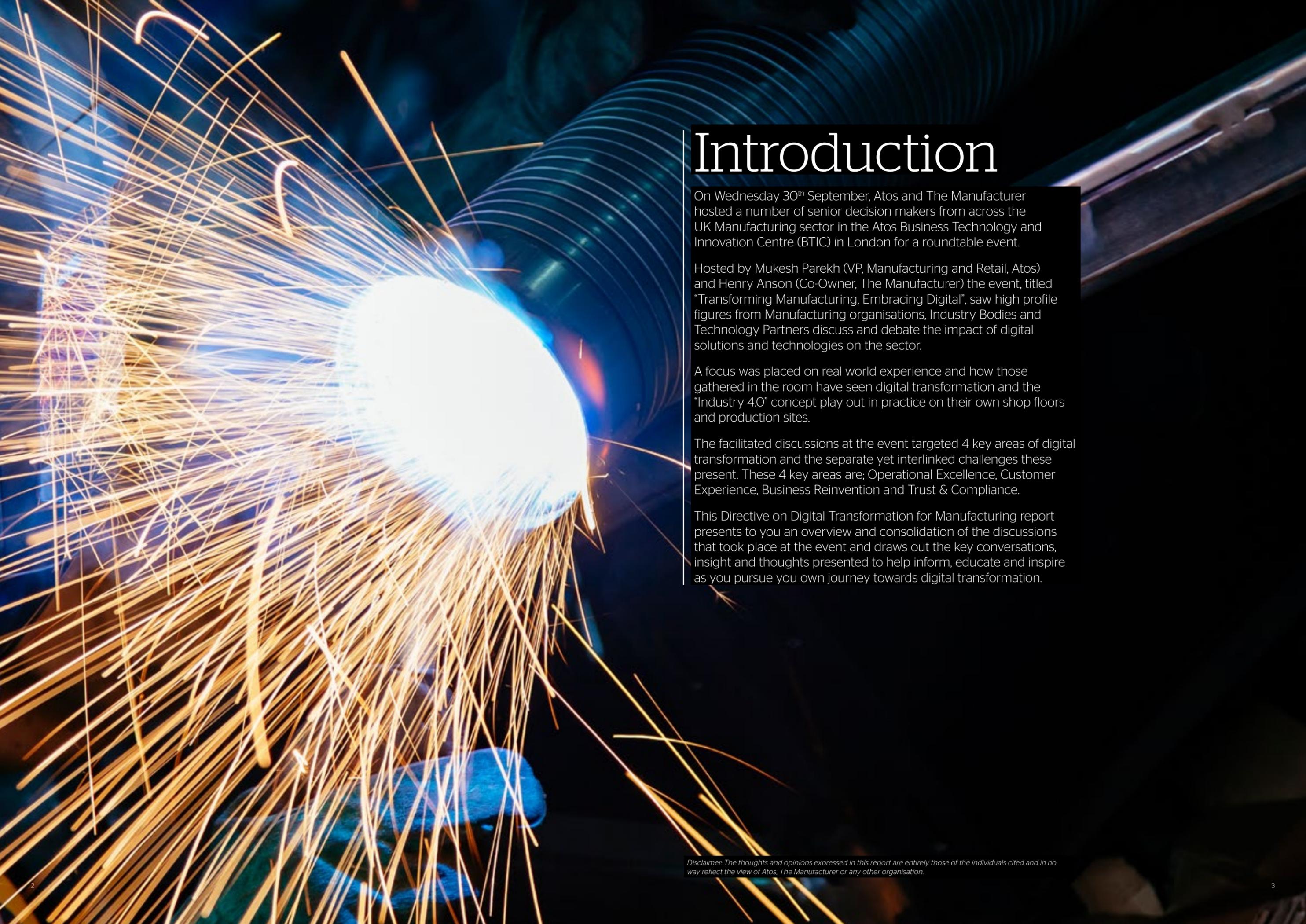


Report

directive

on digital transformation:
manufacturing



Introduction

On Wednesday 30th September, Atos and The Manufacturer hosted a number of senior decision makers from across the UK Manufacturing sector in the Atos Business Technology and Innovation Centre (BTIC) in London for a roundtable event.

Hosted by Mukesh Parekh (VP, Manufacturing and Retail, Atos) and Henry Anson (Co-Owner, The Manufacturer) the event, titled "Transforming Manufacturing, Embracing Digital", saw high profile figures from Manufacturing organisations, Industry Bodies and Technology Partners discuss and debate the impact of digital solutions and technologies on the sector.

