RESEARCH PAPER

Is the **UK READY** for **INDUSTRY 4.0**?
Industrial maintenance in a connected world of **BIG DATA**

ERIKS

know-how makes the difference

METHODOLOGY

Online research was conducted amongst 200 engineers between 8th and 15th February 2017.

CONTENTS

- Introduction
- Section 1: Attitudes to Industry 4.0
- Section 2: Data use and collaborative working
- Section 3: Maintenance and Industry 4.0
- Conclusion

FOREWORD

"It's a win-win for us and our partners."

Industry 4.0 is the hot button topic in UK manufacturing, but the debate has often remained highly theoretical, with far too little attention paid to the role that data sharing and knowledge alliances can play in improving industrial maintenance practices.

This is unfortunate because the challenges faced by maintenance teams within industry are enormous and growing all the time. Ever-widening ranges of technologies and equipment, increasing complexity, the drive for more flexible production facilities and increasing demands for machine uptime, are all placing enormous challenges at the door of maintenance teams.

What's more, in the rush to promote Industry 4.0, the practical difficulties of implementation have been almost completely overlooked. These include issues such as data security, collaboration with OEMs and third party maintenance suppliers, along with the complexities of designing sensing systems.

There is no doubt that Industry 4.0 has its challenges, but an even greater danger is that UK industry will be too slow off the mark to take real advantage, condemning itself to antiquated maintenance techniques and working practices that will do little to prepare our industries for the challenges of competing on the world stage.

The aim of this report is to cut through the hype and hyperbole that surrounds Industry 4.0 and ask a simple question: does UK industry truly understand it and are we ready for it?

Specifically, we wanted to gauge whether maintenance managers and technicians working at the 'coalface' in

industry believe that greater connectivity can help them play their part in delivering greater productivity, more machine uptime and ultimately, greater competitiveness.

Make no mistake, there are formidable challenges ahead, but this report shows that there is a real desire on the part of senior managers across industry to use technology and data to improve their operations, by making them more agile and proactive.

Throughout this report you will find verbatim quotes from engineers which speak to some frustrations with the roll-out of Industry 4.0 in the UK, but mainly they demonstrate their ambitions, hopes and determination to be better.

This 'can do' attitude will be needed more than ever if UK industry is to embrace Industry 4.0 and become truly connected.

Gary Price
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INDUSTRY 4.0: DO YOU GET IT?

There is much talk of Industry 4.0, but do those operating within industry truly understand it? We asked our respondents whether they believed they had a good understanding of Industry 4.0 and its potential to benefit UK industry.

The answers demonstrated that most managers believe they have a strong understanding of Industry 4.0 and that it will be beneficial, with 72 per cent answering in the affirmative.

What's more, the vast majority of respondents believe that Industry 4.0 can have a positive effect on British manufacturing, with 80 per cent registering a positive response.

When asked for more detail, our respondents cited the potential for cyber systems to monitor and alert management to machinery problems before they become catastrophic, and the potential for more targeted maintenance resource. In the words of one respondent, "It means we perform maintenance when needed, not unnecessary maintenance and not just reactive repairs."

