Mind the Gap: The Step from Digital Supply Chain to Digital Supply Network

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Supply chains are heading for drastic change... are you ready?

The rate of change we can expect is debatable but during the next decade the term supply networks will become very familiar as digital technology transforms the way supply chains function. Today's digital supply chains will be seen as an intermediate stage between the traditional supply chain and third generation supply networks embedded in a fully digitised industrial new age, which most of us are now coming to know as Industry 4.0 or the Fourth Industrial Revolution.

Commentators on the gathering force of digital proliferation have generated a barrage of buzzwords and 'what if?' scenarios that are, understandably, confusing. Yet manufacturers need to see through this –to understand clearly where they stand in terms of digital supply chain technology, to discern where investment in technology will deliver the most strategic benefit and to plan accordingly.

> ***For the unprepared, the growth of digital supply networks will pose a real threat, while for others it will present a winning opportunity.***

This ebook explains in layman's terms what is meant by a digital supply chain, where the technology has come from and how it is heading towards the digital supply network (although the word 'digital' will likely become assumed). More importantly, it aims to provide a clearer window on its implications for UK industry, pointing out the key areas on which manufacturing supply chain managers should focus their attention.

Currently, a digital supply chain comprises the same basic elements that have existed since organised commerce began. In a left-to-right, linear sequence these are plan, source, make and deliver. Others may be included, e.g. develop, return, support, but the point is they are discrete, sequentially linked operations. Activity in a supply chain element depends on information coming from another element in the sequence.

Almost every modern manufacturer's supply chain may be described to some extent as a digital supply chain, as companies by now have digital technology involved in one or more of these elements. In the best examples, every section of the chain uses digital technology to enhance operational performance and those manufacturers have engaged with Enterprise Resource Planning (ERP) systems to process and harness the data produced. Nevertheless, supply chains are incredibly complex and no manufacturer yet operates a supply chain that is fully digitised, with end-to-end visibility and operating in a dynamic network, but the day is fast approaching when everything we do will be driven by technology.

In this document we will explore a series of topics that we consider crucial for getting to grips with current digital supply chains and planning to bridge the gap between present-day systems and future supply networks. These are:

- **The makeup of digital supply chains and how they are poised to develop in relation to Industry 4.0**
- **How ERP is now coming of age and providing much of the foundational framework for smart and connected factories.**
- **Robotisation, automation and AI – the positive and negative impacts.**
- **Cloud based technologies – a summary of the advantages and disadvantages of on-site versus cloud technologies.**
- **Benchmarking – looking at your current position in relation to digital supply chain.**
- **Disruptive digital technology.**
- **Technology Readiness Level –TRL, a structured approach to assessing new and emerging technologies.**
- **Fully digitised supply networks – the future of digital supply chains, enabled by digitisation,The Cloud and Big Data.**

Chapter 1: What is a Digital Supply Chain?

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What is a Digital Supply Chain?

The general conception of the term digital supply chain (DSC) has shifted in recent years. It was originally coined to describe systems by which physical goods, such as music recordings and books, had become deliverable in digital form, in particular, over the internet. In essence this only described the diversification of products and services from 'analogue' to digital.

But this technology disrupted the conventional marketplace so much - by stripping out time, distance and cost in bringing products to market - that DSC quickly became a buzzword, obscured by hype and vulnerable to inconsistent interpretation. Even now there is disagreement – whether DSC describes where we are today with supply chain technology, or whether it should be reserved for supply chains we are yet to construct.

It is generally accepted though, that DSC applies to a broader range of supply chain models, including B2B production and distribution of products and services. The fact that companies are already using digital technology to their advantage in managing supply chain activities suggests that modern supply chains warrant the description DSC.

A digital supply chain is the key to the successful operation of every company that manufactures or distributes products. For many companies the supply chain constitutes the business itself. It links business management with the chain participants — the suppliers of raw materials and parts, the production process itself, storage providers and distributors of finished products, and finally the customer.

There is another factor lending support to the definition of modern supply chains as DSCs. A combination of converging technologies and customer pressure is giving rise to a very different, new wave supply chain requiring a new terminology – the supply network. In a fully digitised ecosystem, these third generation networks will be intrinsically digital, rendering the digital description redundant.

