

TATA COMMUNICATIONS

Resilient, Agile and Connected

How business and IT leaders are redesigning tomorrow's winning enterprise infrastructure

A report for the manufacturing industry

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Acknowledgements



Nassim El Abed
 Head of Strategic Planning & Performance - Digital Transformation
 bioMérieux



In a fast growing and changing world impacted by the internet and new technologies, Nassim believes the key to success is to adapt and be disruptive in order to always fit with customers and employees needs. Customer and results oriented, serving the company in this way is Nassim's passion. More than serving, ensuring customer satisfaction is his goal.



Mateus Possati Figueira
 Formerly Head of EHS&S Innovation and Projects
 Boehringer Ingelheim



Mateus has over 12 years experience leading business transformation in various industries. At BI he drives innovations in the field of Environment, Health, Safety and Sustainability management, focused on making BI more green and running the global strategic plan for decarbonisation, resource use, water stewardship and renewable energy.



Karl Prag
 Global Head of Data, Analytics and Data Management
 CEVA Logistics



As a VP, former data scientist and expert on data driven organisation transformation, Karl develops and implements global strategies based on data driven insight and cutting edge analytics. He is deeply strategic in his outlook and always takes a customer/user centric and strategic approach to any problem.



Henrik Jarleskog
 Head of Strategy Continental Europe
 Sodexo



In his role as Head of Strategy in one of the world's largest companies, Henrik is devoted to the cause of enabling sustainable growth for the society at large. Henrik is a trusted advisor to executive leadership teams globally on their most pressing strategic challenges, lauded expert, speaker and frequent contributor in Business Pink Papers on the "Future of Work".



Timo Landwermann
 Head of VTS Supply Chain
 ZEISS Group



Timo has been involved in supply chain topics since 2008 in different roles. His experience includes providing customised solutions for clients at DB Schenker while procuring logistics services, implementing warehouses and heading warehouse operations as well as order management at ZEISS.



Vadym Lotar
 Director Solution Architecture
 Adidas



Vadym is a father, runner and software enthusiast, architecting and developing complex software ecosystems. Vadym spends time and energy evangelising best practices around API Design, Software Architecture and application development lifecycle. Passionate about sustainability and constantly looking for simplification.



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 Aptiv



Experienced executive with expertise in Supply Chain Resiliency, Digital Twin and Supply Chain Network modelling, Strategic Sourcing and Operations excellence. Experience includes project and change management, acquisitions and post acquisition integration, strategic long term relationship building, organisational development and new business development.



Naveen Gupta
 Global Head Data Governance & Analytics
 Archroma



An experienced Data Governance & Analytics practitioner. Naveen's goal is to strive for efficiency and effectiveness to gain productivity through data driven decision making. Advocates for data driven culture and sets up advanced analytics programs to drive the industry forward.



Dinesh Krishnan
 Global Head of Information and Digital Technology - HR, LEX and IT
 BAT (British American Tobacco)



Dinesh excels in identifying opportunities which will solve complex problems and make a difference. At work, Dinesh is the key business partner for the HR, LEX and IT functions in leading demand management, resource planning, innovation, project delivery and designing the digital technology strategy / roadmap, enabling digital transformation to drive value growth.



Nikhil Reddy Poddaturi
 Head of Data Science at BI X
 Boehringer Ingelheim



Nikhil is a technology leader and data executive with significant experience in digital transformation, data strategy, and end-to-end data science and AI engagements. Over the last 15 years, he has either been part of or led business-critical, innovative, and IoT initiatives in multiple domains, more recently focusing on strategic direction with high-performing teams.



Suresh Thomas
 Chief Solutions Architect
 Elekta



Highly accomplished & output-driven software & cloud solution architect and lead with over two decades of experience in strategic roles, leading with influence, and delivering results. Suresh has been leading transformation of technology solutions targeting to cloud native platforms. He has successfully delivered solutions which can run across edge as well as on major cloud platforms.



Laurent Vignaga
 IS Director Operations
 Firmenich



Laurent creates value for companies by transforming core functions. He helps companies improve customer satisfaction, speed and agility, leading to higher profitability and sales revenue. Laurent brings 20 years of operational and consulting experience through his contributions to the success of Industry leaders.



Michael Claus
 Vice President Architecture and Digital Innovation
 GEA Group



Michael's current position is Vice President Architecture and Innovation at GEA Group AG, Düsseldorf, Germany. Prior to this, he worked as CIO and Head of IT in companies with machinery and engineering focus. He also holds experience as an IT Program lead for large change projects on enterprise level (S/4 HANA, PLM, IIoT).



Tony Strows
 Head of Digital Strategy & Transformation
 Philips



As a Learning and Development professional, Tony is passionate about investing in people. As a leader of global teams, he is dedicated to developing his colleagues. As an innovator, Tony continuously experiments to provide high impact, personalised development experiences, at scale.



Antia Alonso
 Vice President Service Business and Infrastructure
 ZEISS Group



Dynamic leadership in core areas development and production. Master in Physics as well as Master in Technical Design. Seven years experience in leading international cross functional teams. Superior understanding of Finance, core processes and key functions within a company. Teamleader with strong influencing, negotiation, diplomacy and communication skills.

Executive Summary

In today's fast-moving and competitive world, those manufacturing companies able to demonstrate resilience and agility - powered by a strong and stable connected network infrastructure - will continue to grow and thrive.

The manufacturing industry is undergoing much change as it faces many challenges; everything from global disruption to digital transformation alongside huge shifts in consumer demands and behaviours worldwide.

It is forcing many leaders in many organisations to rethink their operations, and so in this e-book, sponsored by Tata Communications, we will examine how they are approaching this, and highlight some of the learnings and solutions they are adopting.

According to **Stephen Reid, Director Unified Communication & Collaboration Europe, at Tata Communications**, one major trend for manufacturers is examining how they can scale up and down quickly, in both infrastructure and people.

"It's been a major theme," he says. "It comes up with every conversation. Every customer, driven by the pandemic, has decided flexibility is so important."

This flexible and agile approach is now the bedrock of remodelling, digitising and securing supply chains, and it is increasingly more closely aligned to customer outcomes.

"It comes up with every conversation. Every customer, driven by the pandemic, has decided flexibility is so important."

Stephen Reid, Director Unified Communication & Collaboration Europe, at Tata Communications

It leaves manufacturing leaders with much to consider, including the critical question of how to leverage the greatest value from today's distributed workforces.

This wholesale and unprecedented change will be tricky to navigate, but it offers manufacturers much opportunity, alongside the risks, especially for those who work hard to stay one step ahead.

Stephen adds: "A raft of changes, including legislative ones, are driving behaviours, and manufacturers need to think about the implications and act accordingly for the future."

Those implications and risks also form part of this e-book, produced by [TechPros.io](https://www.techpros.io) who spoke to 15 C-level enterprise business and technology leaders. Each was asked for details of how they are guiding their organisations through these transformational times.

15 C-level Enterprise Business and Technology Leaders



What follows is advice and suggestions to help you develop new and more resilient strategies and revenue streams that will underpin sustainable growth across manufacturing.

Tata Communications currently serves the network needs of some of the largest companies across many different industries, and the experts brought together within these pages have been chosen to examine and define what it really means to be resilient, agile and connected in today's manufacturing landscape.

We do hope you enjoy reading this eBook and that it inspires discussion and action among your own C-suite.

You will learn and understand:

- **How** Covid-19 has catapulted manufacturers into the future
- **Why** operating models have to change now, and fast
- The **five key challenges** manufacturers are facing
- **What** role there is for data and networks when modelling change
- **How** to manage your people through this shifting situation
- **Why** cloud, automation and AI will be critical solutions
- **How** customer experience is key to unlocking greater value

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A testing and changing time for manufacturing

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A testing and changing time for manufacturing

The Covid-19 pandemic has served to speed up the pace of technological change for manufacturers seeking to transform their operations through digitalisation.

For many, it felt as if the fast forward button had been pressed inside their businesses, forcing them to confront challenges not yet prepared for, nor foreseen.

However, for those with change programmes, the immediacy of the situation did enable some to tackle the raft of opportunities they'd already made plans for, even if they hadn't expected to deal with them so quickly.

Pre-2020, many manufacturers had recognised how supply chains must adapt to changing customer experience and market demands. What Covid-19 demonstrated throughout was a push for multiple years of transformation in a short space of time.

"We've probably gone five or seven years into the future in one year," remarks Karl Prag, who at the time of interviewing was Global Head of Data, Analytics and Information Management, Core Business Franchise, at Ikea. Karl has since moved on to become Global Head of Data, Analytics and Data Management at CEVA Logistics.

Globally, that speed of change has caused shockwaves and impacted heavily on the ability of manufacturers, and the supply chain, to each play their respective roles and keep on top of demands.

So it is interesting to note that according to [research of manufacturing and supply chain professionals](#) by McKinsey, **93% plan to focus on resilience of their supply chain**. This shows how critical thinking around longer-term agility, connectivity and security must now take precedence. Understandably, many manufacturers have tackled this Covid-19 period through implementing short-term, hold things together, fixes.

93%

of manufacturing and supply chain professionals plan to focus on resilience of their supply chain



Henrik Jarleskog, Head of Strategy, Continental Europe, at Sodexo, explains the pandemic enabled a paradigm shift from a workplace and a work/life perspective. **"Turning the operating model around was one of the hottest strategic topics during the last 18 months"**, he says.

So, what comes next? Well, with the Covid-19 situation still uncertain, it is clear the impact on manufacturing's future is yet to fully be determined.

However, manufacturers do now have many months of industry learnings behind them, and because of this they are now able to start responding more positively to the urgent needs ahead. They are using data already gathered and adaptations made, as a guide to move forward on this path of irreversible change.

"Turning the operating model around was one of the hottest strategic topics during the last 18 months"

Henrik Jarleskog, Head of Strategy,
Continental Europe, at Sodexo

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The five greatest challenges ahead for manufacturing

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The **five greatest challenges** ahead for manufacturing

The sheer scale of change needed is currently hitting home across the entire manufacturing industry C-suite, as companies seek to become more cutting edge.

The continued supply chain crises have shown the importance of technological improvement and diversification of locations and logistics, plus there is also a vast piece of change management to be done among workforces, due to the rise in automation and digital tools that empower flexible working.

These challenges can be wrapped up into **five key themes**.

