quite to the same extent. 86% acknowledged a lack of investment as a standout reason**
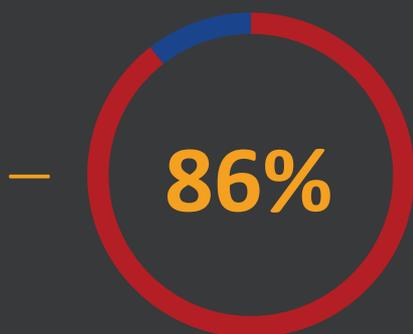
— **86%** **86 of respondents said many US discrete manufacturers will ceaase to exist in the next 10 years**

— **While the above stat is again lower than in the UK, almost half (47%) in the US strongly agreed that many US discrete manufacturers could cease to exist in the next 10 years unless action is taken**

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To what extent do you agree with the following statement? A lack of investment in new technologies and processes has resulted in lost sales:

A lot	42.1%
Somewhat	44.4%
Not at all	13.9%

0% 10% 20% 30% 40% 50%
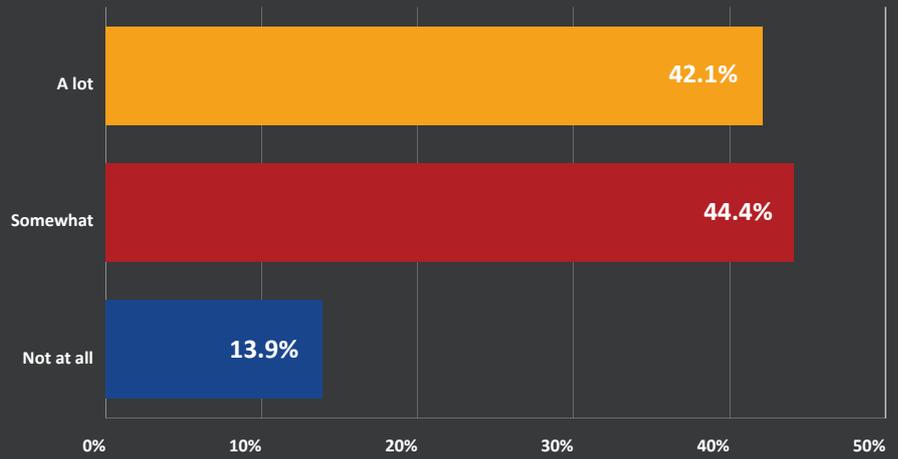
To what extent do you agree with the following statement? Many US based discrete manufacturers will cease to exist in 10 years unless they invest in new technologies and processes:

A lot	46.5%
Somewhat	39.1%
Not at all	14.4%

0% 10% 20% 30% 40% 50%
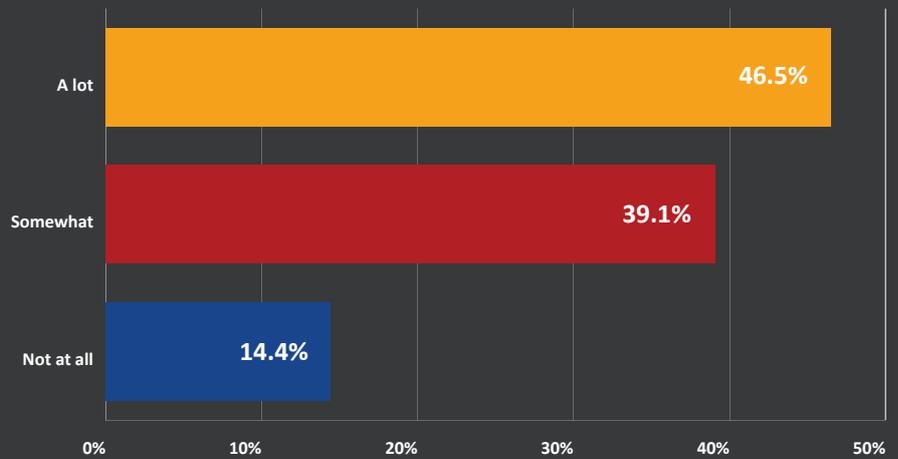
Note: From this point, the report draws on combined US and UK statistics

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LEGACY TECHNOLOGY IS HAMPERING PRODUCTIVITY

The term 'legacy technology' can sometimes be a bit ambiguous. Perhaps even, it's misconstrued by decision makers as a marketing ploy used by service providers to make a sale. However, in this case and from iBASEt's research, 'legacy' leaves little to interpretation.

At present, 95% of respondents still use paper-based processes, and more than a quarter (27%) still use paper for more than half of all activities. 'Legacy' doesn't just mean a tech solution in need of an upgrade. For many, in this sense, **'legacy' means no tech at all**.