A focus was placed on real world experience and how those gathered in the room have seen digital transformation and the "Industry 4.0" concept play out in practice on their own shop floors and production sites.

The facilitated discussions at the event targeted 4 key areas of digital transformation and the separate yet interlinked challenges these present. These 4 key areas are; Operational Excellence, Customer Experience, Business Reinvention and Trust & Compliance.

This Directive on Digital Transformation for Manufacturing report presents to you an overview and consolidation of the discussions that took place at the event and draws out the key conversations, insight and thoughts presented to help inform, educate and inspire as you pursue your own journey towards digital transformation.

Disclaimer: The thoughts and opinions expressed in this report are entirely those of the individuals cited and in no way reflect the view of Atos, The Manufacturer or any other organisation.

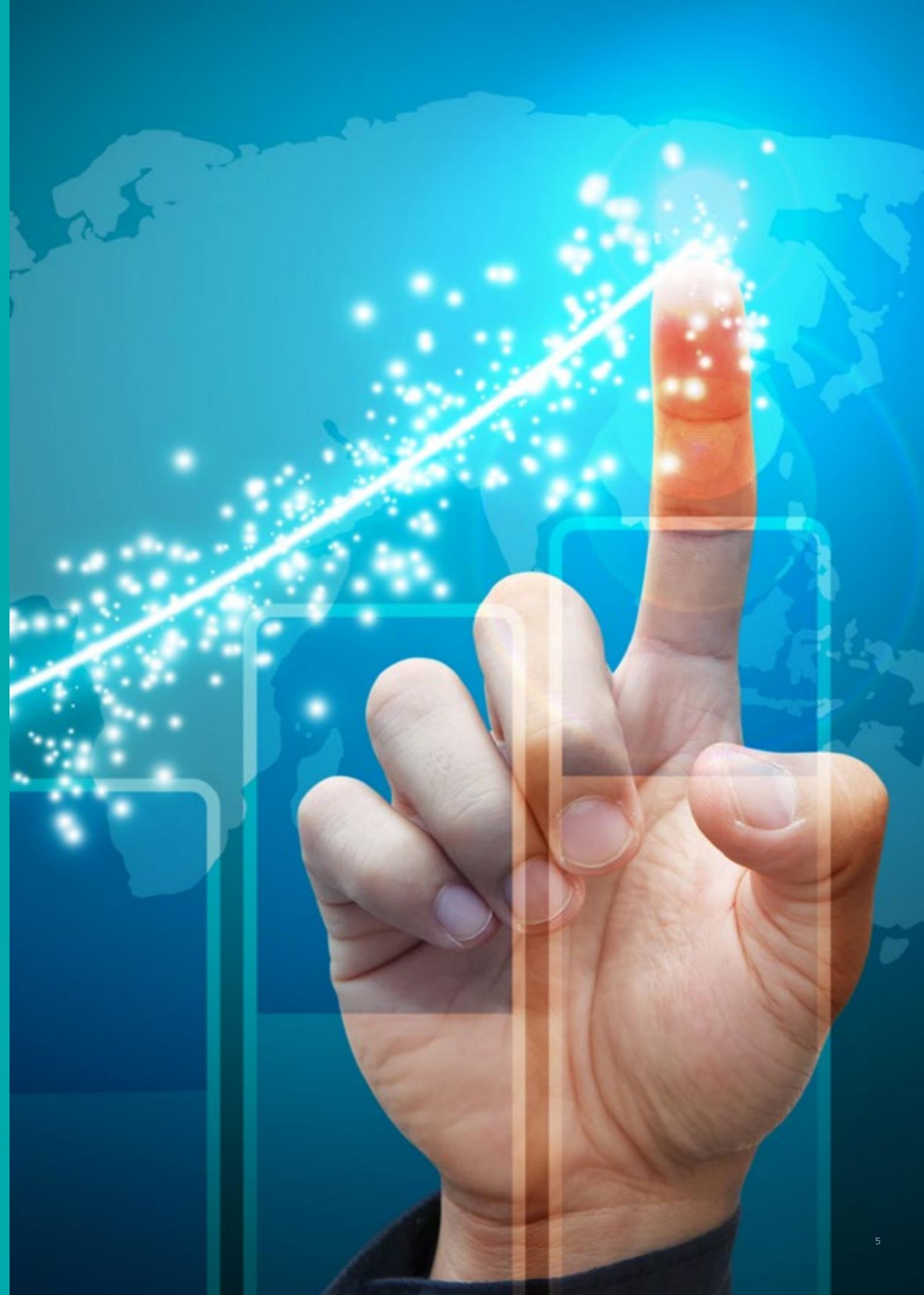
operational excellence



For any manufacturer, the delivery of an end-product to specification, on time and in budget is key. The drive should always be there to do this better, faster and cheaper, but ensuring the right tools are in place to do this in the digital age can be a challenge.

