# The Connected Business

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# Supply chain helps to boost innovation

Customer expectations present challenges for technology developers, reports *Maija Palmer*

Illustration: Oivind Hovland

When Target, the US discount chain, lost nearly $1bn last year in a botched move into Canada, supply chain problems were partly to blame. Shelves in stores were left bare and customers complained about a lack of choice.

Though Target's problems were in part to do with rapid expansion into a new territory, they also reflected the difficulties many companies face in managing complex and fast-changing supply chains.

At L'Oréal, the cosmetics group, a third of products are new each year. "Consumers and retailers now expect that level of innovation," says Patrick Lemoine, customer solutions vice-president at E2open, a technology company that helps L'Oréal manage its supply chain. "The speed on the demand side is putting stress on companies."

At the same time, companies are evermore reliant on their suppliers. Many of the latest innovations in cars, for example, are coming from suppliers of the electronic components rather than being developed in-house. Boeing and Airbus have had to reshape their supply chains significantly for the production of their latest aircraft, the 787 and A350 respectively, with a shift to new types of lightweight materials. The difficulties in becoming "supplier-ready" has led to delays in production of the aircraft.

There is also growing scrutiny of supply chains. An independent review in the UK into last year's horse meat scandal in the human food chain uncovered complex, transborder networks that shipped meat between abattoirs and wholesalers. In response the government is to set up a food crime unit to help police the industry.

In the US, meanwhile, many manufacturers are still struggling to comply with the Dodd-Frank act, which requires companies to know whether their products contain "conflict minerals" such as tin, tungsten, tantalum and gold originating from the Democratic Republic of Congo.

Technology has often been called on to help meet supply chain needs, but not all the developments have brought the expected widespread benefits. Here is a summary of some of the past, present and probable future technology trends:

**Past: RFID.** Five to 10 years ago RFID – radio frequency identification – tags, which could be attached to individual goods to track them precisely, were talked of as the industry's big saviour.

But although Walmart, the US discount store chain, required its biggest suppliers to use RFID tags, they have not taken off in the extended supply chain. Specialist chemical and medical companies use them to track items in transit, and retailers are using them for in-house stock controls, but the vision of having an RFID sensor on every apple in the supermarket has not come to pass.

**Present: Automation software and collaboration platforms.** Companies are experimenting with software and platforms that increase efficiency. Food manufacturer Kellogg, for example, has equipped its warehouse staff with headsets that instruct them on what items to pick up and how to build a palette of goods being shipped. Software

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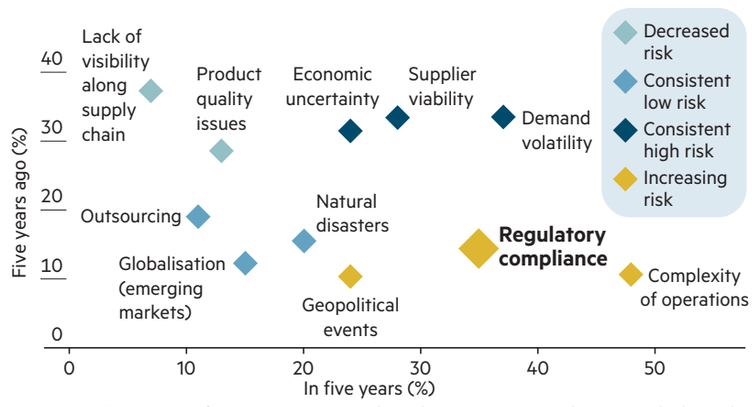
# Software aids struggle against conflict minerals

Regulation

A new industry is growing around the complex audit process, writes *Maija Palmer*

**Supply chain risks: five years ago versus in five years**




Percentages refer to survey questions asking what companies saw as biggest supply chain risks

Source: Supply Chain Insights

The next time your mobile phone buzzes in your pocket, think tungsten. The hard, steel-grey mineral is crucial to the component that makes phones vibrate. It is also used in ballpoint pens, lightbulbs and in the wiring of heated car windscreens.

Since last year, any listed US company making such items has been required to report exactly where its tungsten comes from. Tungsten, along with tantalum, tin and gold (collectively known as 3TG), is a "conflict mineral", often mined under exploitative conditions in the Democratic Republic of Congo and sold to fund warfare in the region.

To stop money going to these kinds of producers, the 2010 Dodd-Frank Act requires US manufacturers to audit their supply chains and report on the origins of their minerals.

Some companies have risen to the challenge fairly publicly. This year, at the Consumer Electronics Show in Las Vegas, Intel announced plans to stop using conflict minerals in its microprocessors, and Apple recently published a list of its suppliers that may be sourcing minerals from conflict zones.

But what about those companies without the resources of an Apple or an Intel? For most companies, compliance with these requirements has been slow and chaotic. When the law was first proposed, the US Securities and Exchange Commission estimated that 6,000 manufacturers and 480,000 suppliers were potentially affected by it.

But so far, just 1,292 companies have filed reports, says Lina Ramos, senior vice-president of Source Intelligence, a company that helps businesses run their supply chain compliance programmes. "Why have the rest not filed? We are not sure. They may not even realise they are affected by this," she says.

Auditing a supply chain that stretches through several layers of component manufacturers, refiners, smelters and miners is not a simple task.

"It requires tracking of products across borders. Companies are very reliant on what their suppliers tell them," says Lora Cecere, chief executive of Supply Chain Insights, a consultancy. "Tracking this requires a real evolution of business networks."