NETWORK INFRASTRUCTURE

DATA

PEOPLE CHANGE
MANAGEMENT

GLOBAL REGULATORY POLICY

CONSUMER EXPERIENCE

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NETWORKS

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NETWORK INFRASTRUCTURE

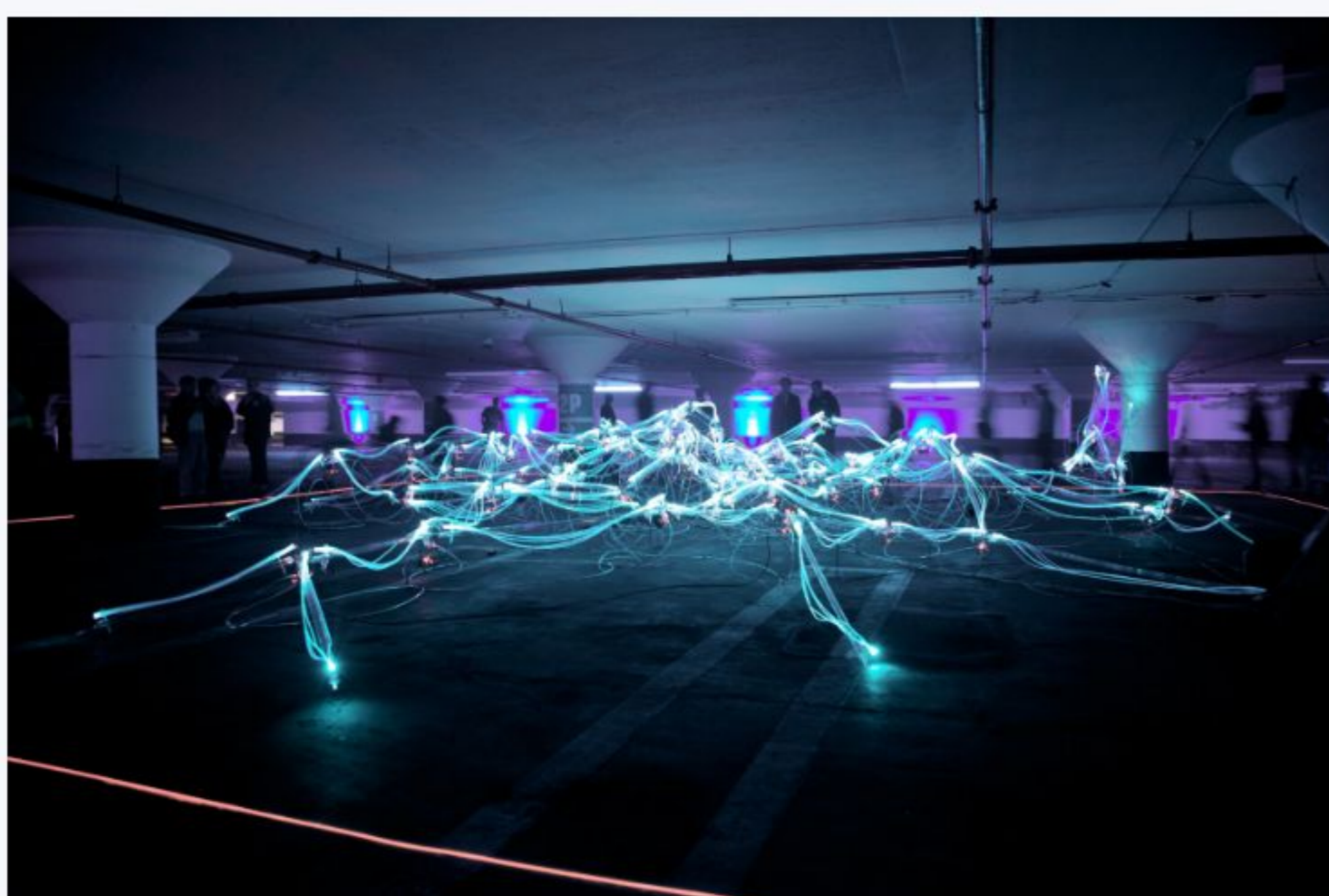
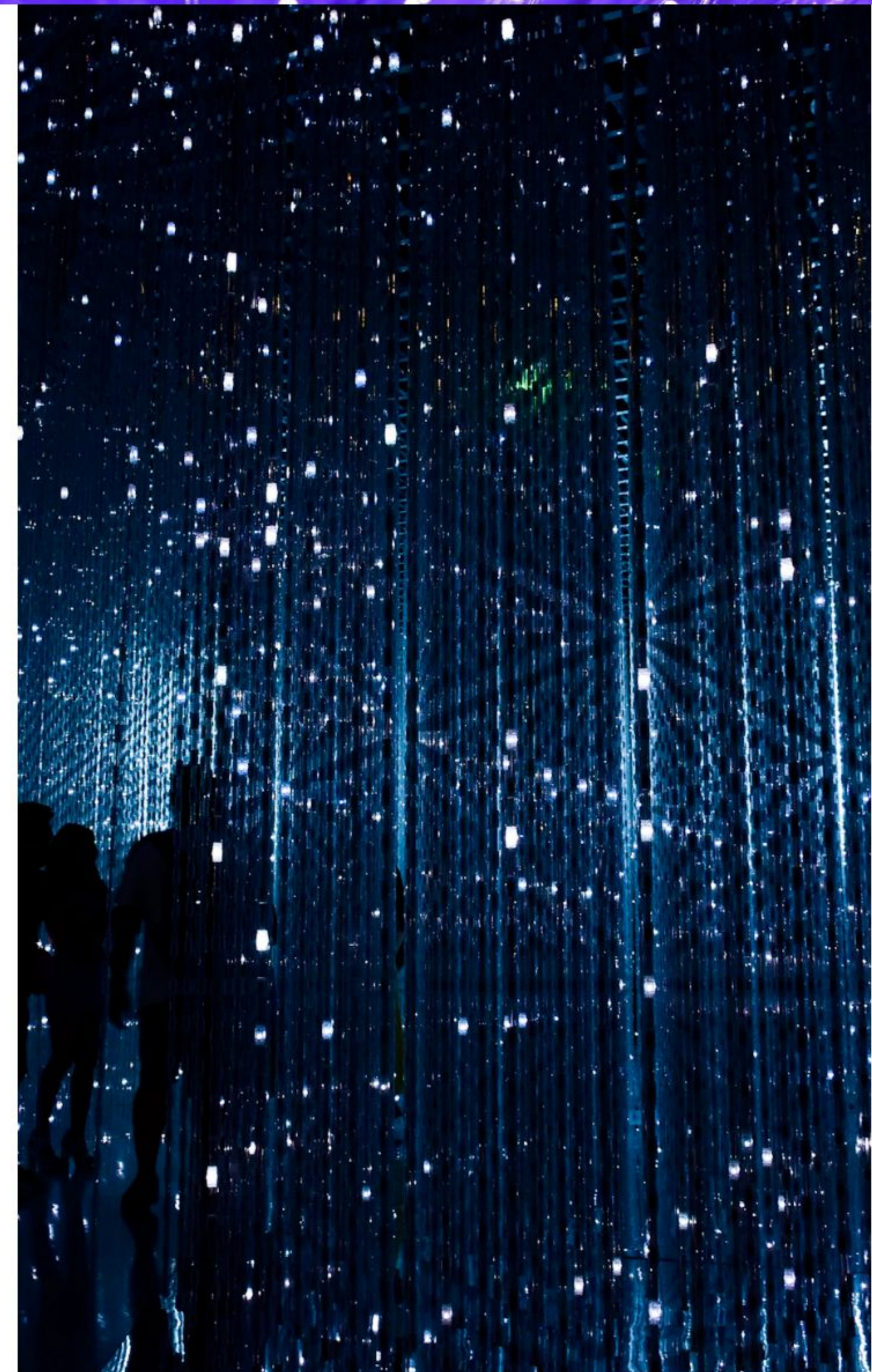
A modern cloud-first network infrastructure is essential to the performance of today's leading manufacturers. Besides connecting suppliers, staff and customers, it is the foundation of the Smart Factory, a highly digitalised and connected production facility, "the factory of the future," according to [Gartner](#).

Early adopters of the Smart Factory must put in place robust multi-cloud-enabled network infrastructures which can support the latest technologies such as 5G, the Internet of Things (IoT), alongside giving secure access to corporate applications in a scalable and agile manner.

You can monitor the status of production and receive real-time data about your products and deliveries, collect data for error analysis and process evaluation, recommend actions and introduce autonomous working through Artificial Intelligence (AI).

The proliferation of cloud applications, coupled with legacy architecture, means that it's an important first step to get the network infrastructure right.

According to [McKinsey](#), Smart Factory implementations are not without difficulty: "Organisational challenges, technology, cost, cybersecurity, interoperability, and installation have resulted in 70% of manufacturers being unable to scale beyond pilots".



The security threat landscape is rapidly becoming more sophisticated.

IoT, cloud, edge computing, and the proliferation of connected devices all function as potential entry points into an organisation's network, which is increasingly difficult to secure. Add in the forced move to hybrid work environments and the use of personal devices for corporate tasks, protecting and securing company data is an ongoing challenge.

Frameworks such as secure access service edge (SASE), that combine VPN and SD-WAN capabilities with cloud-native security functions, are becoming an effective way to target the shifting enterprise network perimeter, by merging network and security services into one.

[Gartner](#) projects that by 2024, at least 40% of all enterprises will have explicit strategies to adopt SASE, which can be integrated with existing SD-WANs.

CEVA Logistics' Karl Prag says: "We need to make sure they are connected from end-to-end, connected by data, in a way where we can quickly reformat the whole process when needed and restructure."

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DATA

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DATA

As Karl mentions, data has become central to business transformation, and for manufacturing especially, it offers the chance to develop a fast-planned response, using artificial intelligence and machine learning to quickly identify changes or new patterns in consumer demands and tastes.

The pandemic clearly demonstrated this with demand for online shopping forcing some retailers to adopt e-commerce for the first time, or to rapidly scale it. In turn, this put pressure on manufacturers and the supply chain, given many products traditionally bought at different seasonal times of the year saw more random increases or reductions in demand when people were restricted to their homes and then given greater freedoms to move.



CEVA Logistics' Karl adds: "We come from a world where we are very production-focused, very similar to a typical manufacturer. What we're looking at now in a big way is how we can adapt to different customer preferences in different parts of the world. Can we, through things such as demand-sensing and AI-driven forecasting, react much quicker to signals?"

Timo Landwermann is Head of VTS Supply Chain at ZEISS Group, a leading technology provider for the optoelectronics industry. He sees aligning with customer objectives as a planning need. "The demands and environment are getting more complex basically every day," he adds. "Without proper tools and I'm talking mainly IT tools, planning systems and so on, you will have a really hard time to be able to deliver on any promise."

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PEOPLE CHANGE MANAGEMENT

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The five greatest challenges ahead for manufacturing

PEOPLE CHANGE MANAGEMENT

For manufacturing, the task of taking employees on the transformation journey is a two-pronged challenge. Firstly, any new ways of working must satisfy those blue-collar workers on the ground who operate machinery or are vital to production.

But it also must match the new expectations and necessities of those white-collar workers who have been more office-based, and now want to work from home regularly and with greater flexibility.

In that first group, colleagues on the manufacturing frontline believe they face many threats from the technological change being utilised to deliver agility, resilience, and connectivity. They sometimes fear automation and AI means losing their job.

For many of those in that second group, who work away from the factory floor, such technological change is a positive, something they wish to embrace because it empowers digital, productivity and collaboration tools for them to work elsewhere.



However, offering this second group of workers digital network access also throws up a further challenge, the third-party external security threats many manufacturers aren't prepared for.

Nassim El Abed, Head of Strategic Planning and Performance - Digital Transformation, at biotechnology company bioMérieux, says that ensuring the right infrastructure of security alongside the cloud is "a no-brainer" for his own industry.

"It should be in place before we engage with customers and before we talk about the distributed workforce, because we are in highly-regulated environments, dealing with data that is super critical," he adds.

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GLOBAL REGULATORY POLICY

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The five greatest challenges ahead for manufacturing

GLOBAL REGULATORY POLICY

As **Nassim** suggests, compliance with regulation in countries and territories around the world is another major challenge all types of manufacturers face.

The pandemic has also caused many governments to look at whether manufacturers should become a more intrinsic part of critical national infrastructure. This would ensure supply chain robustness and prevent shortages for their own nationals of important everyday products, medicines and other crucial raw materials, appliances and apparel.

Such a situation was exemplified in the UK by PPE and ventilator shortages at the height of Covid-19. Other examples include more recent drops in CO2 availability hitting food and drink production, and more mundane items such as toilet roll and pasta running out in supermarkets.