However, when we asked our panel if they believed that Industry 4.0 can have a positive effect on maintenance there was a significant drop in positive responses, with only 64 per cent answering positively.
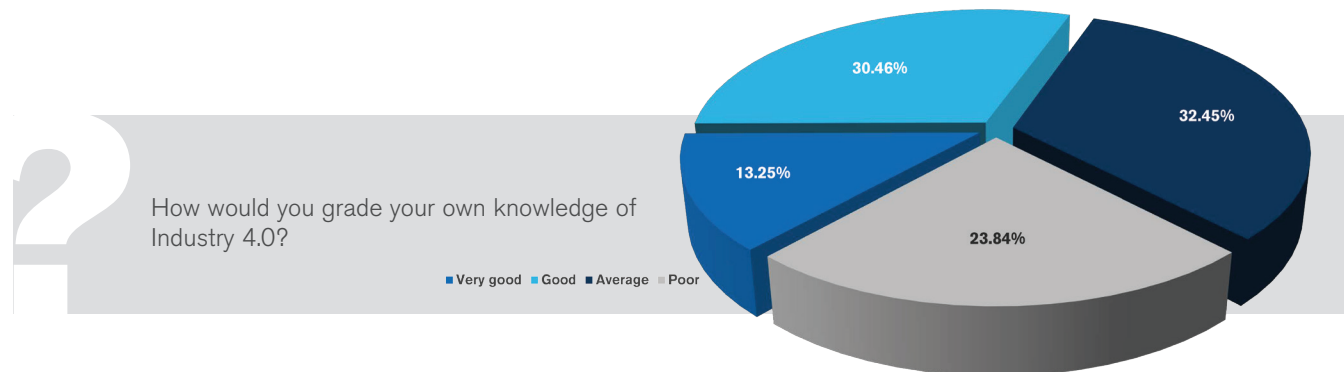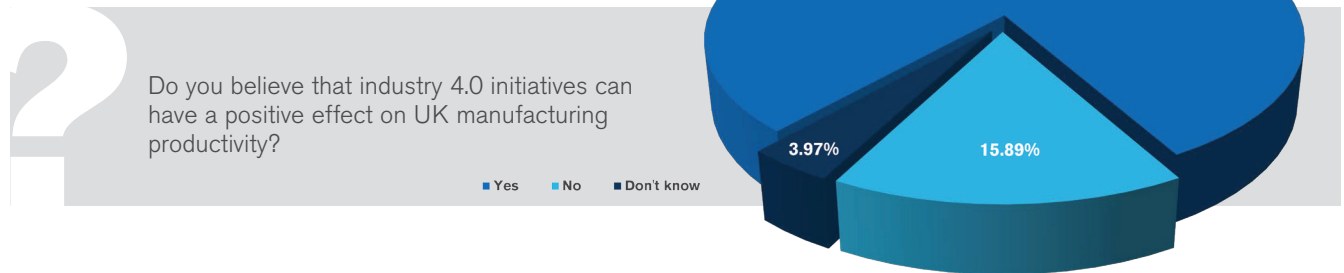
> "I believe it will help a lot. We currently use industry grade radios for communication from the manufacturing floor to other areas of the business, but a more interactive system would offer better levels of communication and better response times to mechanical or electrical breakdown."

Do you believe that industry 4.0 initiatives can have a positive effect on UK manufacturing productivity?

- Yes
- No
- Don't know

80.13%
3.97%
15.89%

How would you grade your own knowledge of Industry 4.0?

- Very good
- Good
- Average
- Poor

30.46%
32.45%
13.25%
23.84%

This would suggest that there is some scepticism that the benefits of greater connectivity will be directed towards improving maintenance practices. This is perhaps reflective of the traditionally subordinate role that maintenance has had.

This theory is confirmed by the number of verbatim responses from respondents that declared "I just don't know" or "Is it everything they say it is?"

Perhaps of greatest concern is how senior managers in industry rated their own knowledge of Industry 4.0.

We asked them to rate themselves on a scale ranging from 'very good' down to 'poor' and found more than 50 per cent admitting to average or below average knowledge levels.

This self-confessed lack of knowledge is alarming as it would suggest that the potential benefits of Industry 4.0 are not reaching all sectors and that there is still significant inertia to overcome.

We will return to the issue of Industry 4.0 and its potential impact on maintenance practices shortly.

"It will allow easy access to flow and trend data that will mean we can spot problems before they become critical allowing more scheduled instead of emergency maintenance."

IS INDUSTRY 4.0 A GOOD OR A BAD THING?

The key question for maintenance teams is whether they think Industry 4.0 is a positive or negative for their operations? We allowed our panel a free response in order to gauge their views on where the potential benefits and the disadvantages lie with Industry 4.0.

The vast majority of those answering cited lower costs, greater operational efficiencies, increased productivity and improved quality. There was also a clear belief that traditional maintenance headaches, such as planned downtime for essential machine maintenance, could be made significantly easier to negotiate.

However, many also hinted that Industry 4.0 could act as a spur for real cultural change within industry, highlighting the potential for them to be proactive rather than reactive in their maintenance regimes and the potential for increased understanding between departments. As one respondent put it, "Industry 4.0 has the potential to increase empathy between departments. We'll be able to tell production that we need to take a machine off line for a few hours because

we know, rather than suspect that, if we don't it will fail and be down for a week." This issue of collaboration will be discussed in-depth in section two of this report.