"Many people thought they could just email their suppliers and ask for the information. They are now realising that doesn't work," says Ms Ramos.

For every 1,000 emails sent, a company would typically receive fewer than 12 replies. Many of those who handled their supplier audit in-house in 2013 are now admitting they need help, and so an industry is emerging to serve the conflict minerals audit process.

The Electronic Industry Citizenship Coalition, for example, has set up the conflict-free smelter programme, offering an independent, third-party audit of smelters and refiners. Its Excel-based template for reporting the origin of minerals has been widely adopted by the industry. But managing all the supplier responses – which must be updated every year – is tricky without the application of some of the latest technology.

> 'It is difficult because it requires tracking of products across borders'

Motorola Mobility, which is part of Google but is being sold to Chinese computer maker Lenovo, found that managing the conflict mineral status of all its suppliers was too complex to do through conventional spreadsheets.

"Although we are managing with a manual system, we have about five Excel spreadsheets that include everything from our cost information, to the EICC information, to our tracking information . . . it is not going to be sustainable. It is very labour-intensive," says Wilhelm Janisch, senior manager of environmental compliance and sustainability at Motorola Mobility.

The company worked with PTC, a Massachusetts-based software company, to create an automated and searchable system for tracking supplier compliance. This allows Motorola Mobility to examine the data from various perspectives, for example to see whether a particular model of mobile phone contains any conflict minerals.

PTC and other companies such as CSRWare, Actio and iPoint all offer software as a service solutions for conflict mineral management.

Source Intelligence, meanwhile, has created a LinkedIn-style social media platform that allows companies to pull together conflict mineral information from their suppliers. Rather than manufacturers asking the same suppliers the same questions about conflict mineral origins again and again, suppliers can go to the platform and fill in a "profile" that contains information on their sourcing.

Ms Ramos says there are hundreds of thousands of suppliers on the network, with 2,000 joining every week.

Source Intelligence, which started out helping companies track their supply chain carbon footprint, has a team who assess suppliers on the ground to check if they are genuinely compliant.

# Disruptive technologies wait in the wings for logistics

Research and development

Drones and 3D printing may have potential in the long term, writes *Paul Solman*

The term "disruptive technology" – innovations that upset established business practices – tends to be overused. But there can be little doubt that two technologies are being developed that could well and truly shake up logistics businesses: drones and 3D printing.

Drones – also known as unmanned aerial vehicles, or UAVs – are already widely available for uses such as aerial photography, while established military applications include reconnaissance and bombing missions.

Meanwhile, 3D printing, which has been in existence for about a decade, can manufacture anything from jewellery and furniture to dental products and parts for the nuclear industry.

Both have yet to be fully exploited, but they have the potential to transform the way supply chains and deliveries are managed.

"It's a little bit like the wild west now when it comes to drones," says Thilo Koslowski, vice-president and manufacturing analyst at Gartner, the research group. "It almost seems like we are trying to reinvent flying."

There is no shortage of projects being tried. Internet and ecommerce pioneers Google and Amazon have tested drones for short-range deliveries, while Deutsche Post DHL has been testing a "parcel copter" for delivering urgent goods such as pharmaceuticals, although the logistics group says it has no plans to introduce a regular service.

"It's an emerging concept and there are clearly opportunities that could be gained," says Andrew Underwood, partner and head of UK supply chain management practice at KPMG, the consultancy. "I would expect logistics companies to be, not worried exactly, but concerned, as it would represent a big upset to their operating model.

"It's not just logistics and ecommerce companies that can benefit from the use of drones. Manufacturers are also looking at the possibilities – for moving parts around and so on."

**Special delivery** Deutsche Post DHL has tested a 'parcel copter' drone but has no plans to introduce a regular service

Mr Underwood says drones offer enormous potential to release assets as companies would no longer need to rely on trucking capacity, for example. He also highlights opportunities to reduce labour costs, and even the possibility of increasing environmental benefits. "Getting trucks off the road and reducing carbon emissions is likely to prove attractive to companies," he says.

Nevertheless, industry experts emphasise there is no hard evidence yet of the savings that might be made, and there are many practical hurdles to get over before drones can become commonplace in the logistics sector.

"Health and safety issues are a big concern," says Mr Underwood. "But there are also question marks over theft – the potential for goods to go missing. Then there are the regulatory implications of flying drones across borders: the impact on air traffic."

Mr Koslowski also highlights the public's wariness. "There is a certain amount of scepticism about drones; people are naturally cautious," he says.

"If we get to the point of regulatory approval, you could see that unions would object to the idea of drones taking over human jobs – concern that people are being replaced by robots."

He adds: "Unfortunately, I don't see a lot of companies doing any work on this. If companies want to use the technology, they need to start thinking about the human element."

There is also a long way to go for 3D printing before its promise can be realised. Printer prices are falling rapidly and much has been predicted about their potential – in making body parts for transplant surgery, for example.

In reality, 3D printing's most transformative applications may be years away, though the technology has clear opportunities for the logistics sector – perhaps even synergies with drones.

"Once the limitations of printing different materials are solved, it will be possible for consumers to buy licences to print products using multiple materials," says Hans-Georg Kaltenbrunner, vice-president of manufacturing strategy for Europe, the Middle East and Africa at JDA Software, a supply chain group.

"For manufacturing or business-to-business, spare parts would no longer have to be manufactured centrally and distributed; they could be printed locally," he explains.