Effective standardisation, integration and information sharing across the entirety of manufacturing production will help to improve processes, reduce complexity and provide continuity in the face of digital disruption.

Virtualisation, automation and the insightful management of real-time data can combine to boost agility and operational excellence in the short term. The challenge is to then ensure that these standards can be maintained in the face of radical business and social change.



We asked the attendees:



“We constantly use data to optimise production and Quality. We heavily monitor data points such as First Time Yield and Performance data to drive informed decisions.”

Jeff Kennelley,
Plant Leader, GE Aviation

To what extent do you use data to optimise your production capability and quality now and for the future?

The view from the attendees of achieving operational excellence and being able to drive this further in the digital age is that, at the moment, this is very much about understanding the art of the possible.

Manufacturers know they want to do these things, and also need to do these things, but there is often a lack of understanding about how to take that first step on the journey to Industry 4.0. This shift to new, digital ways of operating is a massive step change for many and there needs to be sight of what the first baby steps are to get things moving, rather than taking a leap. Manufacturers want to know how they can pilot initiatives which can be tested quickly, fail quickly and repeated quickly to drive out the benefits as swiftly as possible.

However the attendees pointed out that in high pressure production environments where getting things 100% right first time is required, this can often be seen as something that can wait until later whilst the focus remains on delivering product.

The attendees suggested that there needs to be a cultural shift to support this. For instance it is incredibly hard to get those who are focussed on running Business-As-Usual to think ahead, and there is often a cultural challenge in that “this is the way we’ve always done it” prevails. Education and training needs to be provided to help people shift viewpoints.

That being said, the attendees agreed that the move to Industry 4.0 manufacturing and looking at the ‘Factory of the Future’ will help in providing this new focus and a move towards even greater quality and delivery ‘right first time’. The fully connected work force that is focused on quality and continuous improvement will rely much more heavily on data, but it’s a fact that this data, and the effective analysis and manipulation thereof, is crucial.

In using data so heavily there is a need to identify the right KPI’s and measure them consistently. Many manufacturers look at yield as a key output, but the attendees asked the question that, in a new digital world, is yield a true reflection of what operational excellence now is?

But the attendees pointed out that a real time view of data will help to facilitate the necessary cultural shift as people will be able to see right then and there that what is being put in place is working.

However, it was suggested that there is a need to also open much bigger “data windows” to enable manufacturers to gain greater understanding of longer term trends - not just what’s happening right here, right now - so effective planning and balancing can be done between what has to happen right now and what should be done months and even years into the future.

There is some disagreement amongst the attendees, however, about whether these shift changes in the approach to production (and in fact the way the business as a whole will operate) should be spearheaded by the IT function or by the wider business. These are, at their core, technological and IT focused changes and as such the IT function should be heavily involved, but the impact of these changes will be felt much wider in the organisation and consequently collaboration across the entire organisation will be required to harness the benefits of this shift to digital. It isn’t an either/or decision; it should be addressed in total collaboration.

The attendees were also keen to highlight that UK Manufacturing is on the precipice of a major STEM skills shortage and that the skill set required to implement these industry 4.0 changes is currently lacking. Very few people have the necessary mix of IT, shop floor and engineering knowledge available to oversee and implement large scale technological projects in manufacturers, and as such manufacturers need to work with governments, schools, colleges and universities to help fill these gaps.



trust and compliance



Together with digital security, the protection against cyber-threats, privacy and personal data protection have to be intrinsic parts of every manufacturing organisation.

But the biggest challenge can be to deploy privacy and data protection principles and mechanisms that secure operations without stifling production.

In the digital world, relationships of trust have become even more important and any breach of trust can damage those relationships forever. That's also why we need to learn to love compliance; as clear and transparent conformity to recognized regulatory frameworks is the ultimate statement of confidence.