An even greater proportion (98%) have moved into the digital world, but rather than using a dedicated industry solution or bespoke tool for specific operations, they are using manual spreadsheets such as Microsoft Excel. Half (50%) use these tools for the majority of processes.

Unsurprisingly, employees have noted the negative impact of this halfway house, which prevents them from achieving the accuracy, efficiency and effectiveness they are striving for.

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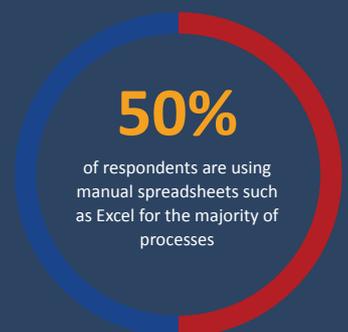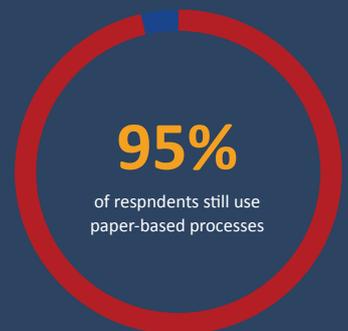
Almost three-quarters (71%) believe that legacy technologies or processes have had a negative impact on their business over the past 12-18 months (an already strenuous period). In fact, in the UK, the impact of legacy tech is seen as more detrimental than notions of Brexit. While across the UK and US this reliance on archaic processes and systems is even more of a hindrance than a lack of skills (70%). Here, you could even argue that having the wrong skills with bespoke systems, would be more advantageous than having an informed workforce with ineffective tools.

In sum, this leads to a damning perspective that technology is the biggest barrier to productivity in their organisation, according to 36% – the most frequently attributed reason above both people and processes.

For respondents, this lack of investment into more modern solutions doesn't just equate to daily frustrations in their work tasks. The upshots are far more cultural and widespread. Almost two-thirds (65%) called out change management and cultural change as a blocker to new technologies and processes. This alludes to a disillusion with the industry as a whole, rather than just to their employers or the role of tech, specifically.

In short, tech resistance exemplifies highly engineered industrial manufacturing as a whole.

This might sound dramatic, but when outdated technologies (26%) is cited alongside an overall lack of innovation (27%) as two of the top reasons for people exiting the industry, the future ramifications become clear. In fact, employees are already seeing this translate into making the sector unattractive to work in. More than half (52%) believe it is difficult for the sector to recruit at present; a number that rises to 55% in the UK.

An upgrade of legacy technologies and processes isn't just an immediate operations enhancer (although that is of course a biproduct), digital investment is also a sign of intent for the future, in showing Gen Z workers that manufacturing is a progressive area to enter.

Replacing these legacy technologies would be a perfect way to break the current, negative, cycle of an old industry refusing to change its ways, and suffering – both operationally and reputationally – as a consequence.

" It is concerning to think that major nuclear and space projects are potentially being run via spreadsheets...The continued use of pen and paper should also be cause for alarm for CIOs and other members of the C-Suite: at best, this approach can cause inefficiencies and lead to mistakes, at worst, it could lead to project failure and leaders losing their jobs, so now is the time to act."

Evan Sloss, Director, EMEA, iBASEt

What proportion of your existing processes are paper-based?

Category	Percentage
None of them	
1-10%	
11-20%	
21-30%	
31-40%	
41-50%	
51-60%	
61-70%	
71-80%	
81-90%	
91-99%	
100%	
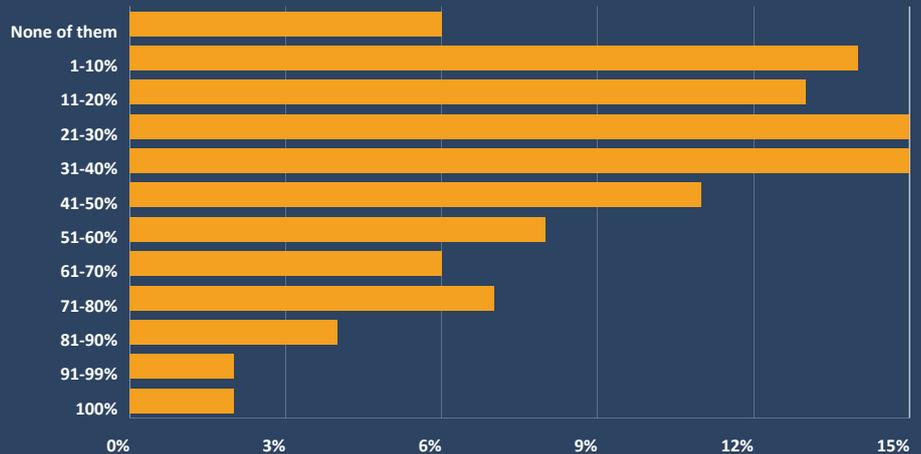
To what extent has legacy technology had a negative impact on your business over the last 12-18 months?