"So this has the potential to threaten every logistics provider. Perhaps 3PL [third-party logistics] companies could merge with 3D printer services to produce parts at local service centres and then deliver them the last mile with drones."

"Drones and 3D printing together have the potential to make a big impact on the logistics sector," echoes Mr Koslowski. "They could create opportunities for entrants specialising in using both technologies to deliver."

While such changes are a way off, Mr Kaltenbrunner believes that 3D printing could make an impact on logistics sooner than drones.

"Widespread use of drones faces difficult practical problems," he says. "The limitations on 3D printing will be simpler to overcome, as they can be can be solved by technology."

# Clever tool improves stock control

**Analytics** Programs can learn to make accurate predictions, writes *Michael Dempsey*

Businesses these days are not short of data. However, making sense of the mountain of facts contained in large corporate applications remains a challenge, which is where data analytics comes in.

Analytic tools can scan millions of pieces of information and pin down very practical lessons for companies. The rate at which a discount on a particular line in a specific location will make sales climb and then tail off is typical of the questions data analysis has to answer.

So-called "machine learning" allows the software to come up with its own set of "rules", directions the software can follow when a similar stocking problem arises.

For example, executives can assess and approve the rules so the software can be allowed to follow a particular avenue when stocks of a popular brand are running low during a sales promotion. These are flagged up in plain language for executives to assess and approve. Once activated, the rules can run forecasts on the likely impact of a given sales promotion on stock levels in warehouses and across the shelves of stores.

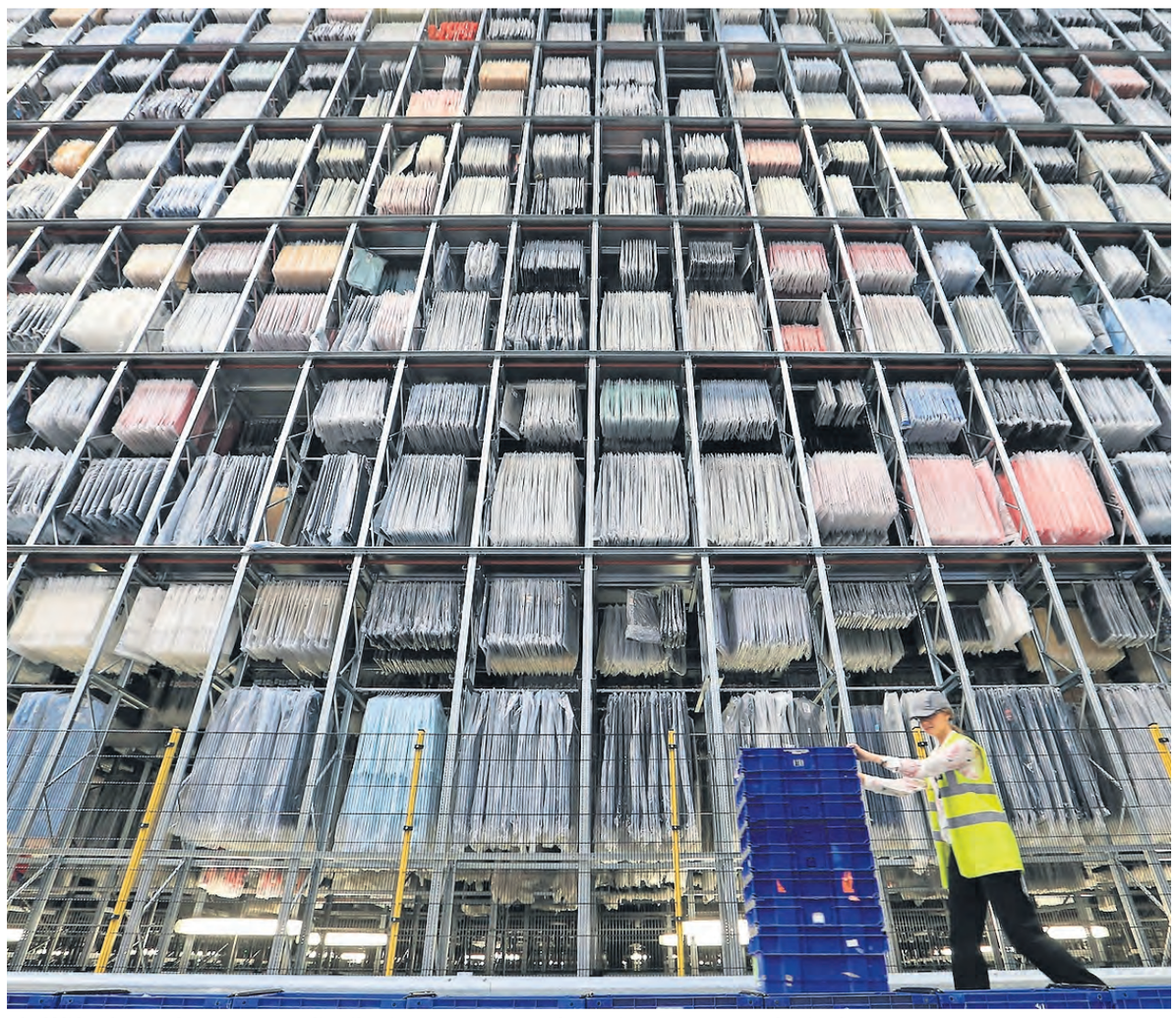
Jeff Bodenstab, a vice-president at Dutch software house ToolsGroup, says machine learning programs can quickly interpret large volumes of data to measure the accuracy of sales forecasts or logistics plans.