Managing the Digital Supply Chain

The Council of Supply Chain Management Professionals defines supply chain management (SCM) as follows:

"Supply Chain Management encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and all logistics management activities. Importantly, it also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third-party service providers, and customers. In essence, supply chain management integrates supply and demand management within and across companies. Supply Chain Management is an integrating function with primary responsibility for linking major business functions and business processes within and across companies into a cohesive and high-performing business model. It includes all of the logistics management activities noted above, as well as manufacturing operations, and it drives coordination of processes and activities with and across marketing, sales, product design, finance and information technology."

The fundamentals of supply chain management (SCM) lie in managing the interrelationship of all business elements in the chain. Key business processes are integrated in a way that adds value for customers and other stakeholders in terms of products, services and information. With a strong supply chain framework in place there is a sharing of data both upstream (with suppliers) and downstream (with customers) delivering benefits that include:

- **Improving time to market for products**
- **Cost reductions across different business functions**
- **Allowing all parties in the supply chain to better manage resources**
- **Better planning for future needs**
- **A better customer retention record**

It is evident why it is so important for companies the get digital supply chain right: when a strong supply chain model is supported by the best technology it renders companies resilient to change in the supply chain.

This contributes to overall organisational resilience, which is vital in uncertain economic conditions, such as those we are currently facing. It also enables companies to be flexible and adaptable to respond to different market conditions, supporting growth potential and opportunities for manufacturers and the supply chain as a whole.

ERP systems enable strong supply chain models to function. Trends towards servitization, where businesses add value to their product offering through additional services, such as aftercare, were made possible by linking the necessary business functions within the chain.

More recent trends - including the circular economy which focused on regeneration and recyclability of materials, components and products - are similarly enhanced by efficient data sharing throughout the supply chain network.

The advent of Industry 4.0, Smart and Connected factories, supported by the Internet of Things, now emphasises the need to take a fully integrated approach to the supply chain, using ever more powerful technology.

Eight Key Business Processes

Looking at some of the component business processes within a supply chain, we can see how best-of-breed ERP systems offer a platform for digital supply chain integration:

1. **Customer relationship management:**

   creates a structure for developing and maintaining relationships with customers. Individual customers or groups are identified, based on their value over time, and their loyalty can be enhanced by providing tailored products and services. Cross-functional customer teams develop Product and Service Agreements (PSAs) to meet the needs of key accounts and for segments of other customers. They also work with key customers to improve processes and eliminate demand variability and non-value added activities. Performance reports are designed to measure the profitability of individual customers as well as the financial impact on the customer.

   Software solutions enable companies to collect, maintain and manipulate a rich, customer-related database to promote increasing revenue and profitability. Sales, distribution and reporting solutions also support the CRM process.

2. **Supplier relationship management:**

   defines how a company interacts with its suppliers. As in the case of customer relationship management, a company will form close relationships with some of its suppliers, while others are less closely cultivated. Good supplier relationship management involves devising the right PSAs and managing them well, so that the company and its suppliers continue to benefit from the most favourable trading arrangements.

3. **Customer service management:**

   operates at the customer interface. It provides the key point of contact for administering the PSA and can give the customer information on orders, shipping dates and product availability. Manufacturing and logistics ERP modules supply the data required by customer service management.

4. **Demand management:**

   allows a company to be proactive in matching supply to demand. The process includes forecasting and synchronisation of supply and demand, in order to increase flexibility and reduce demand variability. The process should employ customer intelligence, historical sales information and planned marketing efforts to forecast and influence demand.

5. **The order fulfilment:**

process involves more than just filling orders. It encompasses all activities deemed necessary to define customer requirement and to design a process that allows a company to meet customer requests, while minimising the total delivered cost. This is not just the logistics function, but instead needs to be implemented cross-functionally and with the coordination of key suppliers and customers. The objective is to develop a seamless process from the supplier to the organisation and to its various customer segments

6. **Manufacturing flow management:**

includes all the activities necessary to move goods through production and to obtain, implement and manage manufacturing flexibility in the supply chain. Manufacturing flexibility reflects the ability to make a wide variety of products at an appropriate rate and at lowest possible cost. To achieve the desired level of manufacturing flexibility, planning and execution must extend beyond the production site to encompass the entire supply chain.

Managing manufacturing flow clearly requires an element of manpower planning and, as such, some software providers have developed human resources modules which integrate with the ERP system to facilitate this planning.