But global regulation is also especially important when it comes to the movement of data within manufacturing. **Mateus Possati Figueira**, formerly Head of EHS&S Innovation and Projects at Germany-based pharmaceutical company **Boehringer Ingelheim**, cites the GDPR legislation in the European Union and describes how sometimes it can be a roadblock to how they can use the data they have gathered.

“Data privacy is a big topic here in Europe,” he says. “The major hurdles we have now is there is a lot of regulation in how data can be manipulated or shared or even collected from customers or from the whole value chain.”



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CONSUMER EXPERIENCE

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The five greatest challenges ahead for manufacturing

CONSUMER EXPERIENCE

It is such talk of data and regulation, as detailed by Mateus, which for many manufacturers inhibits creating a more personalised and more optimised consumer experience. Reaching out to customers, whether B2B or B2C, requires opt-in and there are so many different digital communications channels to navigate individually, from WhatsApp to social media to LinkedIn to newsletters to chatbots and click-to-call/web RTC.

This fifth challenge around customer experience is potentially the most important, and it relies on change to happen across all the themes we have mentioned so far.

Driving product innovation and operational efficiency to meet demand will be imperative for a successful and future-proofed manufacturing business.



Spotting trends fast from data gathered, which will be analysed more frequently by AI, means quickly identifying and understanding the incoming changes on the horizon. This is a key reason why manufacturers must implement processes and technology for enhanced agility, resilience, and connectivity to adapt quickly to these critical and often time-sensitive, suggestions.

The ZEISS Group's Timo Landwermann perfectly encapsulates an example of why thinking ahead is crucial, recalling how before the pandemic's disruption, there was a desire to run leaner operations in terms of stock levels. This is a risk though he says, explaining: "If you're working just-in-time or just-in-sequence, and then if you have a disruption, and it's a global disruption, you basically don't have a chance to react and fill up your warehouses, so you endure long lead times."



Such long wait times, either for parts or raw materials, or to send products onwards to the next stage of manufacturing in the supply chain, have been a huge issue since the pandemic began. But disruption at ports and to other efforts, in pre-pandemic times had already highlighted a systemic fragility.

Timo suggests it wasn't so much of an issue a decade ago when the same parts were used in design and manufacturing for many years, and so were more readily available. Now, however, he describes how these parts are changing far more regularly and rapidly, forcing an impact on both customer and supplier experiences.

Expectation management is crucial, he believes, as the "demand of the customer has changed". Timo puts that down to how people can now receive their consumer goods fast when ordered from e-commerce giants. He adds: "Everybody is so spoiled, you order something, then two or three days later you have it."

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The future path for manufacturing to tread

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The future path for manufacturing to tread

Driving continued and future success through new operational thinking is now a top agenda item for discussion around the manufacturing boardroom table.

Adopting new technologies, moving to the cloud, implementing AI and machine learning, and using the data insight generated from connected machinery to inform decision-making, are just some of the steps being taken.

Much of this is driven by utilising data, and **Laurent Vignaga, IS Director Operations at Swiss-based chemical company Firmenich**, suggests past models of operation do not work for a more hyper-personalised world.

“The big companies are having a hard time because of the new brands coming in, the indie brands and changing consumer habits. We need to be able to deliver faster,” he says.

Laurent adds that shifting priorities more quickly and becoming closer to the customer is the way forward, potentially via greater levels of decentralisation. **“There’s a lot of digitisation that happens in factories, because they want to be faster or more versatile. We need to work differently and have those machines on our network talk and cooperate. People on the shopfloor or running the factories want to know in real time what’s going on. Not by the month, not by the day, but what’s happening now.”**

For his part, **Mateus, formerly at Boehringer Ingelheim**, suggests that companies are now collecting data from many sources feeding into the production and supply processes. **“This is enabling us to track our pallets and see where they are in the warehouse, bringing more speed to the supply chain process. Also, the machines we have within the production process collect real-time data in a remote way, without the need for people to go there and check the equipment in-person.”**

Another area where data and technology can drive positive change in the future is enabling manufacturers to see how and where they can scale up and scale down their people and take their machinery offline at times when demand is low. Such flexible infrastructure, alongside flexible cost models for cloud bandwidth, can save the business money.

For the C-suite, and especially the CEO and CFO, monetary concerns will always play a part, and they will want any move away from legacy operations to be future-proofed, ensuring such huge upgrades to their manufacturing processes are only done once, with full visibility and high levels of security incorporated end-to-end.

Naveen Gupta, Global Head of Data Governance & Analytics at Archroma, a chemicals company based in Switzerland, believes in the importance of providing the right information to business colleagues to make the right decision. Given the pandemic was unforeseen, he describes that as now acting as a spur for conversations around **“how do we actually make capacity?”** and **“how do we become agile?”**.

Naveen also suggests that while previous pre-pandemic data sets around demand and supply must be disregarded due to Covid-19’s influence, the future is going to become far more based on predictive analytics.

“The statistical models do not hold a value anymore,” he says. **“The future we are looking into is more algorithmic, more machine learning and artificial intelligence-based, where we not only look at the situations currently in hand but try to look at situations from market research and from political and geopolitical effects.”**

This prediction offers an opportunity for manufacturing to reinvent itself at every turn, to aid preparedness for any future pandemics, crises, or unexpected events.

However, to do this successfully and ensure both predictive analysis and business intelligence can drive manufacturers forward, there must be enough computing power available across the network to meet greater standards of resilience and agility.



Naveen admits his company was fortunate, as before Covid-19 it harmonised all its network providers into a single cloud solution - and he warns those machines using an on-premises solution are no longer capable to fetch and compute such large amounts of data, at the immense speeds required to see the right information processed between customers and vendors across multiple geographies.

He advises: **“That’s where the network and everything is changing, with more and more cloud computing and cloud solutions being used. That gives you the power and that ability to use the solution to have real-time data ingestion, real-time data analysis and real-time decision-making.”**

As we step towards a post-pandemic future, one that could still be influenced by an endemic Covid-19 for some time to come, it is certain that network capacity and network flexibility must be at the top of manufacturing agendas.

To truly be resilient, agile and connected, manufacturers must build and architect new solutions and processes that can stand up to the rigours of sudden shocks and enforced change - driven by enhancements through artificial intelligence and machine learning.

It is only by ensuring the right future-proofed network strategy is in place, that this can be realised, allowing more efficiency, productivity and business success to be achieved.

MANUFACTURING'S NEXT ACTION POINTS

01

Consider how you ensure a robust architecture for your locations, workers and partners to reach services - whether Private DC, Public Cloud DC or SaaS - in a seamless, secure and scalable manner.

02

Examine the business across all areas to ensure you can use a wide range of digital channels to reach out to customers and suppliers, while meeting varying global regulations, and how you use UCC tools for internal and external collaboration.

03

Understand what levels of security are needed now within your existing network, and any future-proofed network, accepting there is a critical need to build robust security measures within your infrastructure as your digital estate flexes and expands.

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Market view

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Market views



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Global Solution Owner



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Experience Senior Manufacturing Infrastructure

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Market View 01

Habibur Rahman

Director of Technical Services



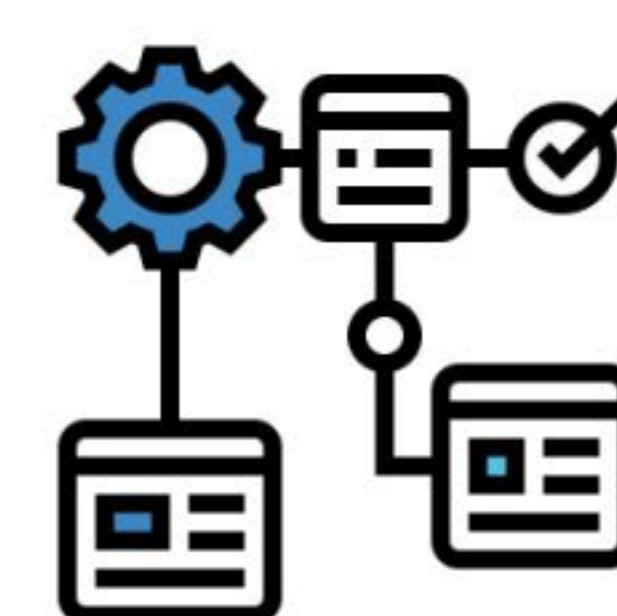
In your opinion, what are the greatest challenges facing manufacturers when it comes to cloud deployments and why?

Probably, fitting all the pieces together, because it all starts with the idea and the architecture. As a product organisation, we go through an ideation phase. At that point, very early on, I do look at things like contracts, existing commercial relationships, who are the movers and shakers in the marketplace, which AWS or Google service will give me the functionality capabilities that I need, etc.

The architecture is what allows us to actually go and create this product, this service, this offering to the customer. All of this is underpinned by the technical architecture and the digitization of what was previously a manual service that we were providing. So the reality is, architecture is fundamental and paramount for building your products and services, and if you don't understand that right from the get go, then the rest will likely be impacted. And when I say the rest, I mean: the contracts, the commercials and what your product actually looks like and what service you can give your customer.



The architecture is what allows us to actually go and create this product, this service, this offering to the customer.



Security and data privacy are big concerns as manufacturing data usually reflects a company's intellectual property. What are your thoughts on the relative security of public/private clouds?

Everything that we do starts with security, first and foremost; be it infrastructure, be it data, be it network, be it edge computing. Today, if we look at the various methods employed, cloud security has come a long way. When I first started with wholesale cloud transformations back in 2014, it was a very different world. The reality is that when it comes to public versus private, you can carve out your own private and public cloud. It all depends on architecture and whether you've got your virtual private cloud architecture set up in the appropriate way. Nothing stops you from utilising third-party security services and deploying them within a VPC structure that you've defined.

So, just be smart about which solutions you pick for which layers of the stack. Now, some solutions will cover multiple layers of the stack, but there's no one platform that will manage it all, despite what people say.



The reality is that when it comes to public versus private, you can carve out your own private and public cloud.



With IoT, cloud, edge computing, hybrid work environments and the use of personal devices for corporate tasks, we are seeing a shift to the new perimeter-less operating environment. With that in mind, what emerging technologies will be needed to provide security?

I believe that mixed reality is going to play a bigger and bigger role moving forward, not just in manufacturing, but across all industries. Last year, we launched a product called Connected Engineer that effectively lowered the barriers of entry for engineers using mixed reality. Now, you don't need an engineer with 60 years of experience in the field; you've got a Microsoft-powered HoloLens headset connecting you to a centre where we have actual engineers with their 60 years of experience, who can see what the individual in the field is seeing. We can use this for training, we can utilise it in a manufacturing setting to optimise the manufacturing process, we can build up actual 3D worlds and images of those settings and pull all that data back and analyse it. So, what historically would have been done by a manufacturing expert is now done by a data analyst looking at the same thing.



I believe that mixed reality is going to play a bigger and bigger role moving forward, not just in manufacturing, but across all industries.



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Market view 02: Javid Awan

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Market View 02

Javaid Awan
Global Solution Owner



How would you assess a Manufacturer as being 'Fit for the Future' (FFTF) and better prepared to deal with future challenges.

The market has changed a lot in recent years. Traditionally, there were two types of manufacturers: those that owned the supply chain end-to-end, like Tesla, and those that didn't own their supply chain end-to-end, like Mercedes. Now, supply chains are disrupted—there's a greater shift to e-commerce and third party logistics management; and one of the biggest trends we're seeing globally is securing supplies.

With that said, the most useful way to assess fitness for the future is through the "fitness test" with three main criteria. The most important criteria really is the shift to remote selling or e-commerce. The second is the ability to manage your supply chains—to have that delivery of components of products or materials in the right place at the right time. The third being the ability to distribute that product across different manufacturing sites to ensure the supply chain remains intact.