Extent	Percentage
A lot	29%
Somewhat	42.5%
Not very much	25%
Not at all	5%

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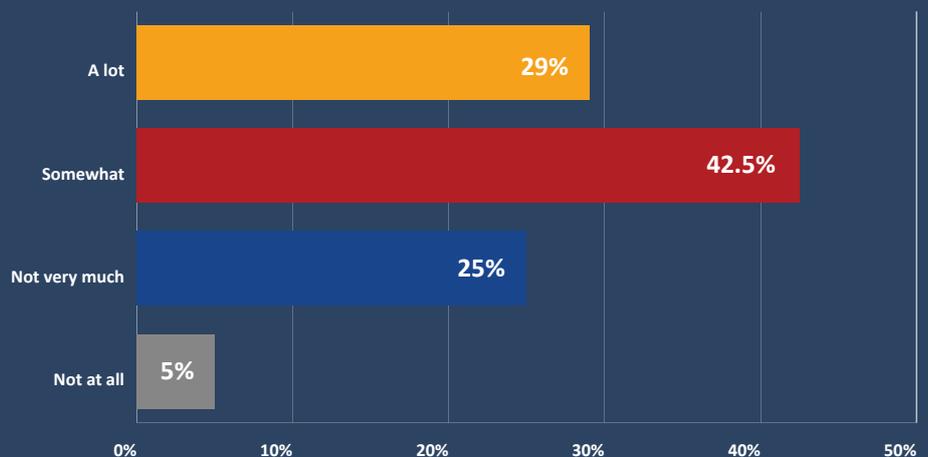
What have been the reasons for people leaving your organisation?

Reason	Percentage
Lack of innovation in the industry	27%
Outdated technology/processes	26%
Ethical reasons	15%
Low pay	34%
Lack of career stability	36%
Concerns about the future state of the industry	36%
Other	10%
None of the above	12%