We also asked respondents for their perceived negatives towards Industry 4.0, specifically towards their maintenance operations. Reassuringly, the majority of respondents perceive no negatives from the introduction of Industry 4.0.

However, that does not mean there are no concerns about its implementation. Many highlighted the costs of introduction, the potential bureaucracy and 'box-ticking' required for successful implementation and the complexity of the solution. Most of all, many doubted the abilities of their own organisations to successfully implement Industry 4.0 initiatives, with specific concerns about the lack of in-house knowledge. As one respondent put it, "I can see the benefits, but I worry that we don't have the ability or commitment to follow it through." We suspect these concerns will resonate with many in industry.

"For our operations the use of technology helps in many ways. All our systems are either automated or have some form of electronic sensors, which means production can be viewed and monitored in real time. Potential faults can be noted ahead of failure and appropriately dealt with."

DRIVERS AND ROADBLOCKS

There is no doubt that UK industry is coming under increasing pressure to embrace Industry 4.0 principles. We wanted to understand these pressures and also what barriers stand in the way of implementation.

Firstly, we asked our respondents to identify where the pressure is coming from, in regard to Industry 4.0. Interestingly, the answers suggest that the greatest pressure is coming from maintenance providers (26 per cent) and software companies (23 per cent).

This was surprising as we were expecting the real pressure to be coming from OEMs and machine builders, who have been very proactive in offering industry the opportunity to remotely monitor highly complex machinery, in order to increase machine uptime and productivity.

We believe this response indicates that maintenance providers have identified the potential benefits of Industry 4.0, but are encountering significant roadblocks within industry that are standing in the way of greater uptake.

We than asked our respondents to identify the main challenge that stands in the way of them implementing Industry 4.0 initiatives. As we suspected the biggest single obstacle identified is a lack of understanding of the potential benefits on offer, with 30 per cent of respondents indicating this was the primary block.
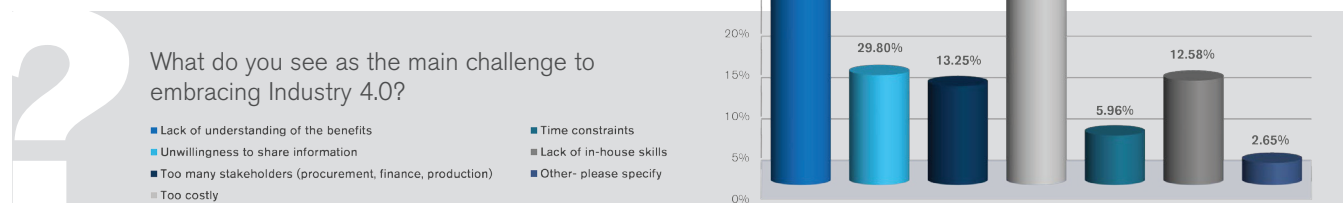
However, it is also clear from the answers that concerns about the potential cost of implementing Industry 4.0 are also placing a significant barrier in the way of implementation, with 24 per cent citing this as the greatest single barrier.

Interestingly, the anecdotal evidence from respondents, in relation to the lack of in-house skills, was borne out by the findings. 13 per cent of respondents indicate that the skills issue is a major concern.

It is also worth noting that a potential unwillingness to share information is highlighted as a significant barrier by 13 per cent of respondents. We will return to the issue of collaborative working and information sharing shortly.

We also decided to investigate the extent to which industry wants government and trade bodies to take a lead in educating about Industry 4.0 and supporting its implementation. 46 per cent of respondents answered that industry bodies and government need to do more to promote Industry 4.0, with only 22 per cent taking a positive view of their efforts so far. This would indicate that industry would welcome a far more interventionist stance by government to encourage uptake at all levels of the supply chain.

> **"I'm not convinced there is enough Government interest in the roll-out of Industry 4.0 despite what they say."**

What do you see as the main challenge to embracing Industry 4.0?