The most important criteria really is the shift to remote selling or e-commerce.



The reluctance to change the software or the unwillingness to change, will ensure they remain the laggards of the industry.



What is the biggest challenge relating to legacy infrastructure when fast-tracking to Industry 4.0?

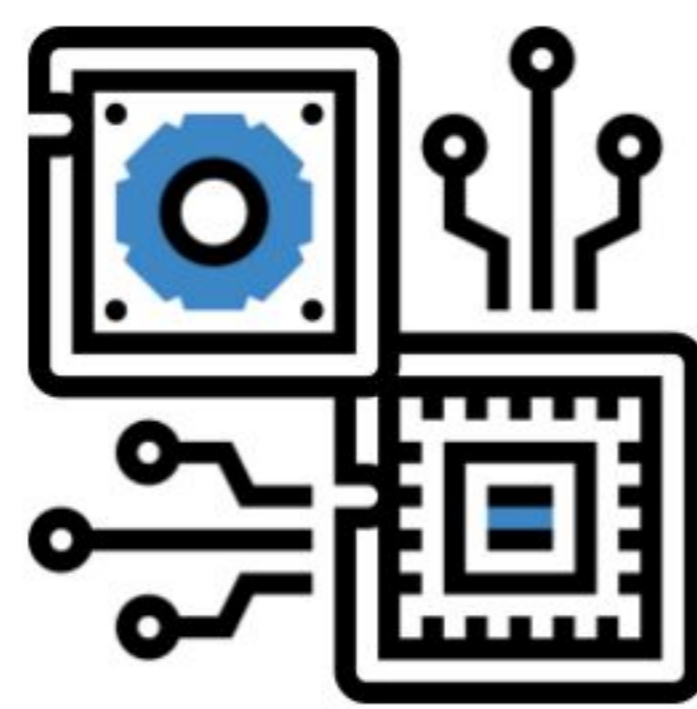
The biggest challenge is the ability to change. And the ability to change is determined by the willingness to change. Many manufacturing companies use monolithic technology and therefore, are unable to adapt to new business models easily. The reluctance to change the software or the unwillingness to change, will ensure they remain the laggards of the industry.

In addition, resources are more difficult to find at the moment. Both in terms of physical goods and services. If you're buying technology to speed up or ramp up for industry 4.0, you have to have the labour force to implement accordingly. If the labour force is not available to you, then you either delay the implementation or you go remote. And some technologies simply cannot be implemented remotely.



In your opinion, what emerging technologies will be needed to secure the new perimeter-less manufacturing operating environment?

First, the API standards. At the hardware level, the components that enable IOT need to conform to single standard APIs. Secondly, they need to ensure those standards are secure, accessible, flexible and scalable. And thirdly, the ability to connect these devices at a local or remote level in a completely seamless and secure way without any compromise in performance.



At the hardware level, the components that enable IOT need to conform to single standard APIs.



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Market View 03

Chandra Shekar

Digital Architecture Lead



According to Manufacturer magazine, almost a third (31%) of manufacturers globally are considered 'Fit for the Future' (FFTF) and better prepared to deal with future challenges. How would you assess a Manufacturer as being FFTF and would you say your organisation is FFTF?

Organisations are a set of capabilities that allow the organisation to manufacture or provide services as long as there are customers to buy them. It's a profitable venture to do. Organisations change and that's because customers' needs change and that requires organisations to repurpose those capabilities to do something different. Therefore, when we're talking about the future, my assumption has always been that it's all about how an organisation is able to repurpose its business capabilities to manufacture whatever is fit for the future and adapt its architecture accordingly.

In my personal opinion, our organisation is definitely fit for the future. We're transforming and changing internally. Sustainability and net zero are big topics that we constantly keep talking about and working on. Our goal is to reimagine energy and be a more sustainable provider of integrated energy solutions for the world moving forward. Ultimately, we need to modernise because there is a clear strategic intent that has been expressed. And it's globally well known, it's in the public domain, that we are going to reimagine energy.

What shape and form might that take? How will it look like in 2026 / 2027? How are we going to consume energy? What kind of role will BP play in that space? How do we ensure we have the capabilities to deliver that all of this point towards one big, very important question, which is that what kind of capabilities we need to run that world? And how does it compare with what we currently do? Which then brings the whole question of our application landscape.

We're listening, we're adapting and this makes me confident in my view that we are definitely fit for the future.



When we're talking about the future, my assumption has always been that it's all about how an organisation is able to repurpose its business capabilities to manufacture whatever is fit for the future and adapt its architecture accordingly.

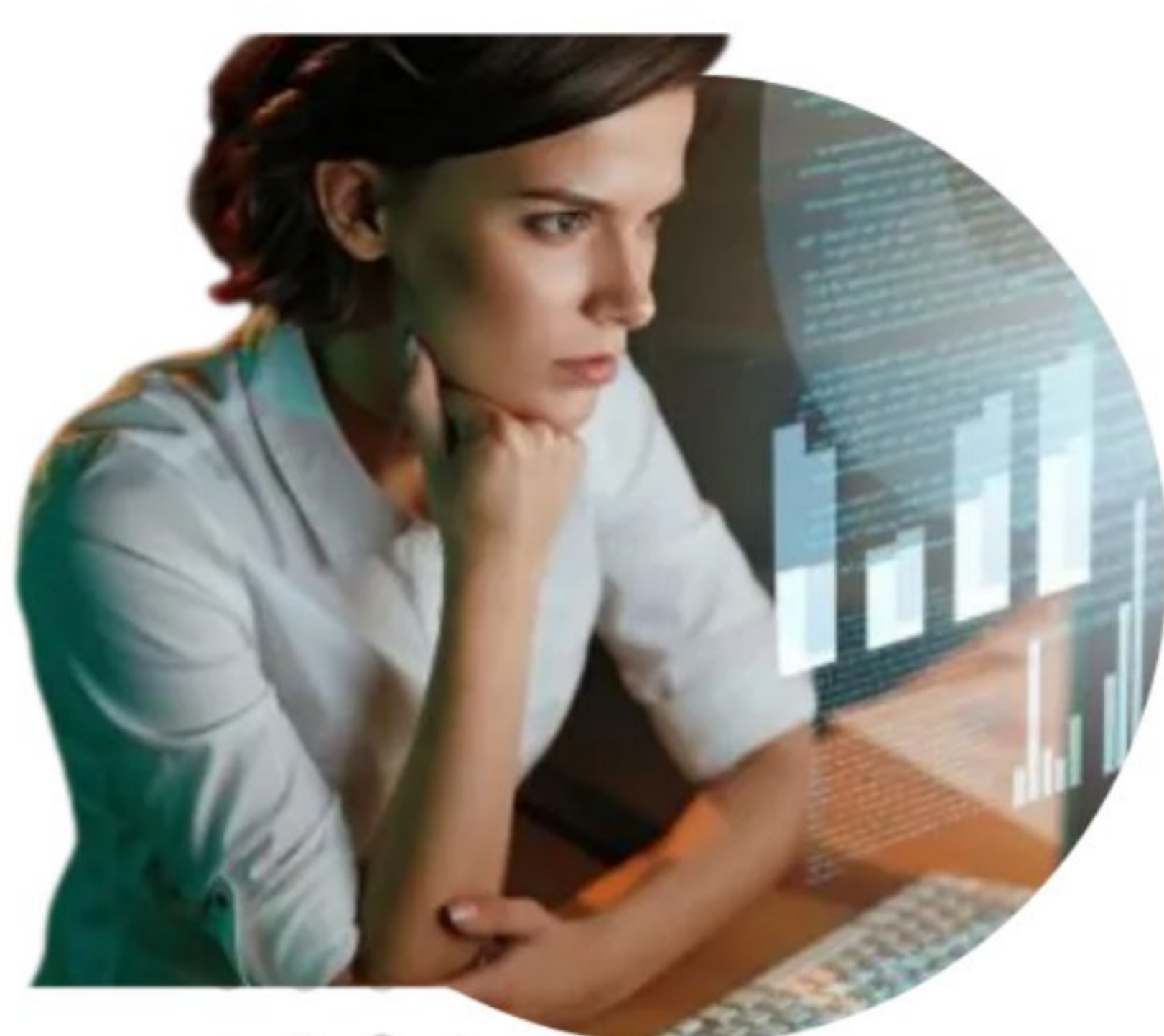
Given that manufacturers are facing challenges in terms of how to implement new technologies against a backdrop of legacy infrastructure, what are your biggest challenges relating to legacy infrastructure when fast-tracking to Industry 4.0?

Every organisation has a legacy infrastructure, and when it comes to implementing new technologies, the main question is what are those legacy systems currently doing? If legacy drives the core elements of manufacturing, they become an essential part of the operating model and are very difficult to change. Therefore, some organisations resort to building layers upon layers to modernise a legacy system rather than replacing it with something genuinely modern and digital.

On top of that, some organisations are culturally more adaptable to change; they can accept disruptions and uncertainties better than others. So, the biggest challenge for legacy system change is the organisation's culture rather than the technology itself.



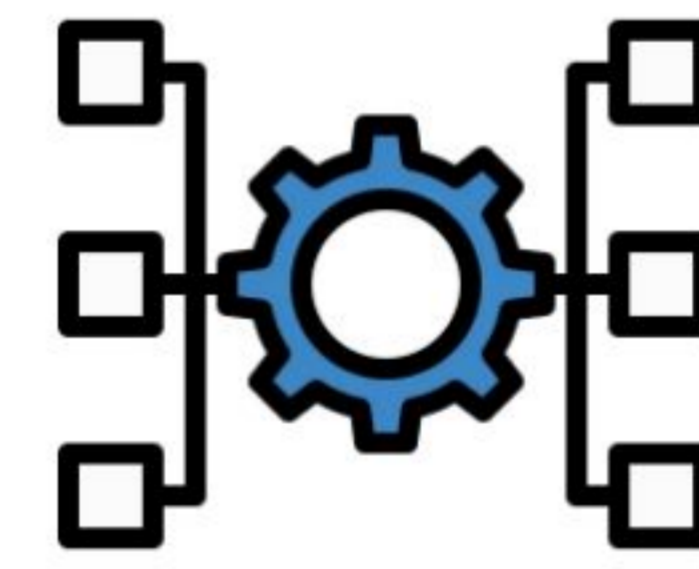
The reality is that when it comes to public versus private, you can carve out your own private and public cloud.



According to Emerald Insight, Manufacturers are expected to face managerial challenges in implementing smart factories and the leading reason is to do with human resistance. What managerial challenges do you foresee ahead as your organisation moves to Industry 4.0, and how will you mitigate these business risks?

Organisations are set up organically over time, and they become information silos. Within those information silos, we have operating models that work to deliver the most optimum outcome. Now, when you change something, it fundamentally upsets many different equations within an organisation: what are the skills we will need in that new environment, how is it different to what we currently know, do we have those skills with us or do we need to partner with other organisations, and so on.

These are all justified concerns, and usually, there'll be a lot of resistance to changing the status quo because the status quo works. When this happens, the camp gets divided into two parts, but the main goal is to drive the best outcome. Accordingly, leadership is critical in all of this. Having clear guidance and direction from the top allows an organisation to embrace change.



Organisations are set up organically over time, and they become information silos.

With industrial IT architectures becoming increasingly more complex with wired and wireless connections needing to integrate together, what network strategies can you share that facilitate acceleration towards a modern smart factory operating model?