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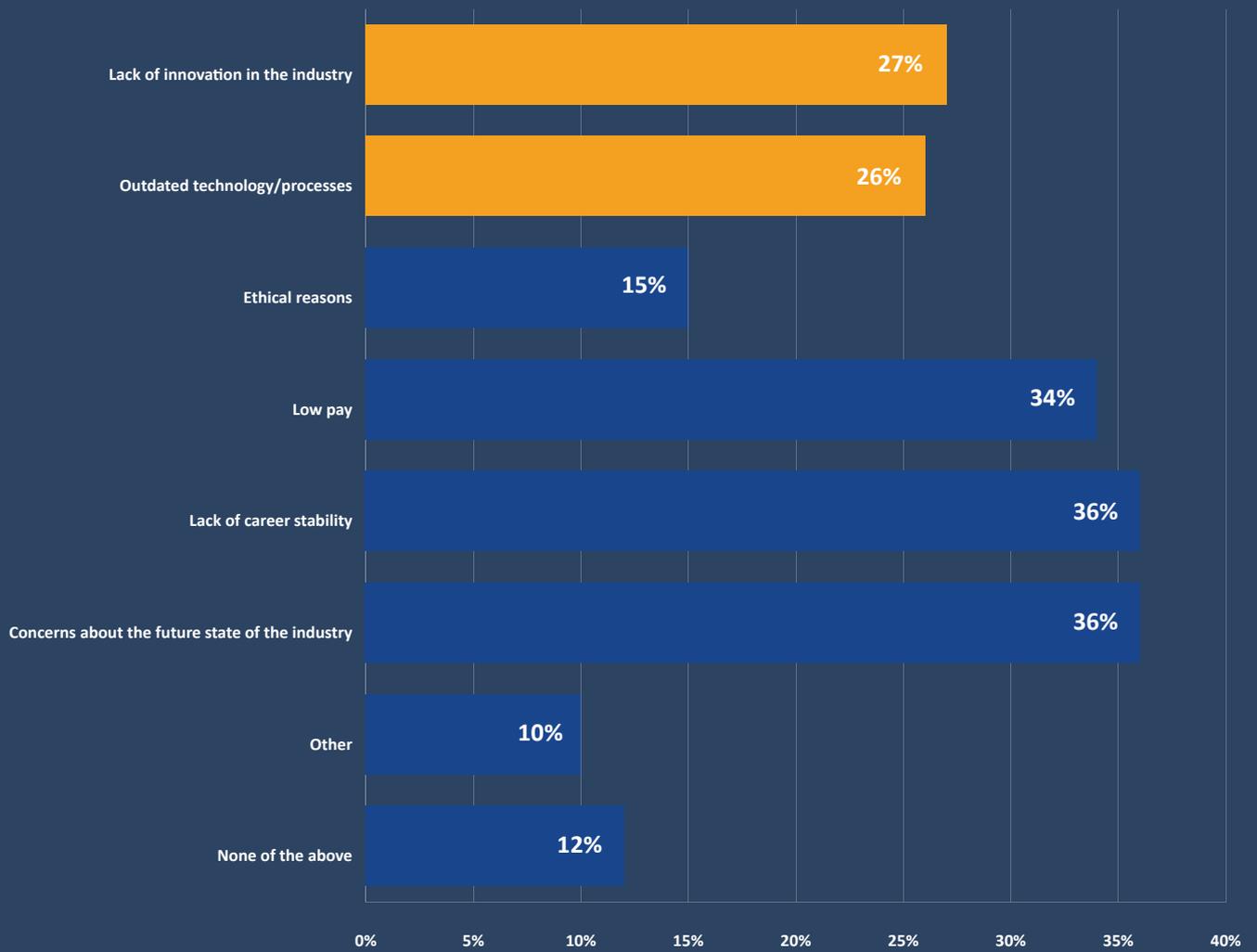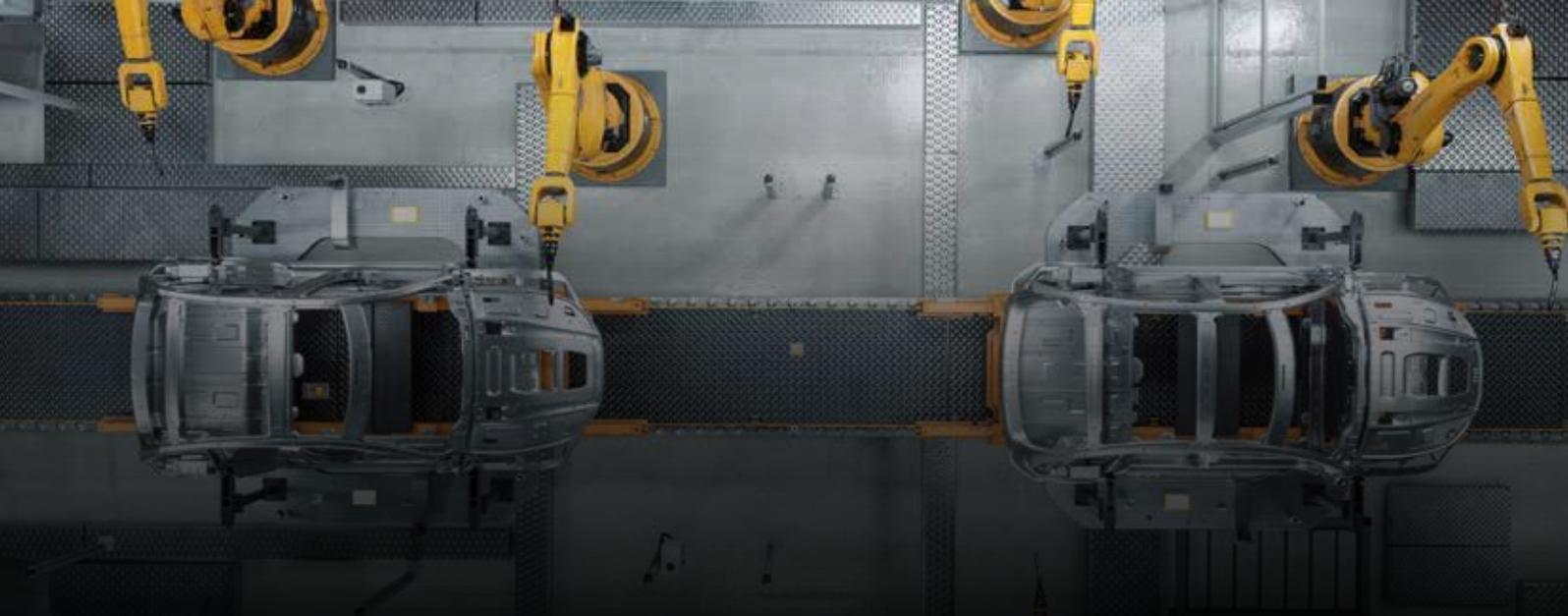
PANDEMIC PRESSURES:
INCREASED INDUSTRY 4.0 ADOPTION, BUT WASTED DATA

While Brexit will have primarily affected UK, rather than US, manufacturers, there is of course one challenge that has hit the entire world over the past two years. It comes as no surprise that 83% of employees across both the UK and US noted Covid-19 as having a negative impact on their business over the past 18 months.

To this end, much of the thought leadership rhetoric in industries such as manufacturing and construction has been around forced digital transformation, the pandemic as a catalyst, and this silver lining of 'better late than never' innovation.

But how much of this coerced development has really come to light, and has it had the desired impact?