Mr Bodenstab says the big breakthrough in recent years has been in producing software that can deal with the incomplete data that inevitably come from busy shop-floors. "With machine learning, we can see through the 'noise', use all the data that don't add up."

The ability to translate columns of numbers that would have been previously buried inside spreadsheets into simple visual images boosts the effectiveness of data analysis. These images are presented using colour-coded symbols such as traffic lights to represent the success or failure of a service.

ToolsGroup customer Granarolo, an Italian dairy products company, uses data analysis to help juggle the shelf-life of many of its products. For instance fresh milk lasts for six days while the company's yoghurt has 40 days to sit in the supermarket.

Seasonal taste adds to the complexity of shipping products across Europe, with items such as mozzarella cheese selling better in summer. Another factor is that 60 per cent of Granarolo's products are sold via promotions and discounts. The consumer response to each of these deals has to be carefully calculated by the Bologna-based company.



**Shelf life: the Marks & Spencer distribution centre at Castle Donington, near Derby, in the UK**

## Visual data and human insight identify where action is needed

Peter Williams, an information analytics manager at Marks and Spencer, the British retailer, uses software from US group Tibco to improve the company's logistics.

M&S sells clothing and food and household goods from its 809 UK stores. It needs to know how many units of a given item to ship to stores, so that a line neither runs out nor is overstocked and wasted.

Tibco's Spotfire analytics platform takes information from a variety of corporate programs and displays it in a simple visual format.

In perishable food lines, data analysis consists of isolating the sales characteristics of products and deciding an acceptable level of waste. Spotfire studies contrasting sales in large and small stores to determine the right quantity of various foodstuffs for each outlet.

The picture is different for clothing, which is subject to changing seasons and fashions. Each line exhibits a trading pattern, a sales curve that rises, then tails off. The company has to determine the angle of that curve and the point at which any line will sell out.

The detailed breakdown from Spotfire lets Mr Williams narrow his focus to an individual store. While the machine learning model can dish out lessons based on its own algorithms, M&S does not allow it to have the last word.

He explains: "Machine learning is great in itself, but you have to apply human insight to it." The secret sauce of retailing, the sense of what a customer base feels and desires, is still at the heart of the business.

Additionally, a supplier dashboard has a been developed. This breaks fresh ground in sharing information directly with suppliers, says Mr Williams. He adds: "building this was relatively cheap, but the value is massive".

The dashboard covers a set of key indicators, which lets suppliers see just how near they are to the levels of service expected by M&S.

Mr Williams says the strength of data analysis is in its clarity. "Visualising data changes people's perceptions of what we can do. We can bypass the spreadsheets and identify where action is needed."

**Michael Dempsey**

'We can see through the "noise" [and] use all the data that don't add up'

Granarolo, applying past experience of how well promotions have worked in different outlets, uses the machine learning program to generate suggested stock levels. These predictions rely on data from 60,000 sites across Europe.

Data analysis has replaced spreadsheet-based work and produces accurate forecasts that cover Granarolo's 200 best-selling lines in great detail.

Sales of lines such as fresh milk are being forecast with 98 per cent accuracy, meaning stock levels are almost precisely aligned to meet demand.

# Internet of things is ready to deliver

Supply chain

Wearables will refine the technology further, writes *Jessica Twentyman*

Imagine products en route from manufacturer to customer, shuttling between warehouses and trucks, all the time chattering away, conveying information about their location and status via a vast network of smart sensors and readers.

This is not a utopian vision, but the way things are at some technologically advanced companies.

Rob Carter, chief information officer at US shipping group FedEx, comments that the internet of things "isn't some bright line we'll cross one day". It has already arrived.

As far back as 1979, FedEx founder and chief executive officer Fred Smith expressed the idea that "the information about the package is as important as the package itself".

FedEx parcels, for example, are labelled so that, when scanned, they convey information about where they are from, where they are going and the route they will take.

Delivery staff, meanwhile, are armed with handheld devices that capture the customer's signature on the doorstep. All that information is stored digitally.

"It's important to put the maturity of the internet of things into perspective," agrees Michael Burkett, an analyst at Gartner, the technology market research firm.

He says some aspects are more mature, such as commercial telematics systems used in trucking fleets. These integrate computer programs with telecommunications.

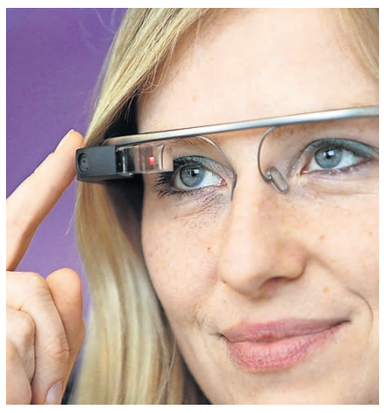
Others, such as smart fabrics that use sensors in clothing and industrial fabrics to monitor human health or manufacturing processes, are just emerging.

Mr Burkett also believes that an imminent explosion in the number of intelligent devices available is set to make supply chains smarter than ever.

The internet of things, he reckons, is forecast to reach 26bn installed units by 2020, up from 900m five years ago.

That has significant implications, he says, for "the information available to supply chain leaders and how the supply chain operates".

Emile Naus, former head of logistics strategy at Marks and Spencer, the UK retailer, and now partner and technical director at LCP Consulting, a specialist supply chain strategy firm, speaks of a big opportunity for companies "to create better supply chains and, in the process, build more certainty into those supply chains".