As an organisation, we have many networks and applications across Europe, Middle East, Australia, Canada, America, and so on. Essentially, these are all the same strategies just repeated multiple times across the globe. Connecting all of these into one enterprise requires a different kind of network strategy that comes with its own challenges in terms of latency, security and so on. The network strategy is centred around: making it easier and faster to respond, minimising the amount of tech and duplication across the globe, ensuring it is all shared and modular, and being able to repurpose solutions for fast-changing problem contexts. So, essentially it is these types of business questions that drive network strategy for us.



The network strategy is centred around: making it easier and faster to respond, minimising the amount of tech and duplication across the globe, ensuring it is all shared and modular, and being able to repurpose solutions for fast-changing problem contexts.



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Market View 04

Anton Yaskevich

Global OT Infrastructure Architect

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How should manufacturing organizations approach technology transformation in becoming Fit for The Future?

Manufacturers could adopt the best practice learned in the corporate IT world, where many businesses have achieved the necessary degree of security, reliability and performance. This needs to be aligned with the specific needs of manufacturing, which means ensuring the highest security in the production environment, business continuity and strict segregation of data to allow secure visibility of processes.

The pharmaceutical industry is still in this journey and maybe a bit earlier than some, because of the high levels of security and regulatory compliance involved in the sector. The sector is actively building the alignment and the mindset that will be needed to proceed with technology transformation and communicating the benefits of that transformation.



The sector is actively building the alignment and the mindset that will be needed to proceed with technology transformation and communicating the benefits of that transformation.



Manufacturing is not only concerned with the security of data, but also with business continuity.



Will public cloud infrastructure become the de facto platform for digitized processes in manufacturing?

Adopting a hybrid approach that combines private and public cloud in manufacturing sites offers several important benefits. Public cloud providers today probably provide the highest level of security available on the market. When securing manufacturing data in terms of long-term storage and post-processing, it will be the de facto platform of choice.

However, there are specific features in private cloud infrastructure that are highly relevant to manufacturing companies, particularly around bespoke security features and highest degree of availability. Manufacturing is not only concerned with the security of data, but also with business continuity. We must consider the reliability of the connection between data storage and industrial equipment. This connection needs to be secure, but also constantly available. In that scenario, a hybrid approach means we can use a public cloud to store the data securely and private cloud to ensure that connection to real data at machine level is always available and avoid any possible data losses.



How do we begin to secure industry 4.0?

With the adoption of private wireless networks, WiFi 6 and IoT, security and cost will be significant challenges.

On a practical level, organisations could struggle to secure availability to implement the necessary security software. By definition, manufacturing sites need to be producing to deliver revenue and profits, so there is a reluctance to stop. That reluctance must be balanced against an awareness that legacy equipment is often less secure in terms of recent cybersecurity threats, and that poses risk to profitability.

Changes must be made and the priority for those changes should be providing online monitoring and continuous threat detection, so we can monitor all traffic and know where any attempt to access the data has originated.

Security should be based on the principle of exception. Conventional antivirus technology allows access to data unless the request matches a known risk. In our case, we need to take the reverse approach and deny any request outside of clearly defined and specific use cases. Those cases should be the minimum required for successful operation.



Changes must be made and the priority for those changes should be providing online monitoring and continuous threat detection, so we can monitor all traffic and know where any attempt to access the data has originated.



Having the right mindset is critical to the success of transformation, so it's important to plan how the change will be communicated and how we ensure people understand the benefits.



What risks and challenges should leaders in manufacturing be aware of as we move towards industry 4.0?

There is a natural human resistance to unknown future events, and the digitisation of industry is one such event. During the period of transformation, we should expect resistance from employees and managers, due to a fear of loss of control or power in the industrial environment.

Organisations need to plan in advance to mitigate this risk, through clear communication and transparency. Having the right mindset is critical to the success of transformation, so it's important to plan how the change will be communicated and how we ensure people understand the benefits. Ultimately, the company doesn't exist without people, so it's essential that people understand how the technology benefits them, and not just the company. That's how to ensure they support us on the journey.



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Market View 05

Muruganandam Pattamuthu

Network Automation Lead



What are the most compelling use cases for cloud technology in manufacturing, and what is the biggest challenge in delivering that vision?

Cloud plays a critical role in enabling seamless integration between the work of manufacturing and R&D. Without cloud, R&D happens but it can take a month to put together data in a lab, and then move it to the manufacturing site, and then get it into production. With the cloud, this communication can be automated, and it becomes seamless.

Additionally, cloud helps us to bridge the gap between legacy and next-gen development. The ability to deliver big integration and seamless transitions is what will take us to the next level, by providing secure, distributed and scalable connections that eliminate single points of failure and deliver better insight into things like data analytics.

Integration and interoperability is a major challenge within manufacturing because you're dealing with every sort of IT system. We're trying to achieve seamless integration in the cloud between critical legacy devices that can't be replaced and new IoT or SaaS technologies. Doing that in the cloud means we also need to ensure that security is considered and implemented in the right places.



The ability to deliver big integration and seamless transitions is what will take us to the next level, by providing secure, distributed and scalable connections that eliminate single points of failure and deliver better insight into things like data analytics.

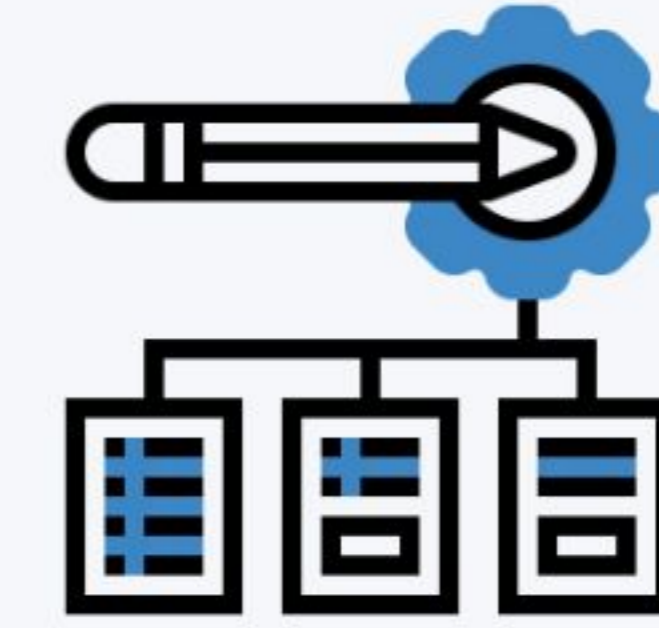


In a hybrid cloud the goal is to protect each connection by having security close to the user, but also ensuring your perimeter is protected.



Manufacturers are increasingly working with complex, hybrid cloud environments – how do they ensure these systems are secure?

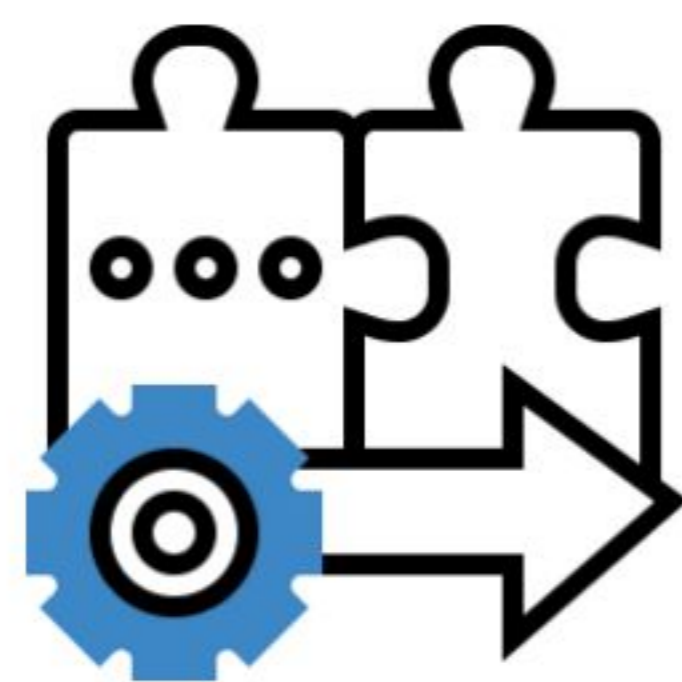
For an R&D organisation, security is the number one question asked of any potential supplier. Always looking for the ability to support the Secure Service Edge framework & Zero trust approach helps to understand what connections need to be protected, and what levels of security needs to be at closer to the source or closer to the user. In a hybrid cloud the goal is to protect each connection by having security close to the user, but also ensuring your perimeter is protected.



What advice would you have for manufacturing organisations at the start of this journey?

Understand your wider strategy and business needs from the start. When deploying cloud infrastructure, you could choose an SDN based on a SaaS model, a dedicated connectivity model for hybrid networking, or even cloud access. The integration and specific features of each approach will differ, and you need to have a clear, consistent process to evaluate providers and understand where the alignment is best.

When a strategy is aligned so that your approach to potential cloud partners is based on the needs of your business, it is easier to deliver value from cloud investment. If you know that your cloud infrastructure might include AWS and Azure and someone else needs Alibaba cloud, then your strategy needs to be flexible and scalable to accommodate those needs. If your strategy isn't aligned it's a block, and when your colleagues look to expand a deployment, it fails.



When a strategy is aligned so that your approach to potential cloud partners is based on the needs of your business, it is easier to deliver value from cloud investment.



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Market View 06

Hubert Suchecki

DATA SCIENCE MANAGER

CRH



Is the manufacturing industry close to achieving Industry 4.0?

In recent years the manufacturing industry has had to focus on the basics of their business to survive the global pandemic, aka manufacturing, selling, and delivering products. As a result, the usual focus has yet to be on process improvement and transformation. But now that we are moving out of the pandemic, the focus has returned to Industry 4.0 as an opportunity to work more efficiently and reduce CO2 emissions. For data and IT teams, this means ensuring that your systems can support businesses through a period of transformation without any risk to data security or day-to-day operations. Of course, if a system isn't suitable for the transformation process, it will need to be upgraded. You also must ensure that you have a team capable of supporting the business through transformation, finding the right balance between experienced, older heads and younger colleagues with fresh ideas. Both bring a lot of value to the transformation process, but too much of either party will lead to an imbalance and reduce the opportunity for process improvement.



We are moving out of the pandemic, the focus has returned to Industry 4.0 as an opportunity to work more efficiently and reduce CO2 emissions.



If you want to improve your manufacturing processes, you must first make sure that you know the process well.



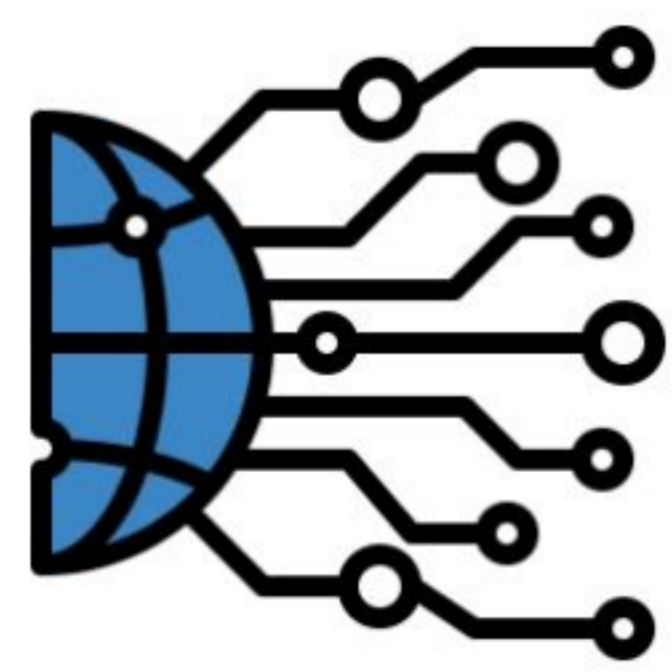
How important is data to process improvement in manufacturing?