7. **Product development and commercialisation:**

provides the structure for developing and bringing products to market in unison with customers and suppliers. The product development and commercialisation process team must coordinate with customer relationship management to identify customer articulated and unarticulated needs; select materials and suppliers in conjunction with the supplier relationship management process; and develop production technology that integrates seamlessly into the end to end supply chain.

8. **Returns management:**

is the SCM process by which activities associated with product returns, reverse logistics, gatekeeping and avoidance are managed within the company/business and across key members of the supply chain. The correct implementation of this process enables management not only to manage the reverse product flow efficiently, but also to identify opportunities to reduce unwanted returns and to control reusable assets such as containers. Effective returns management is an important link between marketing and logistics, offering an opportunity to gain competitive advantage.

Chapter 2: Navigating the Technology Landscape

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Industry 4.0 - A Brief Overview

To say that digitisation is bringing about a fourth industrial revolution may be an overstatement. After all, we are already in a digital age characterised by electronics, IT and automation. Whether you see it as a revolution or evolution, 'Industry 4.0' describes a distinct phase in manufacturing arising from the confluence of many digital technologies - some already adopted by industry and some not yet ready to be implemented.

These disruptive digital technologies include big data and advanced data analytics, the Cloud, 3D printing, the Internet of Things, augmented reality, and advanced robotics. They are introducing change in business models, based on the digitisation of products and services and each of the links in the manufacturing value chain. In an age of connected and collaborative manufacturing, Industry 4.0 sees technology applications connecting with machines and people on the shopfloor. The goal is to achieve seamless supply chain automation from the moment a sales enquiry is recorded, right through to the final despatch of a product, and even field service performance monitoring.

Industry 4.0 will witness the creation of smart and intelligent factories, where cyber physical systems monitor physical processes, creating virtual copies of the physical world to make decentralised decisions. They will connect and communicate with each other and humans in real time over the Internet of Things, providing instant business critical data, which can be used to make more immediate and effective decisions across the digital supply chain.

Enterprise Resource Planning

Enterprise Resource Planning is coming of age and has an increasingly important role in Industry 4.0, particularly as ERP technology has created a foundation for smart and connected factories, forming the backbone of business management and security.

The technology enables strong supply chain models to function, helping businesses integrate the value chain, better understand customers, enhance automation, become more responsive, and facilitate a transformation to factories of the future.

As early as the 1960s, software was coming into use for very specific applications, such as automating laborious financial computations. Materials Resource Planning (MRP I) systems were later developed for inventory control, linked to production schedules. They evolved into MRP II systems, which could optimise manufacturing processes by starting to integrate accounting functions and customer ordering data.

- **Client / Server Technology:** This is now very familiar system architecture, in which client computers are wholly separate from the server. In this technology the client computer initiates a request, which the server computer accepts, processes and then generates a response back to the client. Different parts of the software are hosted by the client and server computers. This allows hosting of resources like databases in central locations and distributing resources like user interface and reporting services to other locations. Typically, in a client/server environment, PCs are connected using networking devices like hubs and routers to centrally located servers like database servers, application servers, print servers and file servers.

In many manufacturing organisations however, client/server architecture has largely given way to more distributed, internet-based schemes that allow access by mobile devices on a global scale.

- **Database Systems:** ERP systems use relational database management systems (RDBMs) to store data and, with, the software efficiently managing and maintaining data integrity. Modern database systems provide features such as structured query language to access data directly from the database, a transaction mechanism to enable concurrent access to the database, stored procedures to enforce business logic, triggers to initiate actions and security to limit user access to chosen features of the database.

- **Development Tools:** Development tools such as Visual Basic.net or C# enable programmers to create a major part of the ERP software application with the exception of the database. These tools have features to quickly create data entry forms, client side validations, programs to implement business logic, programs to interact with the database and programs to communicate between different parts of the application.

- **Cloud ERP:** Cloud ERP solutions bring the benefits of full functionality that ERP software has to offer without purchasing and maintaining an entire IT infrastructure. Remote, mobile use is facilitated so that multiple site operations can be consolidated without a central site ERP system. Cloud ERP also offers a high degree of data security and permits subscription usage, with options such as SaaS (Software-as-a-Service).

In addition to these core elements of ERP development, many more specific technologies have arisen as supply chain models have changed. For instance, in the 1990s there were companies that outsourced their logistics by partnering with third-party logistics providers (3PL), as well as outsourcing production to contract manufacturers. As part of this mix, technology has developed to harness extranet and intranet models to meet the demand for managing these complex systems. Furthermore, business models, especially in manufacturing, are continuing to shift and evolve with the advent of Robotics and Automation, which also has an impact on supply chain models.