- Lack of understanding of the benefits
- Unwillingness to share information
- Too many stakeholders (procurement, finance, production)
- Too costly
- Time constraints
- Lack of in-house skills
- Other- please specify

11.92%
29.80%
13.25%
23.84%
5.96%
12.58%
2.65%

SECTION 2: DATA USE AND COLLABORATIVE WORKING

WHO TO TRUST?

The issue of collaboration and information sharing is central to Industry 4.0. If information is kept in silos, or is not shared with OEMs and third party maintenance suppliers, the true benefits of connectivity are unlikely to be realised.

However, there is much sensitive information that industry is, understandably, reluctant to share. We wanted to examine attitudes towards information sharing and asked our panel to describe their own organisation's willingness to share machine or production data.

The results indicate that considerable barriers still exist, with 79 per cent of respondents answering that their own organisations would offer only limited or no disclosure of information with their OEM equipment partner. Only 21 per cent admitted to allowing full disclosure of information.
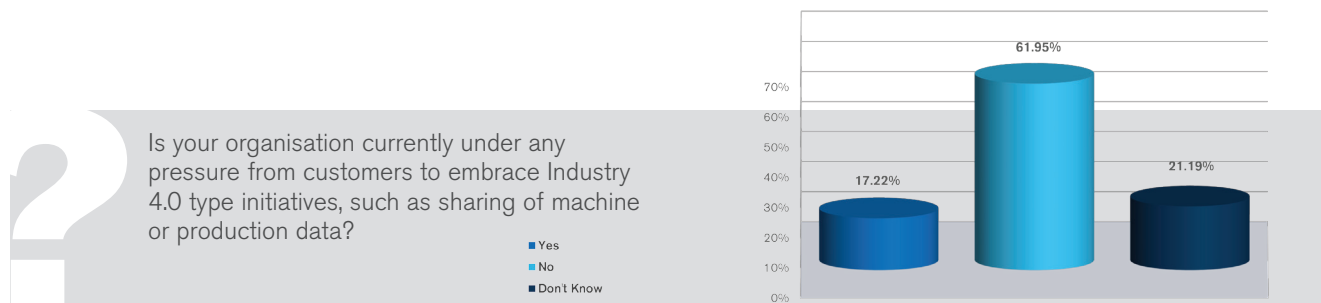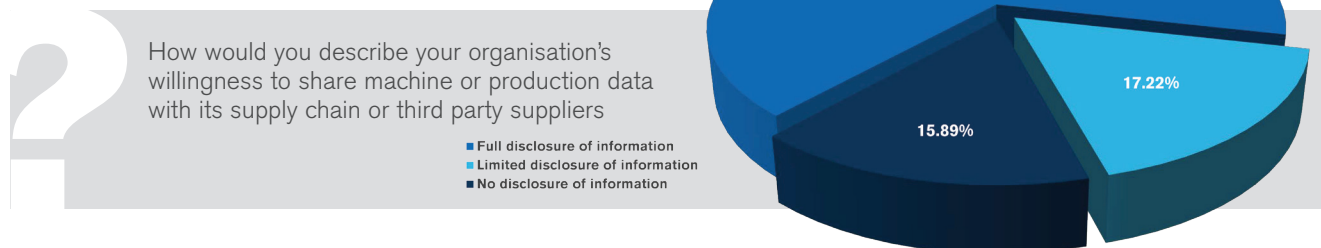
For the industrial supply chain and third party maintenance suppliers the situation is marginally worse. 83 per cent of respondents recorded that there would be limited or zero disclosure of information about machine or production data.

The issue of collaborative working, particularly with third party suppliers, is an important one for UK industry. We asked our panel to judge how far their own maintenance operations had embraced collaborative working. More than 50 per cent responded that they had either occasional or no maintenance support from outside organisations, with only seven per cent indicating that outside support was used extensively.

This is a concern because more collaborative working practices with third party suppliers and OEMs can go a long way towards bridging the skills and knowledge gap that many organisations have and that are a significant barrier to Industry 4.0 implementation.

All of these findings suggest that the successful implementation of Industry 4.0 initiatives will not only require significant investment and a cultural change on the part of industry, but also a change in mentality towards more sharing of information and collaboration.