We asked the attendees:



“As a Defence company, data security is a high priority for us. We need to ensure that we can protect our data in an age where cyber-attacks are on the increase, whilst still looking to benefit from the opportunities that digital manufacturing has to offer. We also have to be mindful of restrictions and regulations that are in place, such as ITAR”

Rob Armstrong,
Industrial Manufacturing PM, Selex-ES

What are the biggest trust and compliance issues your organisation faces in the digital age?

One of the key concerns the attendees expressed is how to get the balance of Trust & Compliance initiatives right.

Not just in terms of what's being put in place within an organisation, but also what responsibility should be shared with other organisations in the supply chain - the old saying still stands that a chain is only as strong as its weakest link.

The view was that getting this balance right can be a significant challenge when working with SMEs. The attendees raised a concern about how to ensure these other, potentially much smaller, organisations have the budget and/or resources required to provide the necessary security assurances and implement the right cyber solutions.

With a view across the supply chain, many manufacturers are now global corporations and as such need to collaborate globally. But in doing so there is a need to ensure that both internal and external interactions are safe and secure - especially if working in defence, which adds an additional dimension in having to deal with government departments.

Some of the attendees have specific concerns around the use of open source platforms and how to stop the misuse of IP. For instance, one of our attendees is having an issue with parts being cloned in China; a concern which was shared by others. In this modern digital world where everything can be shared in an instant, how can this be combated?

With the data explosion needing storage across both public and private platforms, some of which will be in the cloud, managing this and maintaining data integrity is key to achieve compliance. The attendees all concurred that manufacturing organisations need to increase focus on data integrity and the use of data ensure trust & compliance amongst suppliers, customers and other stakeholders.

The attendees also acknowledged there needs to be a shift in how mandatory obligations are viewed. Compliance needs to be seen as a value-add activity that demonstrates transparency and engenders further trust amongst customers and supplier, not just as something that needs to be done because it is dictated by regulatory authorities.

However, the paramount concern for our attendees in relation to Trust & Compliance was that of cultural differences between older and younger generations. The default position for the new generation and millennials is to share and reach out to their network to ask for assistance or give updates. This is often done without thought to where people in these networks sit or work, and if this is done too widely outside of the enterprise it can have detrimental effects. Conversely, the view of the older generation is a lack of willingness to share at all, to sit on information and keep it in internal silos until actively pushed to share.

This conflict needs to be resolved in order to promote the sharing that will be necessary to succeed in the future, let the older generation feel safe in sharing and manage the sharing of the younger generation to mitigate against any issues. As initially stated, it is all about striking the right balance.



business reinvention



What the future holds and what an organisation will look like tomorrow are unknown. One thing that you can be sure of is that it will not be the same as it was yesterday.

Digital solutions are already having a transformational effect on the way we behave as businesses. New technologies make it possible for us to do things faster, better and cheaper, but they can also fundamentally alter not just how we work, but what we actually do.

The Internet of Things (IoT) and Big Data are the technological developments that will have the greatest disruptive impact as, in every sector, organisations are seeking to make the changes necessary to create and sustain genuinely differentiated positions in increasingly fluid and volatile markets.



We asked the attendees:



“Data allows us to provide more accurate information pertaining to product turnaround times, in turn providing our customers with step by step progress throughout the production process.”

Jeff Kennelley,
Plant Leader, GE Aviation

How can you use data to create new services for your customers that are valuable for them and make you more money?

Data was a key area of interest for all the attendees but the use and analysis of data was viewed as the most crucial concern. Gathering and stockpiling data is all well and good, but if you aren't using this data to then drive out meaningful and actionable insight and intelligence it's a pointless endeavour. It is through this data analysis that the attendees can then begin to identify and understand the new products or services customers may require.

With the advent of the Internet of Things, everything is becoming more connected and the attendees were confident that the amount of available data is going to increase exponentially for the foreseeable future. With this data explosion and IoT interconnectivity, the attendees highlighted that a shift in focus is required to look at both the data that exists outside of the organisation and is pulled in, as well as what is created internally and pushed out.