If you want to improve your manufacturing processes, you must first make sure that you know the process well. And to know the process really well, you need to have complete visibility of the data surrounding and produced by the process. Where most companies fall down when trying to achieve data visibility is in the infrastructure of their data gathering. It is surprisingly common in many industries to have sensors that need to be fixed, but nobody bothers to fix them because the rest of the process operates normally, and what is being produced gets sold. Suppose you want to find those small opportunities for process improvement that give you an edge on the competition. In that case, you have to ensure that your data infrastructure is working 100% correctly and use the data to identify opportunities for reduced costs, reduced energy usage, and predictive maintenance. It is worth keeping in mind though that these opportunities will not be revolutionary changes. Instead, they will be small percentage improvements. Although they may seem insignificant on their whole, when you make many small percentage improvements, the benefits soon add up.



What opportunities and risks does Industry 4.0 present the manufacturing industry with?

The rise of the internet has had a huge impact on the manufacturing industry, as it has across all industries. As we move into Industry 4.0, the internet is at the heart of every development taking place. Sensors with remote connectivity now allow for data analysis from anywhere in the world, and improvements can be made in near real-time. But the rise of the internet and Industry 4.0 also presents some very unique challenges for manufacturing firms to overcome. Perhaps more than any other industry, manufacturing uses a lot of legacy software and equipment. Some of which were first used before the internet! When they cannot be upgraded to take advantage of the opportunities that the internet brings for smarter working, they simply have to be upgraded. As they are often pivotal parts of the manufacturing process and directly impact a business's sales, upgrading them can be lengthy and costly. But the challenges continue even when internet connectivity has been achieved. Anything connected to the internet is vulnerable to being hacked. In manufacturing, being hacked is highly costly as it can shut your processes down for an extended period. Businesses, therefore, need to invest in their data and IT teams to ensure they are protected against hacking.



The challenges continue even when internet connectivity has been achieved. Anything connected to the internet is vulnerable to being hacked. In manufacturing, being hacked is highly costly as it can shut your processes down for an extended period.

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CRH is the leading building materials business in the world, employing around 71,000 people across 3,200 operating locations in 28 countries. It is the largest building materials business in North America and Europe and also has regional positions in Asia. CRH manufactures and supplies a range of integrated building materials, products and innovative solutions which can be found throughout the built environment, from major public infrastructure projects to commercial buildings and residential structures.

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Market View 07

Ari Rajamaki
Product Manager, Cybersecurity



How can organizations make it easier to implement technologies such as IoT in a complex manufacturing environment?

In reality, it can be very challenging for manufacturers to implement new technologies such as IoT if they have diverse systems in a multi-vendor environment with legacy and new applications.

This isn't challenging for only technical reasons. In many organizations there are corporate policies that exist around IT infrastructure and personnel. These policies often do not consider or fully extend into the manufacturing environment. Before implementing IoT we need to understand what policies are needed and who should take ownership of those policies.

We need people who understand the specific cyber-security risks when IoT is implemented and if you don't have those people in the manufacturing area then it will be difficult to move forward and be confident that we're doing things in a secure way.



In reality, it can be very challenging for manufacturers to implement new technologies such as IoT if they have diverse systems in a multi-vendor environment with legacy and new applications.



The technologies that will be critical in delivering this protection include proxy connections, firewalls, IPS functionality and perhaps even using data diodes to entirely isolate critical parts of the infrastructure.



Today's organizations are increasingly working with multiple cloud providers, platforms and networks. How do you suggest securing those complex perimeters?

Before we think about deployment of new technologies, we absolutely still need a lot of perimeters. With the emergency of Edge, IoT and connected devices there are many more entry points to the manufacturing network that organizations must secure. My recommended strategy is zoning and segmentation. By segmenting these devices and technologies into different networks, you can protect them in different ways.

Where data is hosted in the cloud, privilege and access management is important and useful, but we should also be limiting and really segmenting IoT devices in the manufacturing area to limit unauthorized use and risk from those devices. The technologies that will be critical in delivering this protection include proxy connections, firewalls, IPS functionality and perhaps even using data diodes to entirely isolate critical parts of the infrastructure. This means you only allow one-way communication in those very sensitive areas.

With the public cloud, information security is baked in as part of the license, but if organisations are using private cloud, then there may be a need to develop additional security protections. Private clouds tend to support highly confidential data and when you are talking about intellectual property, you may need to have a private cloud and implement appropriate security, while keeping that data on your premises.



What advice would you offer to organizations looking to utilize cloud technology in manufacturing while retaining appropriate data security?

Your organization certainly has some information security management policies in place, when you start to consider adding cloud infrastructure. Before selecting tools and suppliers, it's important to consider what additional cybersecurity risk you are introducing. With a single or multi-cloud environment, what is the business risk, do we have a full risk assessment? This information is critical in choosing the best technology supplier, and also understanding what countermeasures and additional security may be needed.

First, know what you need to protect. Second, select the right technologies, and third, implement the technology and continue to monitor and improve processes around cloud services and information security.



First, know what you need to protect. Second, select the right technologies, and third, implement the technology and continue to monitor and improve processes around cloud services and information security.



Valmet is a leading global developer and supplier of process technologies, automation and services for the pulp, paper and energy industries. The company has over 220 years of industrial history and a strong track record in continuous improvement and renewal. In 2022, a major milestone was achieved, when flow control company Neles was merged into Valmet. The combined company net sales in 2021 was approximately EUR 4.5 billion based on the respective company figures.

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Market View 08

Andreas Eisner
Chief Information Officer

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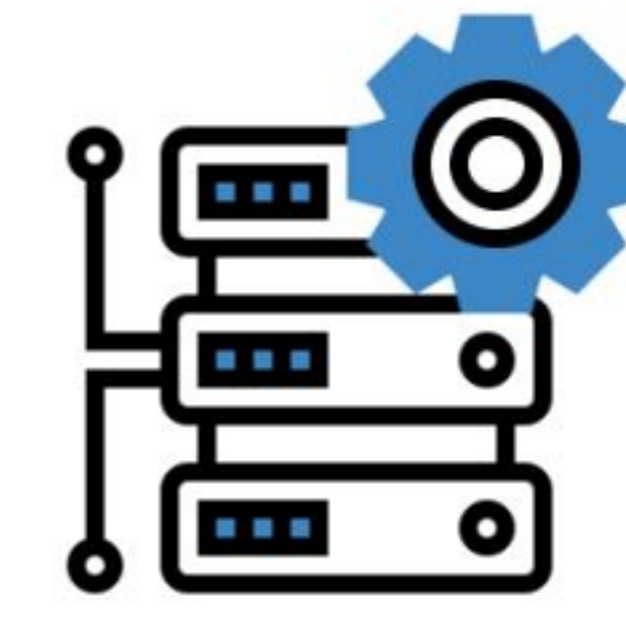


What are the hallmarks of a successful strategy for complex, multi-cloud environments?

When we talk about the multi-cloud environment what we are ultimately talking about is multiple layers. There might be a layer where you have basic infrastructure services, and where we compute the storage database. Above that might be a second layer for collaboration services, such as email, chat or document management. The third layer could be business services, and so on.

Rather than having a strategy for your multi-cloud infrastructure, manufacturers actually need a clear and distinct strategy for each layer. There is no such thing as one size fits all, and it's important to remember that when planning the deployment and use of cloud technologies.

The set-up of your private cloud on-premise is not the same as the set-up of your public cloud with hyperscalers, or your Edge computing set-ups. All of these layers need to be balanced carefully and planned separately.



Rather than having a strategy for your multi-cloud infrastructure, manufacturers actually need a clear and distinct strategy for each layer.

What excites you most about the potential use of cloud in manufacturing?

Electronic design automation (EDA) is one of the most exciting potential applications of cloud technology today. Although it is still in the early stages, EDA has the potential to make the process of designing chip circuits in applications like Cascade faster and more efficient.

EDA helps teams to manage workflow when building integrated circuits, and it helps us to plan what computing power will be needed. When building new chip circuits, you might have a base load of 20 or 30%, followed by a period of weeks or months of very high peak load. EDA helps us to plan for those peaks and troughs, and then to scale up or down resources very quickly, in a cloud or hybrid environment.

That ability to predict and then respond quickly is hugely important in enabling us to hit deadlines and meet budget requirements during development. It is still relatively cutting-edge and I'm extremely proud to have implemented this technology.



Electronic design automation (EDA) is one of the most exciting potential applications of cloud technology today. Although it is still in the early stages, EDA has the potential to make the process of designing chip circuits in applications like Cascade faster and more efficient.



What do you think are the biggest challenges to cloud deployment in the manufacturing sector?

At least 95% of leaders within manufacturing companies would recognise the scenario of having legacy equipment and machinery that is critical, but which cannot connect to the cloud.

In the manufacturing sector, legacy equipment might have been built in the era of Windows 2000 or Windows XP. Companies are unlikely to receive support from Microsoft to upgrade or update these systems, meaning they are not being moved on or developed. Such machines use outdated connection protocols such as SMB-1 that makes them unsuitable to connect to the cloud. They might not even connect reliably to the Internet, if a factory is in a remote desert or factory location.

This is a common scenario across the entire industry. When factories are implementing new systems like IoT then cloud is the logical first choice. However, for older systems, we need to remember that they may not be able to connect directly to the cloud. Instead, you might need to consider how the MES code inside such machines can be amended to send data to another system that is cloud ready, while being aware of the risk of introducing unnecessary latency. That is probably the biggest stumbling block to cloud adoption, because the equipment simply isn't cloud ready.



At least 95% of leaders within manufacturing companies would recognise the scenario of having legacy equipment and machinery that is critical, but which cannot connect to the cloud.

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Teka Group is a one of the world's leading companies in kitchen appliances and bath solutions. Founded in Germany in 1924, for over 70 years, Teka Group has been working on elegant, innovative and useful solutions for the home. Nowadays, the company has 15 factories in Europe, America and Asia, and commercializes its products in 116 countries.

