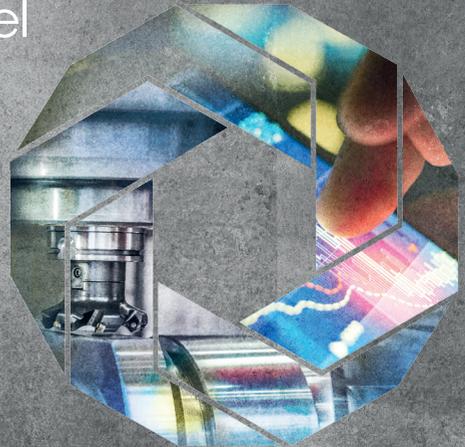


# MANUFACTURING FORUM 2016

The dawn of the connected  
industrial revolution

June 16th 2016  
Coombe Abbey Hotel  
Coventry, UK



## SUMMARY PAPER

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The digital revolution has the power to completely transform manufacturing, with the factory of the future offering huge gains in terms of productivity and quality...



The digital revolution has the power to completely transform manufacturing, with the factory of the future offering huge gains in terms of productivity and quality, thanks to self-learning systems, intelligent automation, realtime data feeds and flexible production and logistics.

But there are challenges. Legacy systems and equipment cannot be replaced overnight; there are issues of interoperability and fears over security. Moreover, the remit of the manufacturing CEO is often to focus on day-to-day activities and their core business – there is little time to plan for the future.

The Economist's Manufacturing Forum 2016 brought together senior business leaders to discuss some of the key issues, the highlights of which we present in this summary paper. We would like to thank all participants for their invaluable contributions.

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## The promise

**Digital manufacturing is already happening but often in a silo or a limited capacity.**



Its full potential has yet to be realised, and proponents of so-called 'Industry 4.0', or the fourth industrial revolution, see a future for manufacturing that is seamlessly connected throughout the supply chain. Factories of the future offer virtual walk-throughs, and assets are tracked in real-time.

Delegates discussed the opportunities that digitalisation can offer. Hamid Mughal, Director of Manufacturing at Rolls Royce, painted a picture of a near future of user-friendly, flexible and intelligent factories on a local street where consumers simply download

a design for them to make up. 'Mass customisation', with bespoke products available at costs associated with current volume manufacturing, becomes a reality.

Participants noted how digitalisation has the power to put the customer at the centre, and talked about the business advantages for manufacturers in doing so. Manufacturing becomes a collaborative process that would see suppliers, designers and customers working together virtually on the same product.

Martin Rainer, Vice-president and General Manager Manufacturing Industry Segment, Hewlett Packard Enterprise, said that even a business in the middle of the value chain will need to understand what the end customer wants. However, there is a challenge in getting that visibility, he added. For this to happen, all the players need to be integrated; crucially not just machines but people, too.

With greater integration come issues of security and regulation and so a balance needs to be sought. Even so, it is no longer enough for a CEO to look at what is happening inside their company, and they must be aware of the ecosystem in which they operate.

Delegates heard several examples of how digital could make manufacturing customer-centric. Jagjit Singh Srai, Head of the Centre for International Manufacturing, Institute for Manufacturing, University of Cambridge, talked about pilot projects with the pharma industry. Smart packaging with printed electronics, for example, could not only ensure that the product was being

stored correctly and validate the authenticity of the package, but also help to inform patient compliance.

However, there may be an image problem for manufacturers to overcome first. Customers and even some internal stakeholders do not readily see them as part of the solution to their problems. To reach the full potential of digital, it must not be something that is plugged into an existing system but used to demonstrate added value.

Martin Petry, Chief Information Officer at Hilti, explained how the company digitised in response to its construction industry customers, who are themselves using more digital processes. The company's design software has become a key differentiator and has allowed Hilti to deeper integrate into the value chain of its customers.

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## Making the connection

One of the biggest challenges to overcome if the potential of Industry 4.0 is to be realised is how to seamlessly integrate a large number of businesses across the supply chain.



Interoperability is one of the biggest causes for concern. Who in the value chain decides which system should be the standard for all to use? How is security ensured, and who takes responsibility?

It was put forward that there is a danger that those in the chain jostle for power over who dictates the standards.

But rather than looking for just one standard, some participants argued that it is more important to have robust networks. Indeed, Alisa Adel, Industrial Technology, Partnerships and Business Development, Airbus, says the company is agnostic as to where solutions come from. Instead of “looking for a needle in a haystack” for a technology it might need, the company asks to be provided with solutions to its problems. She added that long-term servicing contracts do not allow for innovation in real-time. Both parties need to look at how to develop a solution that it is worthwhile for both.

There is also the question of who bears the cost in the transition to digital. For SMEs in particular, is there a risk they might lose out on business if they can't afford to upgrade to a new standard or system that the rest of the supply chain is implementing?

Jonathon Shaw, Chief Engineer at the Digital Engineering, Manufacturing Technology Centre, argued that SMEs often don't have the resources nor the time to explore what might be in it for them. There is a great danger they will get left behind simply because they are not getting the support they need, he said. Programmes are being initiated to help understand the 'cost of quality' and how standardised processes play into that. The cost-benefit analysis is something manufacturers need to look at.

Resources are one issue to be overcome, but also the relationships across the supply chain are not yet in place. Jagjit Singh Srani said that it may be some way off, however there are short-term solutions and not every point in the stream needs to connect. Businesses should take a more pragmatic approach. They need to understand the end-to-end supply chain then examine where the key points are for integration based on competitive imperatives. For example, if the imperative is around responsive supply, then businesses need to be integrated with end users, if it is cost, then suppliers are the priority.