However, our view is that the change in culture required faces a significant barrier in terms of the older generation of engineers who have signficant concerns about data security. We will investigate the 'generation gap' later on.

How would you describe your organisation's willingness to share machine or production data with its supply chain or third party suppliers

- Full disclosure of information
- Limited disclosure of information
- No disclosure of information

66.89%

17.22%

15.89%

Is your organisation currently under any pressure from customers to embrace Industry 4.0 type initiatives, such as sharing of machine or production data?

- Yes
- No
- Don't Know

61.95%

17.22%

21.19%

70%
60%
50%
40%
30%
20%
10%
0%

There is also a wider issue at play with regard to third party suppliers. Whilst our respondents know their own industries and production processes, and the OEMs know their machines, it is the third party maintenance supplier who has the expertise in the individual component parts and sub-assemblies. The reluctance to share information will inevitably impact their ability to diagnose, fault-find and prescribe solutions.

All industrial companies and manufacturers exist as part of often complex supply chains. Whilst there may be no desire to share machine or production data there may well be pressure to do so, particularly from customers.

Whilst the vast majority of respondents have answered that they are currently under no pressure to share machine or production data (62 per cent), interestingly 17 per cent of our panel have said that they are under pressure to share data. We believe that this percentage will inevitably increase as Industry 4.0 takes greater hold.

> **"Industry 4.0 is a very interesting concept for us, but we are operating in a very competitive sector and there are security concerns. Any leaks of data could be very costly for us."**

DATA MONITORING AND INTERPRETATION

> **"There's a lot cynicism around but I'm personally very excited about the prospects for our company and the productivity enhancements that will flow from the introduction of Industry 4.0."**

Collecting data is one thing, correctly analysing it and using it is another issue entirely. We have already seen that many of our panel are concerned that they have insufficient skills in-house to interpret and use Big Data correctly.

In fact, our results show categorically that, at the very least, there is a data analysis deficit in many organisations. We asked our respondents whether they personally believed their organisations had the necessary skills in-house. Whilst, 54 per cent answered in the affirmative, 46 per cent of respondents responded with either 'no' or 'don't know'.

Even more revealing is the admission by 56 per cent of respondents that their organisation needs the support of the OEM manufacturer to use data for machine diagnostics or fault-finding.
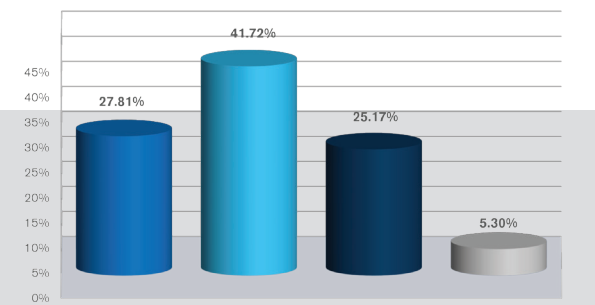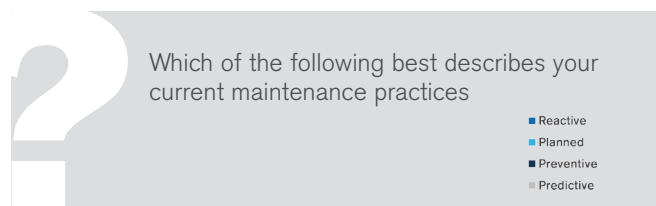
SECTION 3: MAINTENANCE AND INDUSTRY 4.0

REACTIVE OR PREDICTIVE?

For maintenance technicians in UK industry the key benefit of using Big Data will be the ability to implement more preventive and predictive maintenance practices.

The vast majority of our panel describe their current maintenance practices as being reactive or planned (72 per cent) with only five per cent using predictive maintenance techniques.

This response was confirmed by a subsequent question, which asked about their organisation's ability to use production or machine data to influence maintenance decision-making. Whilst 61 per cent described their ability

as either 'very good' or 'good', nearly 40 per cent described their abilities as 'average' or 'poor'. This suggests that there is still a large section of the UK's industrial base that is unable or unwilling to collect and use data.