Robotisation, Automation, Machine Learning and Artificial Intelligence

Machines possess artificial intelligence (AI) if they can perform work that would require us to use human intelligence. This is a simplistic definition that could even include some of the earliest examples of automation. But in the context of future digital supply chains we should consider AI as the facility of machines to learn and then modify their actions as a result.

Self-learning computer technology in the Industry 4.0 era means that machines will be capable of controlling their own production and logistics. They will connect with the Internet and interact with their environment, adjusting their operation to suit prevailing situations. As a consequence, production will be in real time, decentralised and individualised – down to batches of a unique item. Decision making will be done without human intervention, optimising production and managing all of the supply chain logistics.

Automation and the use of production robots generate considerable savings in the cost of labour and products. Once the preserve of the motor industry, robotic machines are beginning to be implemented in shop floors across the UK. At face value, the argument for robotics and automation is a strong one; they do not require annual salaries, they don't need leave or sickness days, and they can start up immediately, on demand. In many cases, manufacturing plants already have robots on the shop floor connected to their ERP systems, enabling them to begin production the moment a sales order is finalised, in order to deliver instant service to the customer.

Simply investing in robotics and automation, though, is not enough for a manufacturing enterprise to thrive during Industry 4.0. They need to be integrated into the wider business strategy and into a smart, Big Data environment. They should be there to solve a problem in the business, often a manual, admin-heavy task; robots should not end up being supplemented by more manual work. In this regard, we can begin to create smarter factories where people collaborate with robots, tedious business processes are automated and people are being empowered by machines to make better decisions.

Obvious amongst the downsides of robotisation is the impact on jobs, education and skillset requirements and social change. There is a huge task in managing the necessary change, with potential for loss of workforce morale, disengagement and labour relations issues.

However, robots and automation can also create jobs. This may seem counter-intuitive, but robots improve productivity, which boosts competitiveness, improves revenues, generates economies of scale, and therefore improves overall margins. This creates demand for more design and engineering jobs to innovate and create new products and services, in turn, opening up more sales opportunities.

Cloud Based Technology

For most of us, cloud computing is accessed every day when we use an internet search engine, web email, or open a web page. For manufacturing companies, tapping into remote computing power can extend to accessing all their business management IT, including ERP systems, as a managed service over the internet.

The shift towards mobile devices has been a significant driver in the development of cloud computing. Users can access software and retrieve their own stored data from any location with internet access and this can be done in a 'private cloud', through secure network connections – the equivalent of an intranet. In this way all participants in a digital supply chain can have authorised, 24/7 access to information and software applications, wherever they are.

Cloud services differ according to client requirements but the most common form is known as SaaS, which we previously mentioned in regard to ERP hosting. This is effectively renting IT applications, storage capacity and server hardware in a flexible, secure facility for an ongoing cost. The headline pros and cons of basing company IT systems in the cloud are:

Pros

- Greatly reduced costs of hardware and network infrastructure.
- Decentralised, global accessibility.
- Simplified supply chain data sharing.
- Pay-as-you-go service managed under service level agreements.
- Flexibility to expand IT services\ is Scalable
- Rapid response to rising or reducing IT requirement.

Cons

- Full dependency on an external service provider for continuity, security and performance.
- Operating costs could be higher in the long term than an in-house system.
- Total reliance on internet connection for speed and availability of service.

Commentators are in agreement that cloud based systems will be integral to digital supply chain operation, providing networking between big data analytics, automated manufacturing, logistics and the Internet of Things. Cloud based systems should therefore be considered when benchmarking your business operation and planning for Industry 4.0 capability.

Chapter Three: Benchmarking Your Current Position

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For many manufacturing businesses the smart factory and digital supply chain of the future is still many years away, and there is a misconception that only big corporate organisations are near to making this dream a reality. Undoubtedly, it will be the OEMs and corporates that will exert Tier pressure on Tier 1s, Tier 2s and Tier 3s to comply with their Supply Chain standards.

There will be plenty of people in manufacturing who don't yet see the need to benchmark where they are currently, and these will be the ones running the risk of failing in the future. But there are also many smaller manufacturing businesses that are seeing the opportunities and seizing them. These businesses are already taking steps to automate their production lines, servitise their business models and embrace new trends. For example, many manufacturing organisations are already performing predictive scheduling to help them forecast and prepare for demand, but they don't label this an Internet of Things adoption, nor are they taking it a step further by integrating their raw material suppliers into the process.