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**“There is also the question of who bears the cost in the transition to digital.”**

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# Getting buy-in

**While there are strong arguments for digitalisation, there can be reticence at both a senior level and on the shop floor.**

Factory workers fear being replaced by robots, meanwhile, business leaders are too busy dealing with day-to-day operational issues.

Delegates discussed the need for all functions across the company to get together to look at the holistic business case, and then be accountable for specific targets in their areas.

Digitalisation often requires a huge cultural shift – human change has to follow the technological change. Internal stakeholders need to take ownership of the issues, but external experts can be useful for communication and training.

Creating excitement is crucial. Demonstrating the opportunity can be powerful. For example, the cost of poor quality can be around 30% of revenue. Digitalisation can help reduce these costs and the money invested elsewhere in the business. Project champions at all levels of the company can create momentum.

Companies need to break down the journey into steps, and then back each step up with early evidence to show how these achievements reinforce the business strategy.



Additionally, the groundwork should not be underestimated. To be 'fit for digital' requires effort. Martin Rainer stressed the need for a standard platform so that the backbone IT can support new projects in the long run. It is often the case that a company's digital strategy requires a significant upgrade to central infrastructure first.

He warned that there is a danger of buying in new technology quicker than the back-end can cope with. Situations can arise where there is, say, £1m available for the digital implementation of a new tool or software but the reality is that it also requires £3m of

back-end implementation. It is essential to do the homework otherwise the value will not fall into place. CIOs must standardise processes and work with those in the company owning the digital or investment space to deliver joint business cases for investment.

Building standardisation into manufacturing value chains and processes is also key to bring greater predictability, which gives management the headroom to think about tomorrow rather than the day-to-day. CEOs should not have to be micro-managing processes but feel able to delegate and give the people around them the space to learn and improve.

# Speeding up innovation

**While SMEs may not have the resources, large companies can lack the agility to implement new digitalisation strategies with the necessary speed.**

the challenges of innovating in a high stakes and complex environment

Delegates heard from GE Oil & Gas and Airbus on how big companies could tackle the issue.

GE has positioned itself as a 'digital industrial company' and has invested heavily in digitalisation. Alberto Matucci, CEO of Wellstream Flexibles, part of GE Oil & Gas, explained how his area of the business has created a digital platform that connects with customers outside and within so it can foster an environment where interconnections can happen.

He went on to explain how it is often not practical or necessary to make big changes to legacy machinery – it is more about smart upgrades. He talked of how the company is selectively introducing digital technology, adding new functionality to its equipment, which results

in significant cost savings, for example in the amount of polymer it needs to use. Externally, it is using technology to maximise value for customers. The oil and gas industry's focus on productivity means downtime must be kept to a minimum and so the company's gas turbines are fitted with sensors that tell its customers when the optimal time is to carry out maintenance.

Airbus's Alisa Adel explained the challenges of innovating in a high stakes and complex environment. The Airbus A380, for instance, is made up of four million parts produced in 1,500 factories in 30 countries. These parts need to be of topmost quality given they will be part of a machine carrying many hundreds of passengers across the world. There is also the issue of longevity with production lines lasting as long as 20 years. Digitalisation is not easy in such an environment. She explained how the company started the process a couple of years ago with a number of initiatives across the diverse business, with a digitalisation platform introduced earlier this year to streamline and standardise the work so far.

Ms Adel said that the company has accelerated innovation by dropping a certification process for anything that doesn't actually go up into the air. It also introduces products to workers as soon as they are ready with basic functionality. This means the product in question can benefit from the direct feedback of the operator that will actually use it.

Mr Matucci noted that almost all the industrial segments that the company operates in are highly regulated and the rigorous process needed to introduce something new was not fast enough for leaders to understand if it was a good or bad idea. To that end, the company encourages employees to think like entrepreneurs, developing ideas with the FastWorks programme using Lean Startup principles, and are allocated a budget and resources to try it out within a given timeframe. The company also has several global innovation centres, meaning business leaders can tap into the relevant expertise when they need it.

## The new approach

Delegates looked at the productivity gains that digitalisation could bring.

Rami Jokela, Group Vice-president, Digital ABB Lead, ABB Group, gave the example of shipping, where digitalisation allows the remote monitoring of hundreds of ships. The intelligence provided allows one person to assess what needs to be done and in the majority of cases, there is no need to dispatch an engineer.

However, it was put forward that while productivity will still be a key measure it is not the only performance indicator that should be in

the strategy. Gaining new market share is becoming more crucial. This is not just product innovation but delivering new business models, and ensuring they can be fulfilled.

Manufacturers will not be competing on efficiency. Differentiation is key. Business advantage will come from how well a manufacturer uses knowledge-based manufacturing excellence to create products that offer value, customisation and functionality.



## The path ahead

While clearly there are major hurdles in realising the full potential of Industry 4.0, there are significant rewards to be gained.

And those not prepared to embrace it could well be left behind.

It was argued that Germany is leading as a model, although this was debated. The UK, too, has its strengths in this area, in particular the idea of putting the consumer at the centre and directly connecting with them. The potential for UK manufacturing is vast, and digitalisation could put

it at the heart of global manufacturing, it was said.

Delegates were reminded that big revolutions don't come easy. But the advantages are many. It requires hard work and the industry coming together. If there is momentum and desire, the barriers can be overcome.

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**“The potential for UK manufacturing is vast...”**

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