Well, at first glance, the results look quite favourable. **A recent global survey**[iv] conducted by Rockwell Automation-owned Plex Systems found that the adoption of smart manufacturing technologies grew by 50% during 2021 alone, with process speed and efficacy listed as primary reasons across the 300 manufacturers.

iBASEt's findings echo this trend.

83%
of employees across the UK and US noted Covid as having a negative impact on business in the last 18 months

The adoption of smart technologies grew by over

50%
in 2021 alone
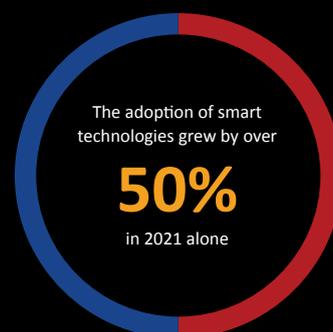
Through our research, almost three-quarters (72%) confirmed investment into new technologies and processes during the pandemic, and an overwhelming 98% confirmed these investments have made their companies more productive. Based on the results around legacy tech and employee frustrations and fears, the pandemic has seemed to vindicate their cries for change.

Delving deeper, 67% revealed the implementation of Industry 4.0, smart factory technologies in response to the pandemic and social distancing rules – almost a third (30%) investing in such solutions for the first time. Again, the results are positive, with 68% saying this step change had made them more productive, and more than half (51%) seeing more business agility as a result.

In the immediate term, for employees, this change of attitude and – perhaps enforced – acceleration in tech investment is a positive upcurve. However, the issue when investment is enacted without sustainable strategy is that those benefits can sometimes stall after their initial impacts. In this case, the stall seems to have occurred when it comes to managing and utilising all this new, insightful data.

Fewer than half of respondents (44%) said that this Industry 4.0 transition was providing them with more actionable data. In fact, 19% are not using any data insights from these smart factory technologies at all. A lack of skills (37%) was chief among the reasons given for this inability to harness new, big data. However, given the speed at which this transformation has occurred, it is just as apt to suggest that businesses simply weren't prepared for the extent of data they'd gather, or how to utilise it moving forward.

> **"As the volume of manufacturing data continues to explode, this issue will become even more pronounced unless the data is standardised and is available in context,"** iBASEt stated in a recent <u>analysis of this 'data problem'</u>.

The ability to not just embrace Industry 4.0 at stage one, but to then convert resultant data into actionable improvements, is pivotal to a true digital transformation. Manufacturers may have been forced into the first step during the pandemic, but as we come out of the eye of the Covid-19 storm, step two must be to establish this positive cycle of data-informing-decisions.

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While manufacturers have been forced to expand their use of technology in response to the pandemic, they need an innovative mindset, rather than a stoic acceptance that this means increasing investment with the same old suppliers they have always used. As use of technology from the factory floor to the design studio continues to grow, CIOs must be willing to rip up the rulebook and work with the specialist tools the industry requires. Patching or modifying more generic systems takes time, costs money and means there's always a burden of completing future upgrades."