It must also be recognised that there are some very real challenges, especially for smaller manufacturers aiming to construct a digital supply chain, which will require a clear strategy that is fully responsive to the opportunities available in a fully digital environment. A strategy must be based not just on the company's current operations and business model, but also on new business models available once digitisation has been implemented, such as creating direct sales channels or 3D printing production.

With a clear strategy in place, companies can consider step-by-step actions in key areas, such as:

- **Processes:** Introducing new end-to-end processes, facilitated by digitisation, which connect the supply chain, such as collaboration on cloud based systems.
- **Skills:** Developing a new company culture with the expertise needed to build the infrastructure and manage the digital supply chain
- **Performance:** Introducing new business rules and KPIs concerning supply chain management.
- **Partnering:** Looking into potential collaboration with a network of suppliers, distributors and technology providers.
- **Technology:** Mapping out the technologies used by the digital supply chain, including the cloud, ERP system and data analytics. Ensuring there is maximum end-to-end visibility in the supply chain.
- **The key to successful progression:** is taking small steps, beginning with an assessment of your current position and a review of the technologies that will be most beneficial. Some of these digital technologies will be disruptive, requiring fresh thinking, new skills and approaches from management.

10 Benchmarking Basics

1. Focus on your key business drivers. These are the processes that underpin the success of your company, and will vary from sector to sector and business to business. If you provide a service, customer care is likely to be a key business driver; if you are a high-volume manufacturer, production-line speed will be a key business driver.

2. Decide who to benchmark against. Pick businesses firms of a similar size and with similar objectives to help work out industry yardsticks; but also compare with firms outside your sector who excel in areas you want to measure adopting their approach could help you leapfrog competitors.

3. Compare strategic objectives. Can you learn strategic lessons from benchmarking partners? Does a focus on quality standards give them an edge, for instance? Are they developing online sales channels? Think what other company's strategic objectives would bring to your business, if anything.

4. Assess the efficiency of your processes. Look at the mechanics of your business - the production techniques, quality controls, stock management and so on. How effective are they? How well are you using your technology? Are other businesses benefiting from new ways of doing things?

5. Analyse your allocation of resources. Are you putting resources into the same areas as your benchmarking partners? Do they have more employees, or fewer? In which parts of the business? Have they invested more in IT and other equipment? Are they spending more on marketing?

6. Weigh up your costs against industry norms. These might include utility bills, wages or research and development costs. If you can highlight areas where your costs are higher than the average, you may be able to make savings.

7. Calculate sales per employee. This will provide a straightforward measure of productivity and efficiency. If your sales are comparatively low, investigate the reasons; you might find the problem is not with your sales staff but your product, or that you are pitching to the wrong market.

8. Work out your profit margins. Your gross profit margin (direct profit on the cost of goods and services sold) will tell you how efficient your production processes are. Comparing this with your net profit margin (profit after all your costs have been taken off, including marketing and administration) will tell you how effectively you earn profits from sales. But how do you compare with other businesses? Should you streamline your operation?

9. Measure your customer service standards. Customer service is a key battleground for businesses with similar products or services. Working out the proportion of sales accounted for by returning customers will give you a picture of your service levels, as will the number of complaints you receive and the time it takes to fulfil an order.

10. Obtain benchmark information without approaching an external benchmarking partner. You can benchmark your firm's key statistics against widely available industry norms - salary surveys and published information on financial ratios for your industry, for example.

Check Your Supply Chain Integration

Supply chain integration is vitally important to a fully functioning digital supply chain.

> **Companies need to prioritise digitisation opportunities and assess only the most promising. Ultimately the end consumer defines the requirements that a supply chain has to fulfil in order to drive the company's success.**

The customer experience can be quantified using the perceived value. This measurement consists of the supply chain costs on the one hand and the service quality on the other.

Supply chain segmentation

Current supply chains of global manufacturing companies have plenty of suppliers, production sites and distribution centres around the world. The immense variety of products, business partners, distribution channels and customer requirements results in a loss of control, which is magnified even further by new technologies and changing business models.