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Market View 09

Javier Carpio
IT HEAD, HEAD OF REGIONAL NETWORK AND COMMUNICATIONS



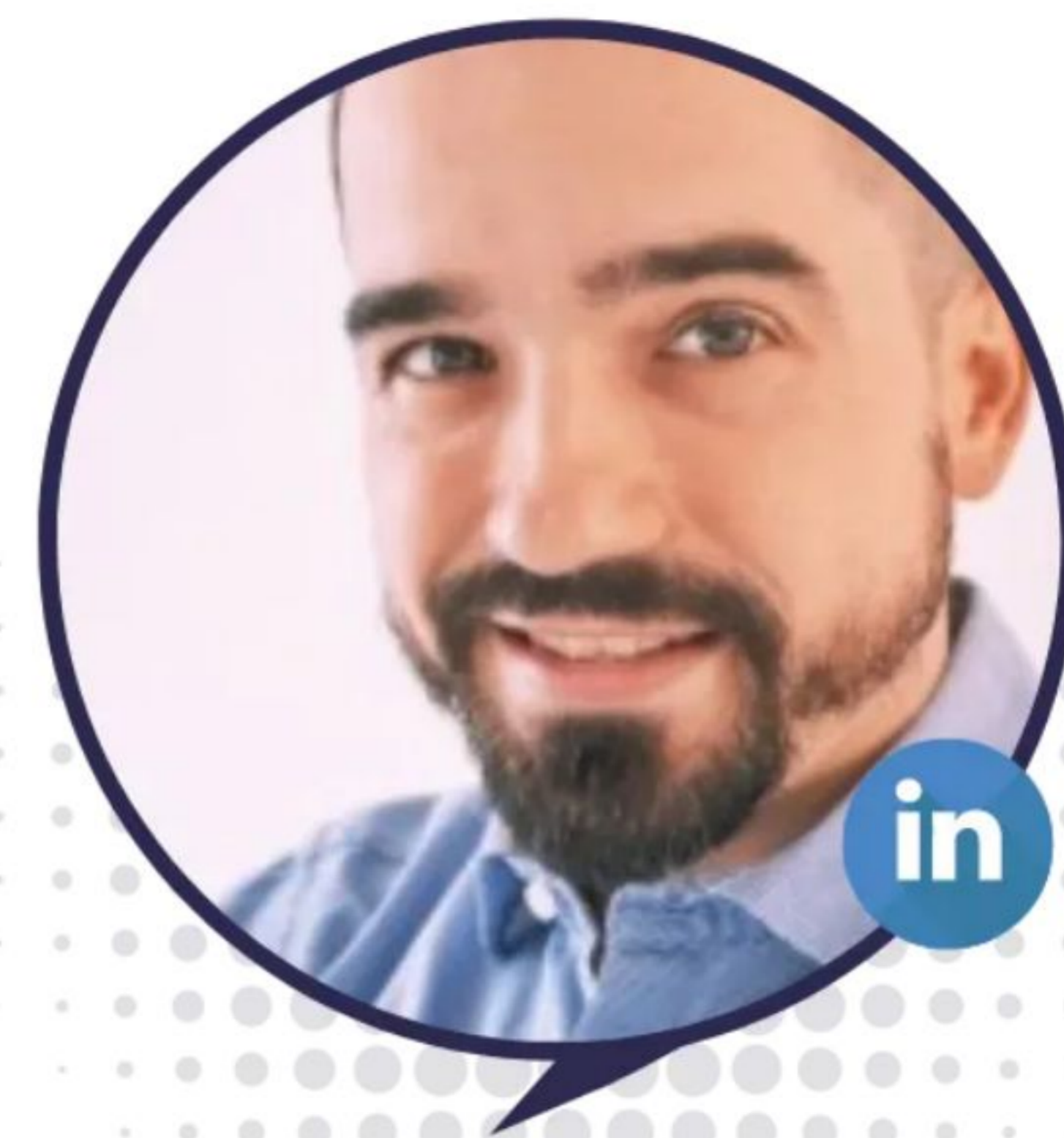
How do you approach the challenge of showing the benefit of Industry 4.0 to the wider organization?

In manufacturing today, the motto must be 'go digital or go home' but that doesn't mean there aren't significant challenges.

The largest of those challenges is demonstrating the value of innovation and securing investment because the ROI of the digital solutions isn't quick"

The construction sector has a different rhythm to the IT department. While IT infrastructure may be renewed every few years, that isn't the case in manufacturing where critical technology can be in place for decades. In the cement industry, investment and moving away from legacy platforms is a long-term undertaking.

We need to position this necessary investment as a long-term strategy to deliver an organization that is Fit for the Future. This means investing in new infrastructure now so that we are ready for future technologies as they become available. We also need to change the mindset so that we aren't calculating potential return on investment over short periods. It's a huge challenge to explain that to the wider organization and ensure we have the budget resource to make these investments and deliver value over the longer term.



The largest of those challenges is demonstrating the value of innovation and securing investment because we are operating in an industry where ROI isn't quick.



We provide local offices with guidelines for buying services that outline minimum requirements and we try to go for Tier 1 providers where available.



How do you approach the issue of increasing demand for network services on the Industry 4.0 journey?

In construction, organizations often need to open and close sites quickly around construction projects. We had a traditional MPLS environment and sometimes our providers didn't have the speed and flexibility we needed in every location. Additionally, our internal customers wanted the ability to negotiate locally for Internet lines.

Three years ago, we moved to a different model using SD-WAN. We tested the model in several countries with positive results, and we now operate entirely on SD-WAN. The change has been very successful because we are no longer responsible for negotiating with local ISPs and services, that is done by each office.

The underlay isn't critical to our success, we really only care that it's working or not. What is important is that we control the overlay, which is the SD-WAN. There were some doubts in the initial stages, but the model is working well. We provide local offices with guidelines for buying services that outline minimum requirements and we try to go for Tier 1 providers where available.

The Internet supports our internal applications and platinum services such as ERP, which need to run to sell our products. Our availability has increased since moving to SD-WAN, and it is significantly more cost effective and with higher bandwidth because we are providing it internally.



How will emerging technologies help you to protect and secure a perimeterless organization?

Network perimeters are increasingly blurred which makes it difficult for companies to know where security is needed and best utilized.

The strategy that makes most sense is zero trust. You close everything and only open when you can be sure who the user is, and what they are trying to achieve. The technology that delivers that is SASE. We have a mobile workforce with their own devices, and they want to connect from anywhere, so any other approach is impossible. Zero trust is the only option.

For many years we believed that if you have something on premise, it will be more secured. Nowadays cloud providers have the best resources to provide security to the cloud.

After the pandemic we had to move faster but we are trying to be proactive in bringing in new technologies to support mobile workers with anywhere access and multiple devices. Our strategy is to use classic, trusted platforms rather than accelerating at a time when we are not 100% confident that the solution is secure. Our priority in this industry is to provide solutions without elevating risk.



With cloud platforms there was a view for many years that if we own something, we can secure it.



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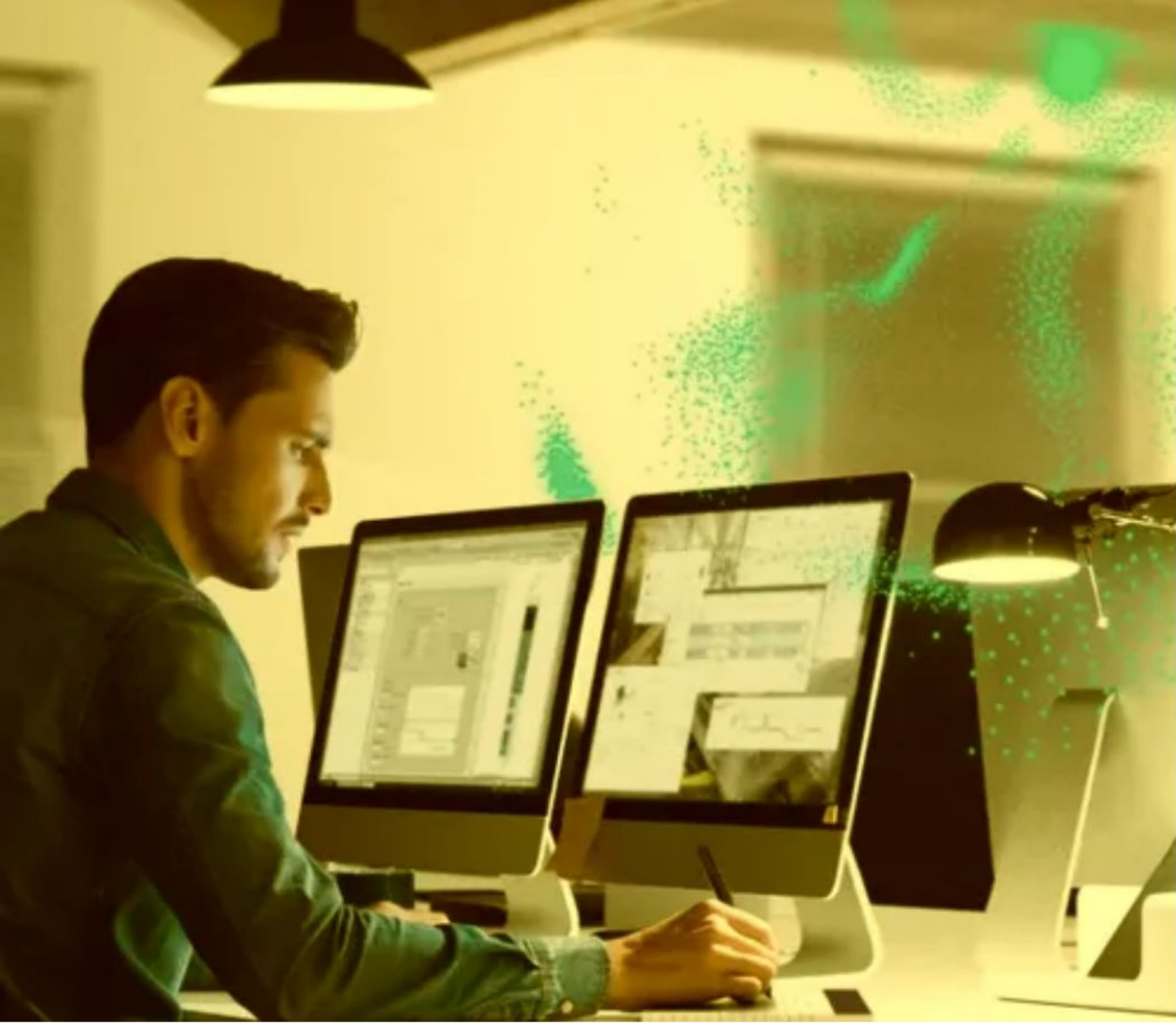
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Market View 10

Carlos Raul Maldonado

Deputy CISO

SIEMENS

How important is the 'human factor' within cyber security?

When talking about cyber security, be mindful not to just focus on the technical skills; make sure that you also consider the human skills. If your team is not motivated and proactive, then it does not matter how good their technical skills are - you are at risk of cyber attack from negligence. IT leaders need to understand how to mentor and nurture their teams, so that their skill set is constantly developing. This is one of the most efficient and valuable ways to keep an employee engaged. Alongside keeping your team motivated, it's important to keep them accountable too by setting the right KPIs. KPIs also create clear expectations across the team.

Another human factor to consider is that when implementing new security measures, take the time to speak with your colleagues to explain what is being implemented and why it is important. You'll be pleasantly surprised by the reactions and the appreciation that is shown as a result. As a bonus, it also makes colleagues more receptive to regular password changes when they feel informed on the wider security strategy!



IT leaders need to understand how to mentor and nurture their teams, so that their skill set is constantly developing.



Businesses are increasingly adopting digitalisation strategies to help provide new services for their customers and to lower overall operating costs.



What does a successful digitalisation strategy look like?

Businesses are increasingly adopting digitalisation strategies to help provide new services for their customers and to lower overall operating costs. To successfully design and implement a digitalisation strategy requires several things. The first is that senior leaders in the business need to have an open mind and positive attitude to the transformation. If a leader believes that their current systems are working fine and that nothing needs to change, then they will act as a blocker within the change process. Senior leaders also need to manage expectations across the business on how long the process will take and how much investment will be required. The best and most realistic digitalisation strategies are measured in years, not months. The second consideration is pillar technology management. IT and cyber security should now be major parts of a business' strategy. As technology becomes more complex and has an ever-growing demand, creating a constant stream of new products and services. IT teams need to be fully aware of the threats that these new technologies might bring and ensure they have the knowledge to quickly tackle any threats that may arise. Finally, make sure that you have the right team in place to handle any cyber threats that digitalisation may bring.



How can companies manage customers with legacy products?