**Look out: Google Glass may aid deliveries** – Reuters

The kind of certainty created by sensors and live tracking, he says, could enable companies to offer guaranteed delivery times and run fewer trucks on less circuitous, fuel-intensive routes.

It is not just information about the location of physical assets that will boost supply-chain visibility. Data about their condition and state will be important, too, says Mr Naus. "I see this particularly with food products, with perishable goods. If you can track the temperature they are kept at throughout the supply chain, you have a better chance of extending shelf-life and reducing waste."

Paul Clarke, chief technology officer at Ocado, a UK online grocery retailer, says the internet of things is about people too. Human intervention will always be necessary to deal with supply-chain deviations and exceptions, he says, which is where wearable technologies come in.

Devices such as smart watches or Google Glass-style headsets could be valuable for Ocado's warehouse and transport staff. "There is massive potential here for getting vital information to them regarding orders and deliveries in the most immediate, convenient and safest ways," Mr Clarke says. The company's technology staff are already experimenting to identify the best uses for such technology in its supply chain.

"Supply chain leaders must design their processes to operate in a digital business world," says Gartner's Mr Burkett. "They must fulfil customers' new expectations and the volatile demands digital marketing will create."

Supply chains must meet those expectations by converging people, business and things and "incorporating fast-emerging capabilities such as internet of things technology and smart machines into this design strategy", he says.

# Demands on supply chain help to boost technological innovation

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calculates the dimensions of the packages and devises a way to pack to minimise gaps so the company does not ship fresh air. Kellogg says the system has increased productivity by 40 per cent.

According to Lora Cecere, chief executive of Supply Chain Insights, a consultancy, about 9 per cent of companies are experimenting with computer cognitive learning, so software can respond to data such as customer shopping trends, weather and geography, and can sense patterns in shopping behaviour.

McCormick, the US spice company, for example, has a consumer-facing initiative, called FlavourPrint, in which people input flavours they like and receive recipe ideas. McCormick is using this data to predict more accurately where it needs to ship more chillies or which areas need more sea salt, for example.

As in other fields, cloud technologies and social media are being harnessed. Where once companies would email orders to their suppliers individually, they are now putting all their suppliers on cloud-based collaboration platforms, where they can see orders in real time, track the status of deliveries and see quickly where there is a problem. This is helping them cut delivery times.

Mr Lemoine of E2open, which has set up a supplier cloud system for L'Oréal, says: "If Boots [the UK chemist] calls L'Oréal to order sun cream, L'Oréal needs to be able to query stock levels quickly and see how soon it can deliver. If it takes two weeks to answer the question, it will have lost the deal."

**Future: 3D printing.** "If 3D printing continues to develop at the rate it has done in the past few years, it could completely change the dynamics of the supply chain for some industries," says Stan Aronow, supply chain analyst at Gartner, the research company.

**40%** Productivity increase at Kellogg from new warehouse packing software

**23%** IBM estimate of savings that could be made using the 'software-defined supply chain'

Instead of shipping a nut or a bolt to a customer, suppliers would sell permission to download a software file with instructions on how to print the component. Transport costs would disappear and it would become economically viable to produce very small batches – even a single unit – of a component. Some 30 per cent of companies polled in a recent survey by PwC, the consultancy, said they believed 3D printing would have a huge disruptive impact on the supply chain.

IBM, the technology company, talks of the "software-defined supply chain", in which 3D printing, intelligent robotics and open-source electronics – the designs of which have been made publicly available, so anyone can change or modify them – will change the way parts are sourced. IBM estimates making products this way would be 23 per cent cheaper than by traditional methods.

# Integration of systems drives speed while reducing cost


**Production line: a worker at Lenovo's Shanghai factory**
Eugene Hoshiko/AP

**Flow of goods** Cloud-based networks can identify and remedy problems at source, writes *Jane Bird*

When Lenovo's factory in Brazil gears up to build a batch of computers, it often depends on microprocessors being flown in from China. A sudden strike by airport cargo workers can disrupt the schedule and delay production.

But if you know exactly where the components are, and when they will be needed, you can react immediately, says Mick Jones, vice-president of supply chain strategy at Beijing-based Lenovo, the world's largest PC company by sales.

"We can decide to wait it out or source the chips from another factory, or buy them somewhere else closer," Mr Jones says. "Even if they are more expensive, it means we can smooth out the manufacturing process and avoid massive interruptions."

Smoothing such bumps and avoiding bottlenecks is essential, because supply chains are increasingly being used as a competitive weapon, says Mr Jones. "Efficiency in the supply chain drives speed and customer satisfaction while reducing cost."

The goal is to be efficient at every stage, including procurement, manufacturing, inventory control, transport, warehouse management, demand forecasting and sales. But the fact that many of these functions are outsourced makes the streamlining process difficult.

Greg Johnsen, chief marketing officer of GT Nexus, a Californian cloud-based network for global trade, says: "It creates a vast constellation of companies with separate data systems that need to be integrated."

Meanwhile, there is a range of potential disruptions to the supply chain, from strikes, volcanoes and financial crises to sudden changes in demand caused by chatter on social media.

To tackle these challenges, companies are deploying a range of technologies, including data management and analytics, machine-to-machine communications, social media analysis and cloud computing.

"We have to build systems that can more easily manage the volume, complexity and speed of data," Mr Johnsen says.