The security of all the data used is then of paramount importance; if attendees don't own the data there is a need to secure what is being used to protect the organisation and the supply chain, both up and down stream. The evolution of the supply chain therefore needs to focus on data integration. [Discussed further in the Trust & Compliance section]

In focussing on the required analysis of data, attendees were keen to point out the consideration that needs to be given to the amount of Op. Ex and time this accounts for, along with the KPI measurements that will be used to ensure this activity generates value for the business. Heavy weight data analysis can be a very costly and time consuming activity, so the attendees were keen to ensure that the correct business case can be built around this activity and the right tools, such as High Performance Computing (HPC), are utilised.

All of the attendees agreed that this much keener focus on data and its analysis is driving a shift in business models and operations. It was given a number of titles by the attendees (Servitisation, Product-as-a-Service, and Service Shift are just three examples) but these all boiled down to the fact that manufacturers are now looking beyond making products and instead looking at the services that sit around them in order to differentiate, drive profits and better satisfy customers.

Manufacturers are now using data to implement “pay per usage” models such as “Power by the Hour” where, for example, vehicles are leased to customers and their use tracked through sensors so customers only pay for the time they use rather than purchasing vehicles that depreciate.

These “pay per usage” models provide the manufacturer a more predictable and consistent revenue stream whilst the customers minimise large payments, spreading their usage costs. These models are also helping manufacturers to provide better maintenance as they can analyse usage data and monitor assets for preventative maintenance or replacement before they cause an issue for the customer. This provides obvious benefits to customers but also ensures manufacturers can better guarantee their revenue streams.

Some manufacturers are also building services and data analysis right into the product itself. Automotive manufacturers are now integrating sensor technology and the IoT into car displays so they can, for example, highlight the nearest dealership garage when maintenance is required or direct a driver to an affiliated petrol station when they need to fill up, driving further revenue for the business as a whole.



customer experience



Organisations need to engage with customers more intimately and individually than ever before, but Manufacturers don't always have a direct connection with the end consumers of their products.

The potential value of an end-to-end customer experience will only be realised when core business operations and supply chains are aligned and optimised for both business-to-business and business-to-consumer interactions.

There is a need to get to the heart of who your customers are and how they behave with a focus given to shifts of age and culture. Particular regard needs to be paid to customers' own digital behaviour as manufacturers now more than ever begin to "change thinking" and "think change".



We asked the attendees:



"We need to reduce our cycle times in getting new products to market in order to make them available to customers at the right time, and at a competitive price. The use of interactive digital technologies such as 3D visualisation/virtual reality can help us to reduce product development times through collaborative design. They can also help us to better engage with our customers."

Rob Armstrong,
Industrial Manufacturing PM, Selex-ES

Do you see your customer's behaviours changing and how would you like to engage with them in the future to increase business?

The attendees highlighted that in properly identifying customer behaviour to make decisions on future engagement, there is firstly a need to properly manage the flow of communication with customers and their orders through all available channels (both virtual and physical) as well as being responsive and able to adapt as new ones come into use.

How manufacturers choose to manage this will have a direct impact on the business models that then underpin manufacturing and operations.

For example, should manufacturers employ an "Argos" model, with a healthy stock of pre-made inventory ready to be purchased quickly or should they use a "Build-a-Bear" model, with parts of the final products available so customers can customise the final product themselves?

This is a very basic example, but it highlights a few of the considerations that need to be taken into account when looking at the production and business models that will best satisfy customers. Manufacturers need to find the right balance between in relation to what they are producing, what customers actually want and how these two parties choose to interact with each other (and potentially further down the chain, the customer's customers).

Many of our attendees are seeing a much greater requirement for product personalisation and mass customisation. Many manufacturers are now looking at producing as a 'batch of 1' and incorporating late changes into designs, but this raises obvious production issues and can create nervousness. Satisfying customers

is clearly important and in large batch production you can throw away defects and still be left with usable products, but in producing a 'batch of 1' you remove this luxury. That means that testing and the assurance of production methods become ever more important and crucial for manufacturing success.

At the front end of the customer relationship many of the attendees are interested in, and are even implementing, new technologies that enable their customers to digitally view products and use virtual reality to "feel" the products. This has already been used in on-site testing facilities and customer experience centres as well as on the shop floor of automotive dealerships. It is very much happening right here, right now.

This digital interactivity is seen by the attendees as helping manufacturers to better engage with customers and enable them to display and demonstrate a whole wealth of ideas and products quickly, easily and in a far reduced physical footprint – a high priority for those manufacturers who also operate show rooms.