As an example, customers buying standard make-to-stock products focus on fast delivery. OEM customers of the automotive industry plan weeks in advance, but need their products just in time for production. Here, the focus lies more on the reliability of the delivery than the speed. The requirements vary greatly – a different supply chain setup up is required to recapture control. Big data analytics supports a more sophisticated segmentation through dynamic clustering. The analysis of demand patterns, for example, replaces simple ABC customer segmentation in terms of sales.

Identifying the segment‘s critical success factor

Critical success factors have to be identified for each defined segment: Why is the customer buying this product? Which role does the supply chain performance play in the customer‘s choice? A clear understanding of customer needs is required.

Modularisation

Modularisation enables companies to in and out-source modules quickly, depending on the changing customer requirements and the partnering opportunities on the market. The modularisation limits the change impact and allows technology to be embedded quickly across the supply chain.

Chapter Four: Beyond the Horizon - What's Next

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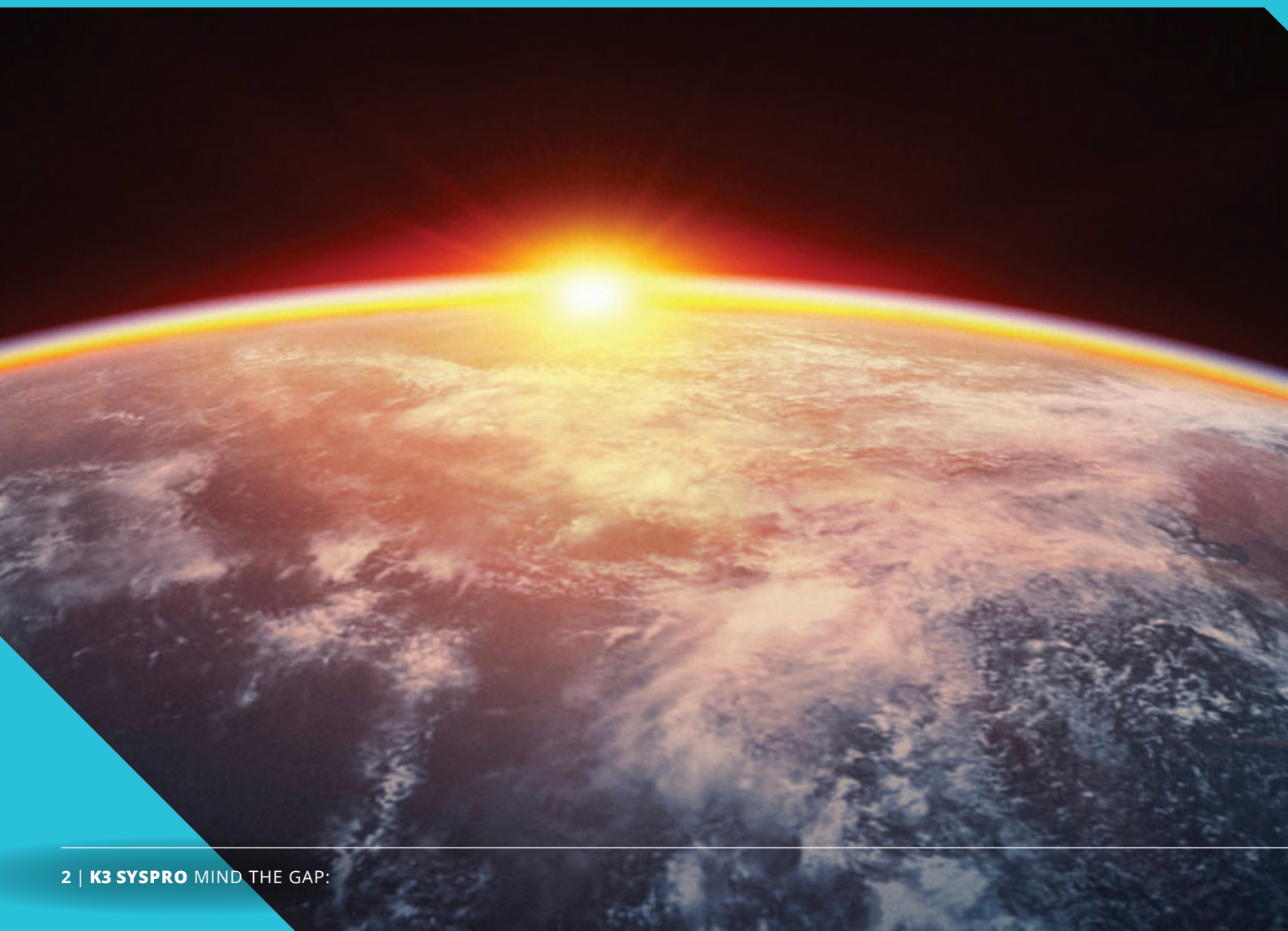
Beyond the Horizon: What's Next?