Capturing data from suppliers helps companies calculate how best to use warehouse space, and decide which distribution centre to use and when to switch from trucks to air freight.

At the other end of the supply chain, says Ian Foddering, chief technology officer of Cisco UK and Ireland, data gathered from "intelligent" devices can warn companies when supplies are needed. "A connected fridge could alert a supermarket when a customer's milk is out of stock, making the efficiency of the supply chain even greater," he says.

Lenovo is using data analytics to understand how it can speed delivery. "We had an issue last year with getting products to customers on time, which you would typically assume was due to a delivery problem," Mr Jones says.

But data analytics showed logistics were running on time; the problem had occurred during manufacture and involved component lead times. "The product was incredibly complex and we realised the answer was to simplify its manufacture by reducing the range of components," Mr Jones says.

Identifying the problem at its source enabled Lenovo to boost efficiency across a wider range of products and achieve greater cost-savings.

Data analytics can also help with logistics. Empty miles (journeys with no stock carried) can account for up to 30 per cent of transport costs, says Razat Gaurav, executive vice-president of global industries and solutions at JDA, a supply chain management company.

"This equates to 840 megatonnes of unnecessary $CO_2$ emissions each year, which clearly doesn't make economic or environmental sense." Businesses should aim for empty miles accounting for less than 10 per cent of costs, Mr Gaurav says.

Supply chain efficiencies can also be achieved by analysing "unstructured" data, such as social media gossip about trends. This now influences 20 per cent of demand forecasts, Mr Gaurav says.

'We need systems that can more easily manage the volume, complexity and speed of data'

Gathering supply chain data is a formidable task, especially because, previously, each company tended to have its own system. Cloud-based systems are now used by many groups, says Mr Johnsen, allowing companies to orchestrate processes across networks, more like a business social network.

"The update is in one place and everyone who needs to can see it and sees the news right away. Whole networks of companies can act as one," says Mr Johnsen.

Being cloud-based means companies do not have to build or invest in expensive IT systems, they can pay as and when they need them.

The holy grail in supply chain management is to know exactly where each item is in real time. This is not yet possible, but as more advanced technology, from embedded microprocessors to data capture techniques, become more widespread, it is only a matter of time.

# Hackers find suppliers are an easy way to target companies

Security

Cyber criminals are developing increasingly sophisticated techniques, says *Hannah Kuchler*

The windows may be bolted and the security gate locked, but security experts are warning that unless every other entrance and exit is secured, cyber criminals can still enter your company via your supply chain.

The risk of hackers entering a company's computer networks through a supplier – or even, the supplier of a supplier – has become a greater concern since the cyber attack on the US retailer Target late last year.

The details of more than 70m customers of the food-to-clothes chain were compromised, including the accounts of more 40m credit card holders, snatched by a criminal who entered the system using access granted to a refrigeration and air conditioning supplier.

Craig Carpenter, at AccessData, a computer forensics and cyber security company, says a whole range of suppliers, from vendors to law and accounting firms, have often been used by cyber criminals looking for an easy way in to a company's databases.

"Financial criminals will typically look for the weakest link – the most efficient, easiest way into a system. And, the majority of the time, suppliers are the easiest way in," Mr Carpenter says.

There is no such thing as "perfect vendor management", says Rohyt Belani, chief executive of PhishMe, an email security company. He says cyber criminals are becoming more creative in how they target individuals to win their trust and enter their computer systems, for example, studying the social media profiles of suppliers' employees to understand what will make them click on an infected attachment, a technique known as spear-phishing.

He says these are not the typical sort of phishing methods people are used to, "sending you emails offering you $20,000 that even the untrained [are] not going to act on. Spearphishing is the attackers sharpening their pencils and doing reconnaissance."

Smaller companies often have less to spend on sophisticated cyber security, as shown by a recent survey by professional services company PwC that showed budgets for security fell 4 per cent last year, led by the decline in small company spending. This is despite an overall rise in the number and complexity of cyber attacks.

One reason for this is smaller businesses often have less negotiating power with service suppliers that offer more protection, such as Amazon and Rackspace, which are reluctant to change standard contracts for all but the biggest customers, Mr Carpenter says.

Sam King, executive vice-president of strategy for Veracode, a cloud security company, warns that "every company is becoming a software company" and says businesses often do not realise how dependent they are on third-party software until it is too late.

'The majority of the time, suppliers are the easiest way in for criminals'

**Cloud security: Sam King**

For example, this year, the US hardware store chain Lowe's suffered a security breach affecting employee information including social security numbers and driving records, which was stored in an online database provided by a supplier that did not properly secure its back-up copy.

Ms King says boards are just beginning to realise what a complex web their sensitive information is stored in and how important it is to vet suppliers.

Vetting is a constant process, she says. "If you list the top-10 critical suppliers and make sure they are secure, then that list might change or some random website created by a third party that wasn't in the top 10 may be the risk."

Ionic Security, a start-up in Atlanta, Georgia, suggests it might have the answer to securing data wherever it travels in the supply chain. Its encryption method cocoons a piece of data in a protective layer that calls back to the company that owns it to ask for permission every time it is opened, and tracks who uses it and how.

Adam Ghetti, Ionic's chief technology officer, says many "early adopters" using the software are trying to mitigate supply chain risk. He has customers in financial services, energy and manufacturing. Any industry that is highly regulated, has a broad distribution base and relies on many vendors needs to consider its supply chain security, he adds.