Which of the following best describes your current maintenance practices

- Reactive
- Planned
- Preventive
- Predictive

45%
40%
35%
30%
25%
20%
15%
10%
5%
0%

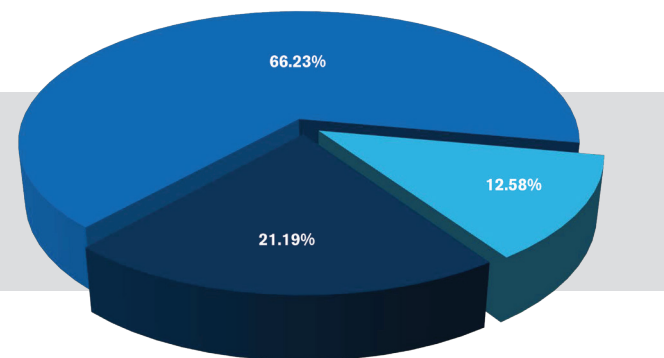27.81%   41.72%   25.17%   5.30%

CAN INDUSTRY 4.0 HELP?

The key question therefore is whether industry believes that Industry 4.0 initiatives can improve maintenance regimes and machine uptime. Results showed that 68 per cent of respondents believe that Industry 4.0 will have a beneficial effect, with only 10 per cent taking a negative view.

We then asked our panel if they believed that Industry 4.0 initiatives, such as remote monitoring and diagnosis of machine faults, could potentially reduce OEM maintenance and servicing costs. Again, the responses revealed that industry believes that Industry 4.0 could offer a significant maintenance cost reduction, with 66 per cent answering positively.

However, whilst the majority think that remote monitoring and diagnosis of machine faults could reduce maintenance costs, there appears to be less inclination to allow third party suppliers access to the data which would facilitate
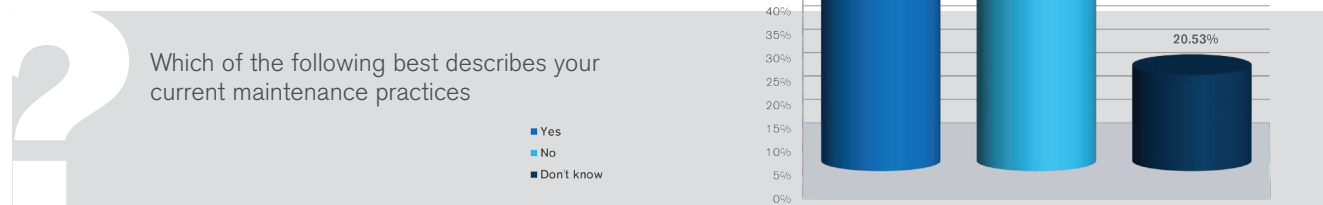
remote monitoring. In fact, only 46 per cent of respondents answered that their organisations would grant access to a third party supplier.

Do you believe that Industry 4.0 initiatives, such as remote monitoring and diagnosis of machine faults, could reduce your OEM maintenance and servicing costs?

- Yes
- No
- Don't know

66.23%   12.58%   21.19%

There is also a clear differentiation between believing in the potential of Industry 4.0 and actual implementation. When we asked our respondents if their organisations were currently undertaking any Industry 4.0 initiatives aimed at benefiting maintenance or machine uptime, 61 per cent answered either 'no' or 'don't know', with only 39 per cent answering in the affirmative.

This answer may well, at least in part, be due to the perceived difficulties in implementing Industry 4.0, such as the complexity of designing sensing systems that can record the correct information for easy interpretation as part of an asset management programme.

Which of the following best describes your current maintenance practices

Yes
No
Don't know

39.07% 40.40% 20.53%

WE KNOW THERE'S A SKILLS GAP, BUT IS THERE AN AGE GAP?

There has been plenty of talk of an industrial skills gap, but one of the key areas we wanted to investigate with this research was how different generations viewed Industry 4.0.

Our findings reveal that the younger generation of engineers is, as you might expect, more switched-on to the potential of technology and big data to solve many of their production and maintenance issues.

For example, more 25-33 year olds (83 per cent) than over-55s (52 per cent) say they understand the potential of Industry 4.0. What's more, the same number of 25-33 year olds (83 per cent) believe that Industry 4.0 initiatives can have a positive effect on maintenance in their own organisations.