The technologies powering Industry 4.0 are already driving manufacturing towards a future dominated by digital supply chains. As the digital infrastructure replaces the traditional, linear supply chain, the term digital supply network could be a better description for the new, interconnected model.

Although many are introducing or at least evaluating digital technologies, for most businesses accustomed to linear supply chain models a shift to digital supply chains or networks will be a huge, transformational step. Benchmarking processes not only help to gauge the gap between current and potential levels of digitisation but they can also indicate where best to start investing in bridging that gap.

For the purposes of discussion, let's break down manufacturing businesses into three broad categories: those that have a negligible level of digitisation – 'Initiates'; those with a part-digitised operation – 'Intermediates'; and those looking to maximise an already digital supply chain – 'Advanced'.

In taking the first steps towards a DSC they can continue the process by focusing on digital innovation that enhances an existing supply chain operation, yet enables its future network integration.



Initiates

Benchmarking the company position should already have engaged the most capable staff in researching the digital landscape. In taking the first steps towards a DSC they can continue the process by focusing on digital innovation that enhances an existing supply chain operation, yet enables its future network integration.

The idea is not to pursue a wholesale switchover to digital supply chains. Most dynamic organisations have for years invested heavily in their linear supply chain assets, such as warehousing, logistics operations and computer systems, in addition to their manufacturing facilities.

Consequently it is far too expensive and disruptive to think in terms of scrapping existing assets in favour of a new, fully digitised infrastructure.

However, useful ideas may arise from any area of digital technology, whether in cloud computing, Internet of Things, predictive analytics, augmented reality, 3D printing, autonomous control or cognitive computing (self-learning AI). By tapping into the expertise of specialists and example applications in other industries, businesses can potentially identify large numbers of digital applications with relevance to their own operations. With this initial research phase complete it is then easier to prioritise a few options that could, if implemented, deliver significant return on investment and solve existing performance issues.

A high proportion of manufacturers taking the first steps towards a DSC find they can make their strongest business case for introducing mobile technology. Whether used by workers on the shopfloor or in logistics, mobile tools such as tablets provide a rapid data feed to multiple workflow information systems, such as ERP and warehouse management systems. They also generate data for analysis, channel operational information and instructions back to the user. Making the right choice of mobile equipment prepares the system for successful networking with other Industry 4.0 digital technology that may be added in the future.

It is important to not though, that adopting mobile PC technology, though highly beneficial in many situations, may not be the best starting point for every business approaching DSC for the first time. It can pay dividends to talk to others with experience in digital technology across wider industry. For example, guidance including technology selection, or formulating and mapping out a DSC strategy, can be obtained from ERP consultants, IT specialists or business strategists.

Intermediates

Companies that have already undergone substantial organic growth are likely to be operating with legacy technology. They perceive the need to keep pace with the changes taking place and are keen to remain competitive and efficient. For these companies, which could be described as part digitised, there is an enormous advantage in consulting experts in the field, as they can assist in areas such as integrating new technology with their current ERP systems.

New digital technologies frequently interconnect with legacy systems, rendering them more flexible and introducing more employees to a more unified system. This also avoids awkward workaround situations that can develop when standalone technologies are introduced. In terms of the long term goal of end-to-end supply chain visibility, this approach contributes to a single version of 'the truth', with the result that decision making and business performance are greatly improved.

In adding a new digital technology, it should be remembered that this can have serious implications for the skill sets that are required. In planning production demand, for example, the forecasting tools that utilise all the supply chain data require routine adjustment to sustain high performance, which demands advanced knowledge of analytical algorithms and statistical methods. New systems are also likely to affect company structure, through centralisation of some activities and decentralisation of others.

Some of the questions that companies might ask at this stage can be divided into four areas:

1. Structures

   How far has our current supply chain moved from silo architecture to a high visibility network?

   Where are we on the supply chain spectrum from supply driven to demand driven?

2. Personnel

   What specialist skills do we already posses in relation to digital technology?