It's no secret that innovation and offering new products and services is the best way to build a successful company. But if your customers become too used to a certain product or service, particularly if they have been using it for a long time, then it can be tricky to move them away from your legacy offering to a newer one. Even if the newer offerings are more secure, or offer a greater number of benefits, if a customer is resistant to change then it can cause problems to continue supporting them. To overcome this, vendors need to communicate with customers as early on as possible, in a way that is easy to understand, about any upcoming changes. If a customer knows exactly what is going to change and how you are going to support them through this change, then they are far more likely to agree to the change. Although this may require some time investment, it is time well spent when compared to the cost of losing a customer.



Vendors need to communicate with customers as early on as possible, in a way that is easy to understand, about any upcoming changes.

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Market View 11

Miroslav Jascur

Pharma Architecture Director



What is the most important tip you would offer to organizations trying to develop a multi-cloud strategy?

Organizations should focus on the business process before the technology for three key reasons:

- First, in most manufacturing sites, it is easier to rethink technology than process.
- Second, when you change technology, it can change the process, and you need to plan for that possibility.
- Finally, you may find that a business process is inextricably linked to something that is run on-premise, so it can't be moved into the cloud.

We won't be moving everything to the cloud in the next month or even the next year because this strategy takes time. When you take a process-first approach, you will likely end up with a backlog of processes to be checked.

There are scenarios where it definitely makes sense to move to the cloud, where native applications can be dissolved and built back up a public cloud environment. These decisions and priorities should be set by the application owners as part of their innovation cycle, and not the infrastructure team.



There are scenarios where it definitely makes sense to move to the cloud, where native applications can be dissolved and built back up a public cloud environment.

How can manufacturers meet security requirements while supporting the needs of a mobile workforce across the factory, corporate and home environments?

What we are seeing across the industry is a change in the approach to security and mobile workers. The conflict in Ukraine means that many manufacturers are taking a more cautious approach to Internet connectivity for remote access, and looking at alternatives to the cloud, and open, internet-based access.

The industry was beginning to look at security solutions such as cloud proxy, but these new technologies are less popular in light of the war. Organizations are looking at older technology such as VPNs rather than allowing employees to access resources directly from an Internet connection and cloud environment. Many companies are concerned about potential security threats and attacks by hackers, so the strategy is to make doors into the network as small as possible.



Organizations are looking at older technology such as VPNs rather than allowing employees to access resources directly from an Internet connection and cloud environment.



How should we view the relative security of public versus private cloud infrastructure?

We use public cloud infrastructure, and our corporate security team has certified public cloud platforms for hosting even the most sensitive data, because we have all relevant safety features enabled. I think public cloud providers now offer a level of security that means there is no significant difference in the security offered by private versus public platforms.

This does not mean there isn't a difference between public and private cloud. We have certainly found that adding full security features to the public cloud means taking a hit on performance and cost.



We have certainly found that adding full security features to the public cloud means taking a hit on performance and cost.

Would you agree that a multi-cloud architecture is important to enable IoT deployments and other Industry 4.0 concepts?

We have investigated the options and we have come to the conclusion that it is important but it's unlikely to be fast, or straightforward.

One of the key challenges for the manufacturing industry is that public cloud providers aren't using standardized services, so it is hard to move data and workload between providers. It would require an additional layer of standardization on top of the public cloud.

It is challenging to get good connectivity to on-premise sites, which impacts response times. If we're using a local database on-premise that needs to be really fast, we have struggled to get the right service from a public cloud provider. The challenge is getting the right response times and availability in the regions where our manufacturing sites are located.



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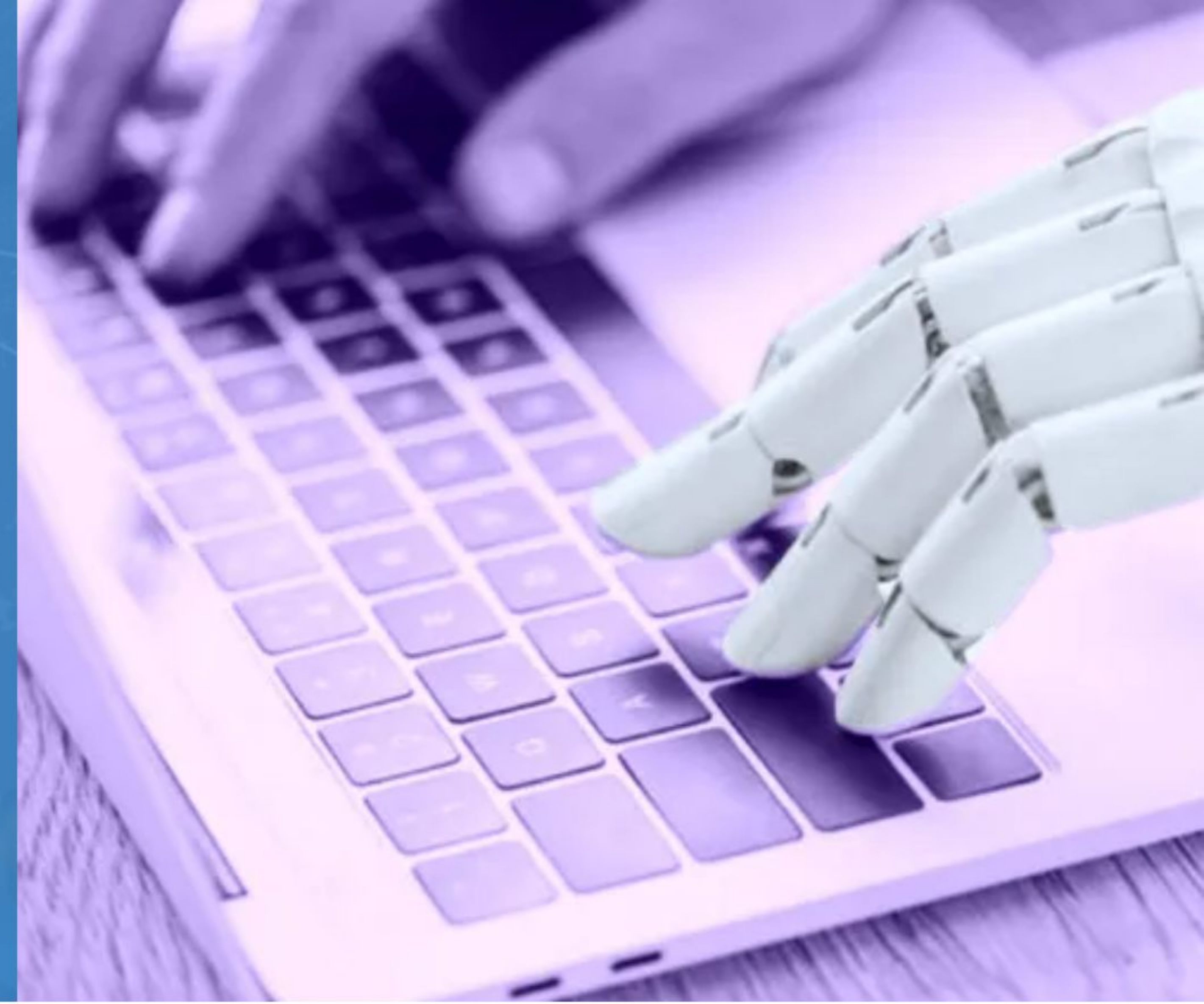
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Market View 12

Andres Prieto Anton

Experience Senior Manufacturing Infrastructure



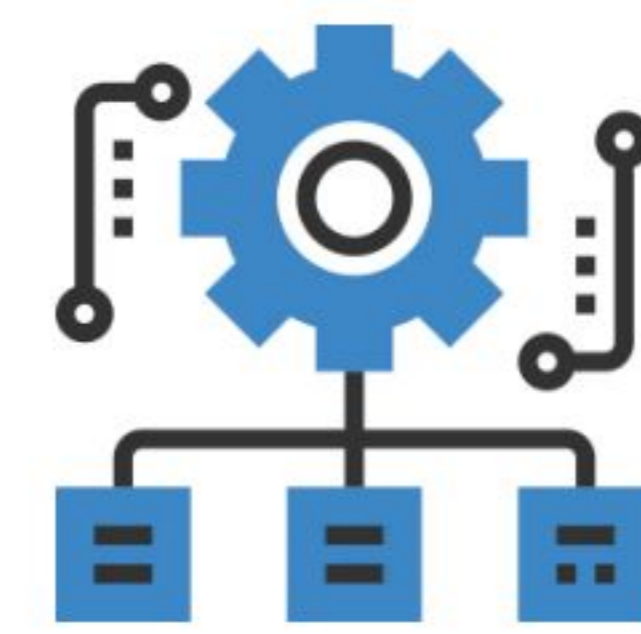
Are manufacturing businesses ready for digital transformation?

Many manufacturing sites are on islands and isolated systems, which presents an important challenge when preparing for the new digital age that we have started to enter. If they don't have the infrastructure and security protocols required to empower seamless digital transformation, then they are at considerable risk of being left behind. This can require 'fresh thinking', as many manufacturing companies are in the habit of upgrading their machinery and have previously prioritised this over infrastructure investment.

This doesn't just apply to existing manufacturing sites, any nation that wants to conduct business on a global scale, regardless of industry, needs to make sure that they have the robust infrastructure their businesses require.



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What challenges do manufacturers face with the arrival of Industry 4.0?

Whilst Industry 4.0 will bring tremendous opportunities and is an exciting time for manufacturing businesses. However, getting there will take significant investment. There is the infrastructure investment we spoke about before, but investment will also be required to connect legacy machinery with modern networks. Many legacy systems, if they were connected at all, were often done so on their own networks with custom security settings.

Therefore businesses will need to find the right connectors and upgrades to allow the machinery to connect globally. If the machinery has never been connected before, then this becomes slightly trickier. It's not uncommon for the original vendor of that machine to have gone out of business, so no support is available when upgrading the machine. This can be particularly frustrating as the operating systems on legacy machines simply don't talk to modern systems. And then if you can successfully upgrade the machine, there is a lot of paperwork to complete when making sure it is secure to connect with modern networks.



Businesses will need to find the right connectors and upgrades to allow the machinery to connect globally.



It is now appropriate to move many operational parts of your business, such as maintenance or mobility, to run on wireless networks. But anything related to the production system should still have a wired connection for maximum reliability and to minimise downtime.

Is wireless technology a 'holy grail' for manufacturers?

The rise of wireless communication technologies, including 5G and WiFi, are a hugely exciting opportunity to connect remote corners of the world with fast, reliable networks. In a manufacturing setting, it is now appropriate to move many operational parts of your business, such as maintenance or mobility, to run on wireless networks. But anything related to the production system should still have a wired connection for maximum reliability and to minimise downtime. To make sure this is achieved in a secure way, you should have complete data visibility of the data flows within your factory. Keeping control of your data by ensuring external vendors use your networks is also important because otherwise, if they were to go out of business then you would simply lose all of that data. Businesses sending out data to external organisations that they have no control over is surprisingly common, sadly. When engaging with a new vendor make sure it is clear what data is transferred, both actively and passively, and also the governance surrounding this data - how can you be 100% confident that it is secure? What are your rights for data deletion? Can I access or download the data that you have gathered from our systems? These are big questions, but important ones to get right because the consequences of lost or stolen data can have a considerable negative impact on businesses.



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A long-exposure photograph of a road at night, showing vibrant light trails in white, yellow, and blue. The road curves through a dark landscape, with the light trails creating a sense of motion and depth. The background is a dark, textured wall, possibly a tunnel or a large building.

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A part of the Tata Group, Tata Communications is a global digital ecosystem enabler powering today's fast-growing digital economy in more than 190 countries and territories. Leading with trust, it enables digital transformation of enterprises globally with collaboration and connected solutions, core and next-gen connectivity, cloud hosting and security solutions and media services.

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