It is also clear that the older generation is far more concerned about data security. Only 15 per cent of over-55s would allow full disclosure of machine or production data with OEMs, compared to 34 per cent of 25-34 year olds. What's more, only 12 per cent of over-55s would allow full disclosure with third party suppliers, compared to 28 per cent of 25-34 year olds.

It even appears that the younger generation is more aware of its limitations, with just over double the number of 25-34 year olds (72 per cent) believing they need the support of an OEM manufacturer to use data for machine diagnosis or fault-finding, compared to only 35 per cent of over-55s.

What do these figures tell us? Unsurprisingly, they seem to indicate that the younger generation of UK engineers is more technologically savvy, but they also tell us that the older generation, many of whom are occupying senior positions in industry, are more risk averse in regards to issues such as data security and should perhaps therefore look to guide and empower team members who have grown up with IoT technology.

CONCLUSION

When we had the initial idea for this report we believed that we would find low levels of understanding about Industry 4.0 amongst managers in UK industry. The opposite has been proved true.

There are, in fact, high levels of understanding (more than 70 per cent) and a great belief in the ability of connectivity and Big Data to improve manufacturing productivity, maintenance practices and, in turn, our country's competitiveness.

Why then do these results ring alarm bells? As the questions became more granular, the answers revealed gaps in understanding, concerns about the lack of leadership from government and industry bodies and, most importantly, significant 'roadblocks' standing in the way of greater collaboration and information sharing.

The fact that more than 80 per cent of respondents described their organisation's willingness to share machine or production data with OEMs and third party maintenance suppliers as either limited or non-existent is deeply concerning. This is exacerbated by the fact that more than half of our respondents admitted that their organisations need help from OEMs to interpret data.

In other words, industry knows it needs help with data analysis, but is unwilling to give the experts access to the data.

Without this access, remote monitoring, predictive maintenance, condition monitoring and other progressive maintenance techniques are, at best difficult and, more likely, practically impossible.

This inertia to change may lie at the heart of the other worrying statistic, namely that more than 40 per cent of respondents answered 'no' when asked if their organisations were currently undertaking any Industry 4.0 initiatives. Another 21 per cent answered 'don't know', suggesting that, even if initiatives are underway, they have a low profile within their organisation.

Perhaps most worrying of all is the age issue. The implementation of Industry 4.0 is moving quickly and the UK must move even more quickly to make up for the implementation deficit that already exists with other countries, such as Germany.

And yet, our research demonstrates that the older the respondent the more sceptical they are about the potential for Industry 4.0. These individuals inevitably occupy the most senior decision-making positions in UK industry, so this is a legitimate concern.

Overall, I cannot help but ask whether our respondents, and industry in general, are focusing in on the big picture, namely that Industry 4.0 offers the opportunity to truly connect with their supply chain. In short, Industry 4.0 offers enormous opportunities, but those opportunities must be grasped soon, before competitors take an unassailable lead. There is much work to be done and that work must start now.

Gary Price
International Product Manager
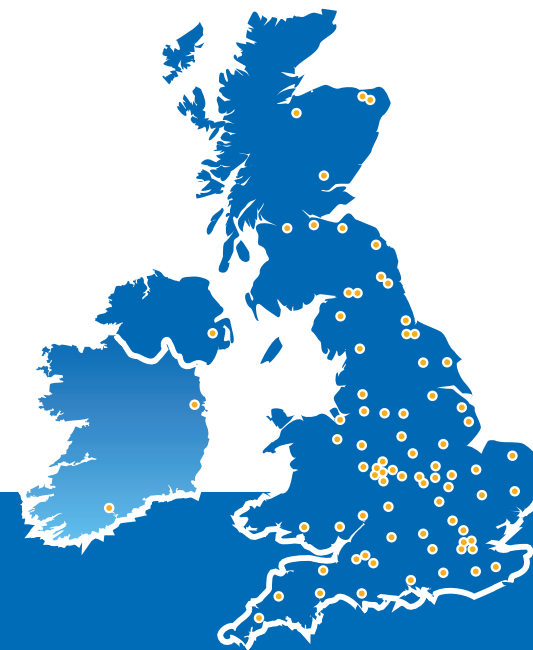Automation and Services
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