This shift to a greater customer focus and the use of digital technology to interact with customers better is clearly important to our attendees, but the consensus is that this all needs to be underpinned by what could be seen as a monumental shift in organisational culture and employee attitudes. This will clearly take time and may be met with resistance in some of the more established manufacturing organisations, but the feeling amongst the attendees is that this shift in culture and attitude will be vital in ensuring future success.



Key directives

Based on the questions presented around the four key areas of digital transformation and the answers the attendees gave, the following points can be seen as the key focus areas manufacturers need to consider when looking at their own digital transformation journey:

People and culture

Digital transformation and Industry 4.0 as concepts are viewed with great importance, but it is apparent that there needs to be support from within organisations and the correct mind-set in place at the very start of any initiative such as this to help it to succeed.

The importance of people and culture was highlighted across all four of the discussion areas, whether it was in shifting internal views to focus on customer requirements rather than production fulfilment or in managing the conflict between how older and younger generations approach data and sharing.

It is often thought that an organisation does these things, without realising that it is the people within an organisation who actually make things happen. Manufacturers need to ensure they have the right people for the job in place and that they build the culture around these people that will enable them to truly embrace and deliver digital transformation.

This can be a mammoth task if starting from scratch, so manufacturers should look to partner or consult with organisations that have a history of delivering effective change management and organisational restructuring to help ease through what could be a turbulent task and lay proper foundations for the future.

Products vs services

It became apparent during discussions that manufacturers aren't anticipating being just manufacturers for much longer. They are looking at how to embrace new ways of doing things and new business models to provide new offerings to customers that will create greater engagement, loyalty and revenue and thus enable them to better compete in the modern world.

This is best seen through the shift to service based offerings that sit around a product, rather than just the product as a single purchase. Product-as-a-Service propositions are coming to market thick and fast as the world shifts away from "ownership" based purchasing. Customers don't want to own a depreciating asset but they still want to use it, and providing these products as services instead benefits both manufacturers and customers.

The challenge for manufacturers is in identifying exactly what these new services are and how they should operate. This requires in depth analysis and the management of masses of data that will exist both inside an organisation and out in the external market, however it can often be a minefield to know where to begin.

To get a better grasp on what these services will look like and how they can be presented to the market, manufacturers should look for experienced partner organisations that have a history of working within the manufacturing sector delivering these Product-as-a-Service solutions to help analyse data and information to best define the new propositions that will help them to succeed in the new digital world.

A transformation plan

As we have seen in the discussions around the 4 key digital transformation areas, manufacturers know that they need to embrace digital transformation and Industry 4.0 initiatives. In many cases they want to do this too, but often there is a struggle to understand how to do so on a step-by-step basis.

The move to digital can be seen as a massive leap and, without a phased approach to get there, many manufacturers can be put off from addressing what is a prime concern. However, the digital journey for one organisation can be drastically different from another, so it should be clarified that there is no 'one size fits all' approach to digital transformation.

It should also be noted that the digital journey is an ongoing endeavour. There is no end point for digital transformation as technology will continue to develop and organisations will need to continually evolve and reinvent how things are done in order to keep pace.

As such, manufacturers will need to look at their working relationships and partnering approach with tech organisations and solution providers to ensure the digital transformation they require can be assessed and delivered. A preference should be given to those organisations with deep sector knowledge and a wealth of solutions and expertise at their disposal.

Properly harnessing data

Data has been an intrinsic part of all four of the discussion topics addressed at the event and in this report. This is to be expected, as data is now the lifeblood of the modern world and those organisations and individuals that can properly manage, analyse and use it will be the ones that are best placed to succeed now and for the future.

The key for each organisation and manufacturer is in using data in the way that provides the greatest value and benefit to them. Whether that is in analysing external customer sentiment to better plan production schedules or completely locking down IP information to ensure parts can't be replicated without authority, how data is managed and used will be crucial for success and seen as a key differentiator in the modern age.

Properly harnessing data to drive the greatest value from it can be a very time, energy and budget consuming activity. Even more so, if it is done without proper targeting or planning it can be a futile exercise.

As such, in order to drive the greatest value from data, manufacturers should look for assistance from IT services companies with experience in handling and analysing massive volumes of data to drive out insight, preferably where there is provable delivery of High Performance Computing (HPC) initiatives.

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For further information on the 'Transforming Manufacturing, Embracing Digital' event or this 'Directive on Digital Transformation: Manufacturing' report please contact: russell.powell@atos.net

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