   Are we predominantly focused on operatinoal tasks and firefighting?

   What proportion of effort is dedicated to data analysis supply chain coordination?

3. Operational Processes

   Where can we benefit from further automation?

   Are we primarily occupied with routine supply chain operations and orders, or in dealing with exceptions?

4. Information Systems

   Do we operate isolated, monolithic systems or will they readily integrate with others?

   Do we have accurate real time data and good supply network visibility?

Answering these questions assists in defining an overall strategy and in shaping the DSC road map. Having identified a new technological direction companies can then design pilot projects to test out ideas. Although industry leaders often introduce pilots in key operational areas, they may be restricted to peripheral projects, carrying less risk but preparing the ground for implementation in other areas.

Advanced

Companies at an advanced stage of digitisation are, in effect, championing the DSC movement and although they may have invested in their own digital systems development and expertise, they are still encountering new possibilities in Industry 4.0 technology. In looking for best-fit technologies, senior management teams can reach out for consultancy input but should ensure this carries genuine pedigree and experience at the cutting edge of digitisation.

In this respect, K3 Syspro is an ideally-placed ally, firmly embedded in emerging digital technology and supply chain innovation on a global scale. The company traces its history from 1982, when SYSPRO ERP technology was first introduced to the UK. Today, SYSPRO ERP software suite encompasses interlinking module sets comprising more than 60 individual modules. Among the many functions covered are finance, manufacturing management, sales and distribution, reporting, mobile technology and human resources. The modules use information from platforms such as machine robotics, warehouse picking systems, manufacturing data communications and networking, arcoding and mobile user interfaces, such as tablets and smartphones.

In addition, the company is part of the K3 Business Technology Group (K3 BTG). The group combines expertise in the processes employed by retail, manufacturing and distribution industries, utilising SYSPRO, Microsoft business solution software, Sage and other world-class software to deliver ERP and CRM, cloud hosting and highly specialised IT solutions.

In summary

Rapid advancements in digitisation and the confluence of new technologies, particularly as they are now heavily influencing manufacturing processes, means that the concept of a digital supply chain, or network, is now becoming a reality. Also, the availability of Big Data and the reducing cost of obtaining and storing it is enabling in-depth analysis for competitive advantage. The ability to capitalise on this data is accelerating disruptive change towards digitally integrated supply chain elements.

The gap between companies who adopt DSC technology and competitors who delay is likely to become a gulf, the difference between success and failure becoming apparent over the next 10 years. However, the good news is that UK companies have already embarked on the journey to full DSC operation, to a greater or lesser extent.

In fact, the complexity of supply chain structures is such that no single organisation has yet succeeded in constructing a complete, 'true' DSC. Nonetheless, companies are busily focusing on getting the supply chain right. The combination of a strong, customer centric supply chain model with empowering technology produces flexibility, the adaptability to seize new opportunities and resilience to threatening market change.

But throwing out expensive assets and inducing radical change at a stroke is unnecessary. For instance, existing ERP systems continue to enable strong supply chain models to function by linking the business operations within them. Businesses are therefore advised to progress in small steps towards Industry 4.0 and smart factory technologies, beginning with a thorough assessment of current position through benchmarking exercises.

Although justifiable in terms of return on investment and competitive edge, some of these digital technologies are very disruptive to conventional structures and systems, requiring real imagination and new skill sets from management. Yet, through access to ERP consultancies and other specialists immersed in the new digital technologies, business managers are far from isolated in finding their best route to DSC technology.

MIND THE GAP: THE STEP FROM DIGITAL SUPPLY CHAIN TO DIGITAL SUPPLY NETWORK

Chapter one	What is a Digital Supply Chain	27th October

What do we actually mean when we talk about Digital Supply Chain? How is this going to change business process in the manufacturing and engineering sectors?

Chapter Two	Navigating the Technology Landscape	2nd November

Important terms and phrases and technologies you need to understand if your company is to be ready for Digital Supply Chain Networks.

Chapter Three	Are You Ready? Benchmarking Your Current Position	8th November

How to know if you are ready to take the next step to become Digital Supply Chain ready. It is not only the OEMs and Tier 1s who should be benchmarking their progress.

Chapter Four	Beyond the Horizon: What's Next?	14th November

What is next for manufacturing companies working on Digital Supply Chain Networks? How will the industry change as manufacturers start to truly embrace Industry 4.0 and the Digital Supply Chain?

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