Mr Ghetti says that supply chains do not have to be very big to be at risk: where the data go to may be more of a problem.

After the Edward Snowden revelations last year, which exposed a National Security Agency mass surveillance programme in the US, some companies have been especially cautious about letting their data travel to territories where it might be spied on.

Mr Ghetti says: "The [uses] we've seen are companies working with suppliers in a particular region who want the information they exchange to stay in that region."

# Why my door is staying firmly disconnected from the web

**INSIDE TECH**

Maija Palmer

Last month in The Economist I read a scenario of a future home in which all manner of objects, connected to each other in the internet of things, would communicate and work together. In the case of a fire, for example: "Connected smoke alarms could enlist nearby lightbulbs to flash and speakers to sound an alert. A warning about the smoke's location could appear on a television. And door locks could be automatically opened."

I nearly choked on my cornflakes. In reality, what would happen is that the television would display an inexplicable "error, code not found" message and – as the flames began to close in and the room filled with smoke – the door locks would tell you that they wouldn't open until they had finished installing the latest software update.

This is what happens now when I grab my smartphone to take a picture of something my four-year-old is doing. By the time I've clicked through all the update requests, the "cute" moment has passed. I imagine an app update is going to be even more annoying when I am on fire.

There is an old joke about Microsoft and General Motors which went along the lines that if GM developed cars like Microsoft developed software various things would happen, for example: "Occasionally, executing a manoeuvre such as a left turn would cause your car to shut down and refuse to restart, and you would have to reinstall the engine."

It was a funny-list entry back in 1999, but it seems less funny now that the internet of things and self-driving cars are becoming a reality. I'm still not completely reassured that a left-hand turn isn't going to suddenly cause an error message.

Working with programmers day-to-day, I can see how often a tiny bit of mistyped code results in software not working at all or doing something bizarre.

I also see how many frustrating hours go into trying to ensure any new software can actually talk to the decades-old legacy systems most of our homes are filled with: 10-year-old televisions and laptops with operating systems Microsoft no longer supports and old iPhones long since passed on to pre-teen children.

**Door jam** A warning about the smoke's location could appear on TV. Door locks could be automatically opened…

If the internet of things is going to work, two things need to happen. Programmers need to start writing error-free code, which is pretty unlikely (the industry standard is for about 15-50 errors per 1,000 lines of code).

Testing gets rid of many mistakes, but the reason cyber security problems such as Heartbleed and Shellshock arise is because not all bugs are discovered. Some of them, as in the case of Shellshock, can lie festering for 20 years.

The technology sector is also going to have to come to some agreement on standards, which is not going to be easy. There are dozens of alliances, each trying to create the definitive standard.

The biggest of these is the AllSeen Alliance, whose core technology is based on Qualcomm software. It includes Electrolux, Haier, LG Electronics, Microsoft, Panasonic, Qualcomm, Sharp, Silicon Image, Sony, Technicolor, and TP-Link – a fairly powerful list of companies.

But wait – Intel has its own rival alliance, the Open Internet Consortium, which includes Samsung and Dell. Meanwhile, AT&T, General Electric and IBM are in the Industrial Internet Consortium. Not forgetting Google and chipmakers ARM, Freescale and Silicon Labs, which have teamed with Samsung to create Thread Group, and are developing the Thread wireless networking protocol.

Then there is Apple, which has its own HomeKit, which is going to provide the communication between all Apple devices.

In previous standards battles, its has taken a good 10-15 years for the groups to come to some kind of agreement. In the meantime, my front door will remain disconnected from the internet of things.

*This article can be read online at ft.com/connectedbusiness*

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# Annual ranking finds that big numbers do not equal success

**FT-Bowen Craggs Index** A one-size approach to company websites does not fit all, says *David Bowen*

The world's largest companies own "magic devices" that allow them to talk to half of humanity – but few know what to do with them.

This year's Financial Times-Bowen Craggs Index of corporate online effectiveness shows that, far from coming to a consensus about how they should be using their websites and social media channels, there is more variety than ever.

The FT BC Index has been running since 2007. It judges corporate websites and other channels, but this is about much more than corporate communications; it is about the way big companies speak to the world.

They may be speaking to customers, jobseekers, journalists, critics, governments, but for each of them, the internet has become an increasingly vital channel. Call it "group level marketing" – marketing/promotion/messaging for the group as a whole – and it suddenly seems more important.

One conundrum is that, even though the speed of change seems phenomenal, few senior managers understand the internet's importance except as a pure selling tool. The companies from which the list is drawn are the 80 biggest in the world, but only a handful come close to using it as they might.


**Channel hoppers** Top performers also see that 'social media' are really a set of individual channels that do different things

Furthermore, the gap between those who "get it" and those who do not is widening. Some companies renowned for their tight management seem to lose all sense when it comes to online communications. At the same time, other companies are getting increasingly slick. These are marked out by:

• A refusal to go along with trends – they do things because they are appropriate. BP and Total have relaunched their sites with profoundly unfashionable left menu navigation. But they work. Nestlé, GSK and (again) Total have created mobile-friendly sites, but they have not put mobile usability first, as some others have.

This is sensible, as fewer than 10 per cent of their visitors look at their sites on small screens.

• A belief that – if they want to get their messages across – they must not be boring. General Electric has some terrific magazine-style material, exploiting broadband-powered multimedia with verve. Siemens' commissioned short films still shine. Shell's videos of beasties under the sea are gripping, while Apple's multimedia essays are rather beautiful (especially on tablets). This is, however in danger of being undermined by another fashion, for "stories" that are simply rather boring words labelled as stories. High-quality editorial control is still too rare.