Evan Sloss, Director, EMEA, iBASEt

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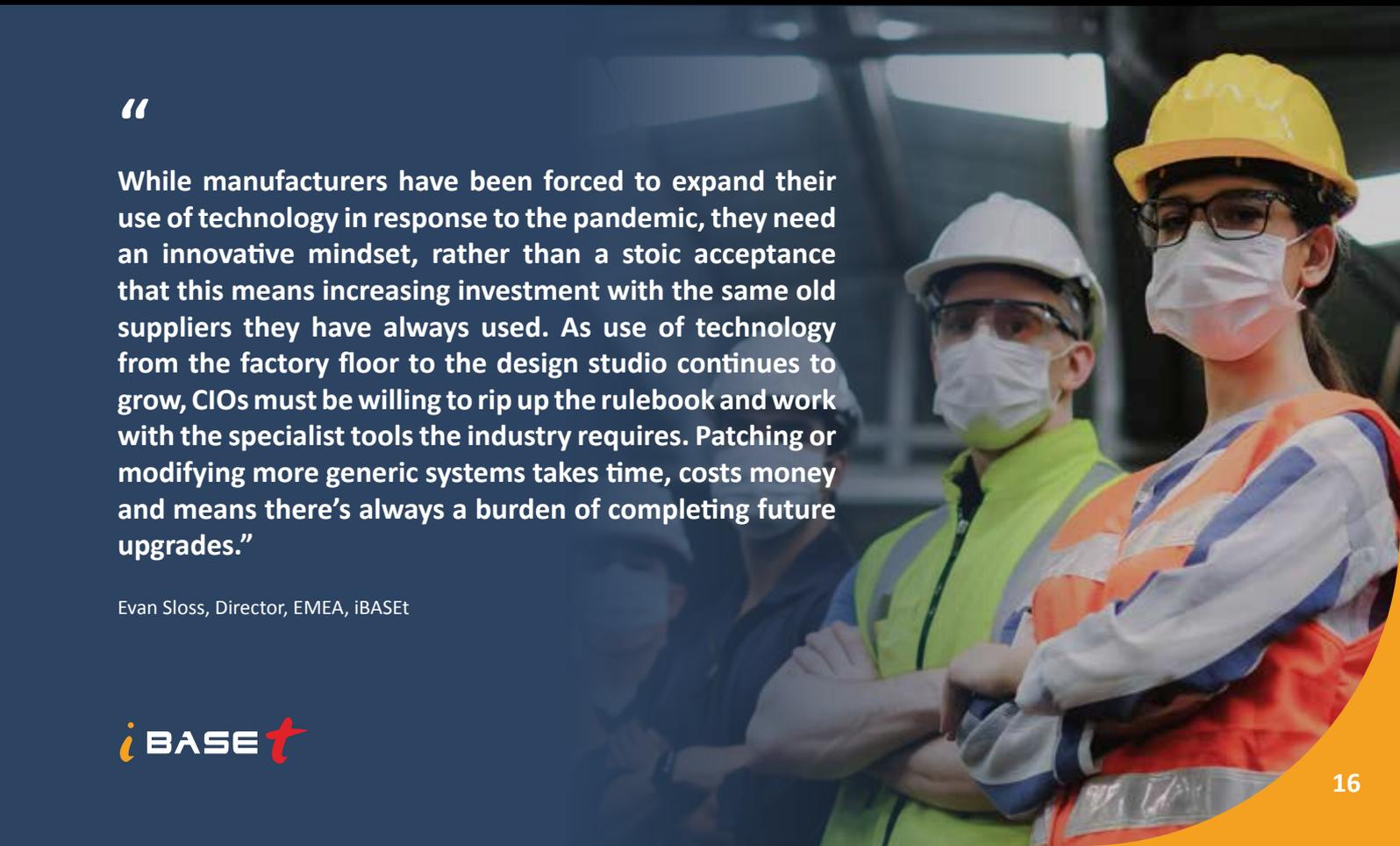
To what extent has the Covid-19 pandemic had a negative impact on your business over the last 12-18 months?

Response	Percentage
A lot	49%
Somewhat	42%
Not very much	2%
Not at all	1%
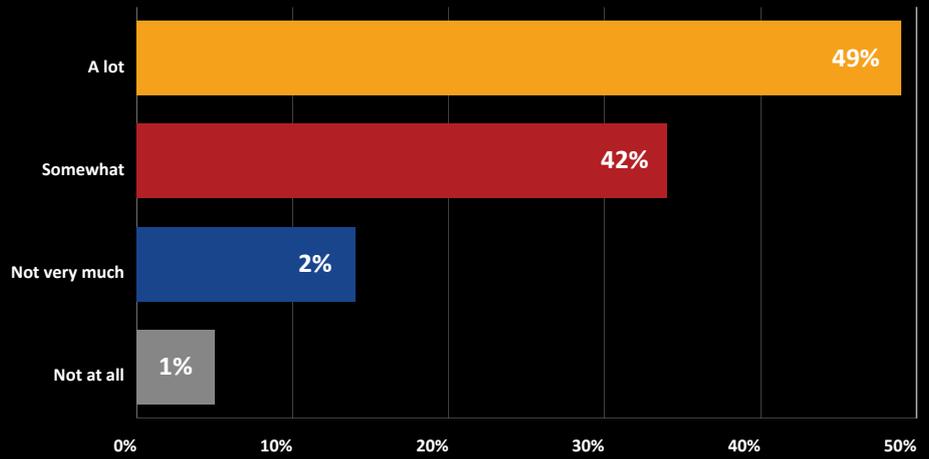
To what extent did your organization's investment in new technologies and processes during the Covid-19 pandemic ensure your business remained productive?

Response	Percentage
A lot	57%
Somewhat	42%
Not very much	2%
Not at all	1%
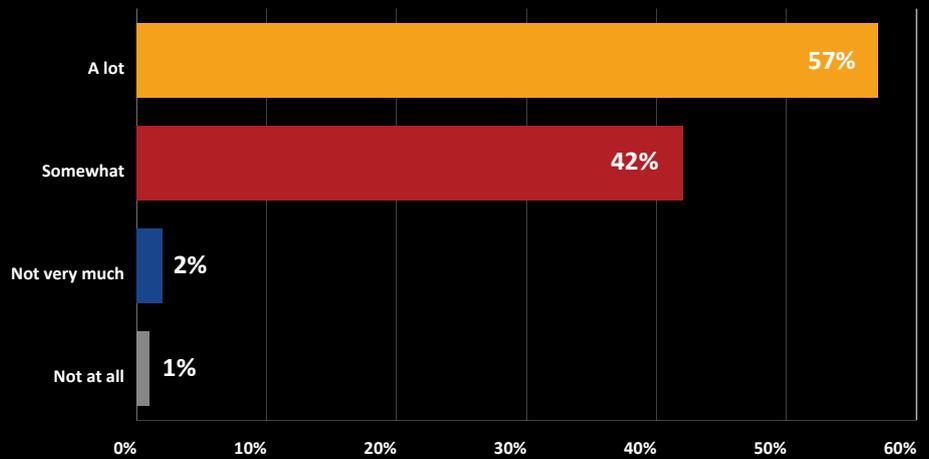
To what extent are you able to put data generated by Industry 4.0/smart factory data to use? (e.g. for decision making)

Response	Percentage
We use it a lot	38%
We use it somewhat	44%
We are unable to use it	19%

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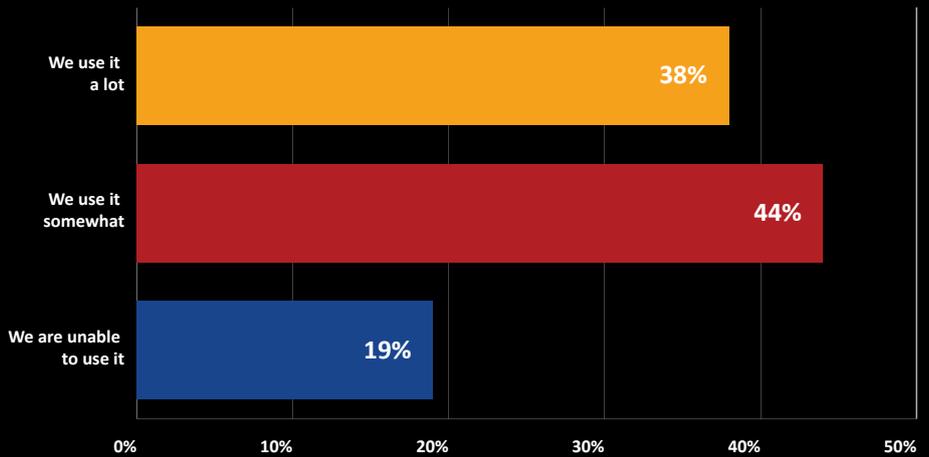
A SLOW TRANSITION TO THE CLOUD

"We are seeing the desire to move to the cloud as a real priority for UK manufacturers. That wasn't the case three years ago, so in recent times, there's been a push towards adoption. After 30 years of living off a diet of heavily modified, generic ERP systems and applications, manufacturers have realised that there are other options. And moving to a world with cloud services built exactly for your organisation is very attractive."

This is a quote courtesy of **The Manufacturer's recent interview**[v] with Phil Lewis, SVP of Solution Consulting for International at **Infor**. Lewis echoes our findings around the Industry 4.0-big data challenge by urging customers not to even think about smart factories until "they've got control of their data".

Once that data step has been achieved, "by applying machine learning or modern analytics around prescriptive working and predictive working", step two is mastering a now- "mandatory" transition to the cloud.

In this vein, 88% of respondents are increasing their investment in cloud technologies over the next 12 months, at varying speeds. Only 8% have no plans to use cloud infrastructure as part of manufacturing operations at all, and two-thirds (66%) believe this accelerated move to the cloud will unlock benefits that help drive operational efficiency.

Despite this promisingly positive intention, immediately, small alarm bells ring. Is this another example of companies running before they can walk, having only recently been pushed into digital realms at all? Indeed, only 21% are currently completely transitioned to the cloud, emphasising how far there is still to go for the majority.

It is not to say the journey isn't necessary, but to rush the process at this stage would be to make the same error as with the data-loss conundrum.

Rather than rushing towards this transition, **the journey must be taken carefully, strategically, over time, and alongside a trusted partner**[vi]. It's worthwhile being methodical with this migration because the potential benefits are massive.

There are a huge number of **potential competitive advantages**[vii] including : improved operational resilience following 18 months of unforeseen challenges; the ability to utilise data from smart technologies, and to let it drive future decisions; more seamless collaboration across teams to enhance the work experience and make the sector more attractive; improved connections with customers and partners to aid sales performance; and an overall statement of intent that the company is open to new ideas, opportunities and revenue streams.

It is great to see this overwhelming shift to the cloud in recent years, and there should absolutely be urgency in this effort. Manufacturers just have to make sure this urgency begins with a proper period of planning, alongside a dedicated partner.

To what extent has your recent digital transformation included moving applications to the cloud?

Category	Percentage
None – We have no plans to use cloud infrastructure in our manufacturing operations	8%
Might consider – We see the value of using cloud but have no immediate plans to leverage this infrastructure	29%
More than last year – The pandemic has made a compelling case to leverage cloud infrastructure to create a more nimble, flexible manufacturing environment	43%
We're all in – We have successfully completed a cloud migration and full leverage this infrastructure in our operations	21%

What best describes your level or commitment to continuing investing in cloud technologies as part of your ongoing transformation during the next 12 months?