• An understanding that the internet is the most flexible medium invented, and that to use a corporate site for only one purpose is to abuse it. Apple.com is fantastic at serving consumers; pretty useless for other groups.

• A realisation that online channels should also support specific needs of a company.

To be at the top of the index, you need to do all these and more. Apple, GE and Goldman score highly in some ways, but their usability is way off. Pfizer works well, but is dull. Use the table (more on our website) to pick out those that shine and fade in different areas.

Top performers also see that "social media" are really a set of individual channels that do different things. LinkedIn is often best for communicating the company's attractions for jobseekers, Facebook for corporate social responsibility messaging.

YouTube and Flickr are often used as extensions of the corporate website, essentially integrated channels for publishing further information about the company, rather than "social" media inviting interaction. Real social media channels – Facebook, LinkedIn, Twitter – need careful, active management.

The most interesting development has been the use of Facebook as a reputation management tool. After struggling to understand it for years, a few companies are now using it well to respond to their critics.

*A fuller version of this article was published on ft.com. The writer is senior consultant for Bowen Craggs and Co. For the full ranking, visit www.bowen-craggs.com/FT-Bowen-Craggs-Index*

## FT Bowen-Craggs Index of corporate online efficiency 2014: high-flyers

| 2014 overall position | 2014 overall score | 2013 overall position | 2013 overall score | Company | Construction | Message | Contract | Serving society | Serving investors | Serving media | Serving jobseekers | Serving customers |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 218 | 5= | 213 | Royal Dutch Shell | 47 | 39 | 8 | 25 | 28 | 24 | 21 | 26 |
| 2= | 216 | 1= | 215 | Eni | 48 | 38 | 10 | 27 | 27 | 25 | 20 | 21 |
| 2= | 216 | 7= | 207 | Nestle | 48 | 39 | 11 | 26 | 26 | 24 | 21 | 21 |
| 4 | 213 | 5= | 213 | Unilever | 46 | 38 | 9 | 27 | 26 | 19 | 25 | 23 |
| 5 | 212 | 4 | 214 | Siemens | 37 | 40 | 11 | 25 | 25 | 28 | 23 | 23 |
| 6 | 209 | 7= | 207 | Roche | 43 | 42 | 9 | 25 | 21 | 23 | 23 | 23 |
| 7 | 208 | 12 | 201 | British American Tobacco | 47 | 39 | 9 | 26 | 25 | 20 | 21 | 21 |
| 8 | 207 | 1= | 215 | BP | 43 | 36 | 8 | 26 | 27 | 23 | 20 | 24 |
| 9 | 203 | 1= | 215 | SAP | 41 | 41 | 8 | 23 | 25 | 23 | 19 | 23 |
| 10= | 201 | 9 | 206 | Novartis | 49 | 34 | 10 | 23 | 24 | 23 | 21 | 17 |

Source: Bowen-Craggs and Co

## Index Mobile moves to the foreground

In the past two years, companies have rushed to make their sites mobile-friendly. The index provides the evidence, with the big story being that 40 per cent (29 of 78 sites), are now responsive: they reformat automatically according to the screen size.

However, some 21 companies have done nothing. These tend to be in the bottom half of the index, but non-mobile high scorers include Unilever, Novartis, Rio Tinto and AstraZeneca.

Then there are 18 with separate mobile sites – most long-established but not all. BNP Paribas has just launched a separate mobile site, while Siemens has three sites: for mobile, desktop and (quite new) tablet.

Finally, eight companies have mixes. Microsoft includes three distinct approaches on its web estate. Apple and Statoil start off responsive, but go to an unadapted approach deeper in the site – signs of poor management.

BP is a "mixer" with a difference, however. BP.com does not have a responsive or any other mobile version, but nearly all its business and country sites are responsive. This does have some logic. The point is that people do not tend to look at corporate sites on small screens – mobile viewers usually make up less than 10 per cent of site visitors.

Why would you want to look at complex information on a tiny screen when you almost certainly have access to a big one? By contrast, customers are much more likely to be on the move and to have only a phone with them. BP has clearly thought about the issue, even if the result is a little odd.

And this is the real division: companies that have thought about what is right for them; those who have not really considered it; and those who have followed fashion for its own sake.

Going down the responsive route can certainly be the right path. When it works, it is a cost-effective way of improving the service. Nestlé, Johnson & Johnson, GSK, Telefónica and Walmart have sites that work well on all screen sizes.

But some companies have managed to damage desktop usability while switching to responsive. ExxonMobil and General Electric both have tricky navigation on desktops and laptops, even though they are fine on smartphones. The slogan "mobile first" has a lot to answer for.

Separate mobile sites are a safe alternative, but they are almost always cut-down versions of the main site. There is logic in concentrating on groups that are most likely to use mobiles, whether customers, journalists or investors. But there will inevitably be frustrations for others. Also, of course, it is more expensive to produce two versions of the same site.

This brings me back to Siemens, which does nothing without thinking hard.

It launched its tablet version a year ago. It is still struggling to get it going – too many links lead to the standard site – but the concept is sophisticated.

People use mobiles to find information fast on the move; they loll around browsing and watching videos on tablets; and they look detailed stuff up on laptops or desktops while at work.

Can the same site serve audiences well on all three? Siemens thinks not, and it may well be right.

**David Bowen**