Category	Percentage
Staying the same – We've moved some applications into the cloud, and we're not planning to continue investing in cloud	13%
Slightly higher – We're allocating some funds to make additional cloud investments, but this will not be a major focus for us	31%
Moderately higher – We are continuing to step up our investments in cloud technologies to continue the pace of transformation that began during the pandemic	43%
Accelerated investments – We are 'doubling down' on cloud investments and view this as a critical part of our manufacturing transformation	14%

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CONCLUSION

Highly engineered industrial manufacturers simply have to invest in digital, or they risk falling behind the competition. A small crumb of comfort right now is that most competitors are still sat, neck and neck, on the start line. However, it would only take a few to race on ahead to leave the rest far behind. Stagnating any longer is not an option.

UK manufacturers are clearly aware they need to treat digitalisation as a priority, increasing investment in the tech space. To the east of the Atlantic, underinvestment is more apparent, and the upshots of harmed productivity, lost sales and – ultimately – jeopardised futures are all clear to employees. In the US, the same connections have been made, albeit to slightly less dramatic extents. But the resounding message being sent from workers in both countries is that a revolution is required for the good of their companies, and of the wider sector.

To this end, there are signs of hope emanating from this research. An intent when it comes to smart factory solutions to combat pandemic pressures has been matched by stronger inclinations towards the cloud. In time, these trends should begin to chip away at the still-unfavourable statistics relating to legacy tech usage.

What manufacturers need moving forward, is guidance. Guidance from a strategic standpoint about the next steps and what to prioritise. But, also, guidance in terms of the solutions being deployed.

A Manufacturing Execution System (MES) can make all the difference here. Addressing the data concern, by placing an MES front and centre of digital operations, manufacturers can unlock real-time visibility and intelligence for improved control; while on the cloud front, an MES is a readymade facilitator of a more mobile, agile and productive workplace.

Organisations that have already adopted MES have had a head start in not just embracing innovation, but channelling it towards bespoke goals and aims, to ensure more sustainable decision-making moving forward.

When connected with Supplier Quality Management (SQM) and Maintenance, Repair and Overhaul (MRO) solutions too[viii], the result is a holistic, connected and strategic disruption of all aspects pertinent to manufacturing excellence.

Our iSeries architecture is designed to meet these exact goals. And, based on feedback from employees across the highly engineered industrial manufacturing space, such intervention in the form of a considered digital revolution can't come soon enough.

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METHODOLOGY

iBASEt's independent research was conducted in March 2022 across the UK and US. In total, 403 manufacturers (from the aerospace & defence, medical device, industrial equipment, electronics and ship building sectors) provided feedback – 201 from the UK and 202 from the US.

REFERENCES

[i] **An automation update from MTC – The Manufacturer**

[ii] **The Problem of Too Much Manufacturing Data - iBASEt**

[iii] **We're still talking about paper-based manufacturing systems in 2022? - iBASEt**

[iv] **Take-up of smart manufacturing soared by 50% during 2021 – Drives & Controls**

[v] **Make sure your cloud has a silver lining – The Manufacturer**

[vi] **Navigating The Challenges of Cloud Migration - iBASEt**

[vii] **5 Ways the Cloud is Driving Business Value for Manufacturers - iBASEt**

[viii] **The Solutions We Provide - iBASEt**

ABOUT iBASEt

iBASEt is a software company that simplifies how complex products are built and maintained. Founded in Southern California in 1986, iBASEt solutions ensure digital continuity across manufacturing, quality, and maintenance, repair, and overhaul (MRO) operations on a global scale.

The iSeries, powered by Solumina, is a cloud-native platform that establishes a digital ecosystem to drive innovation and improve operational performance. With offices in the U.S., UK, France, and India, iBASEt drives the manufacturing operations for customers that include Lockheed Martin, Northrop Grumman, Rolls Royce, Pratt & Whitney, and Textron.

iBASEt.com

ABOUT MTC

The MTC (Manufacturing Technology Centre) was established to prove innovative manufacturing processes and technologies in an agile environment in partnership with industry, academia, and other institutions. The MTC houses some of the most advanced manufacturing equipment in the world, creating a high-quality environment for the development and demonstration of new technologies on an industrial scale. This provides a unique opportunity for manufacturers to develop new and innovative processes and technologies.

The MTC was founded by the University of Birmingham, Loughborough University, the University of Nottingham and TWI Ltd. The MTC's industrial members include some of the UK's major global manufacturers and aims to provide a competitive environment to bridge the gap between university-based research and the development of innovative manufacturing solutions, in line with the Government's manufacturing strategy. The MTC is part of the High Value Manufacturing Catapult, supported by Innovate UK.

www.the-mtc.org