SECTORS - BIG DATA

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Prof Amar Ramudhin, Hull University Business School's Logistics Institute

Image: Shutterstock

Visibility and control

BY MALCOLM WHEATLEY

The humble bed sheet isn't an especially high-value item – which can be a distinct problem for a business such as FTSE 250-listed textile services specialist Berendsen.

Operating out of 30 factories spread across the country, it hires and launders bed linen and towels to customers such as hotels and hospitals, each factory equipped with a fleet of vehicles collecting used linen and delivering freshly cleaned replacements.

The problem? Keeping tabs on what linen assets are where, in order to optimise asset utilisation, and – more importantly – maintain a regular flow of laundry-fresh towels, sheets and pillow cases, available as and when customers want them. Each day, for instance, the business handles close to a million pieces of hotel linen.

"At root, these are low-value items, which significantly impacts the cost-benefit equation," points out Duncan Macmillan, Berendsen's IT director.

"The cost of manually barcode-scanning bag after bag of incoming and outgoing linen was simply prohibitive."

MORE INFORMATION, NOT TOTAL INFORMATION

Until 2015, that is – the year in which it became possible for Berendsen to cost-effectively combine a whole series of cutting-edge technologies. The starting point: low-cost, passive UHF RFID tags, sewn onto items such as sheets and bath towels. Trials showed that an entire rollcage pallet of incoming or outgoing linen could be read in a single pass past the RFID reader.

"We could reliably get a first-pass read rate of 995 items or so – that's a 99.5% success rate," explains Macmillan. "For our purposes, that was more than adequate: the goal was more information, not total information."

But what would be the best way to store, analyse and extract value from what was very quickly going to become a deluge of RFID data? For even rough estimates of the data streams involved took the proposed project firmly into Big Data territory: there were four million RFID tags in place with, on

average, four tags being read each second of the day.

The answer: the open source Apache Hadoop data processing and analytics engine – a technology that is purpose-designed to scalably handle Big Data volumes – running as a pre-packaged service on Microsoft's cloud-based Azure platform. Deployed under Windows or Linux, it could process structured or unstructured data, and scaled to petabytes on demand – and yet was fully-integrated with familiar Microsoft analysis and visualisation tools such as Excel and Power BI.

XML-encoded messages are sent to Berendsen's central IT facility from RFID scanners located at the despatch, processing and inwards return points at each factory, from where they are automatically sent to Microsoft's Azure cloud platform processing.

About 20 files are received every minute, explains Macmillan, with each file containing multiple transactions, equating to more than four transactions per second. Via dashboards on mobile devices, real-time analytics – again located in the cloud – then provide Berendsen factory and administration personnel with real-time insights into linen availability and location.

CONTROL TECHNIQUES YIELD GREATER VISIBILITY

The result has been a transformation in visibility and control, claims the company. And while asset utilisation will increase, asset losses will decrease, and operational efficiencies will be delivered, the real benefit, insists Macmillan, is the ability for Berendsen to deliver a better service to its customers.

"For hoteliers and hospitals, a daily supply of fresh linen simply isn't front-of-mind," he says. "They view that as our job – and this investment allows us to perform that job to a higher standard."

Writ large, the Berendsen case study is a story which impressively combines some of industry's hottest IT technologies. 2015 – as at Berendsen – was the year that showed just what could be achieved not just by using these technologies on their own, in isolation, but by combining them together for greater effect. And not just within the four walls of the enterprise, but externally, along the upstream and downstream supply chain, pulling in data from suppliers, customers, and logistics partners.

At a high level, there's the Internet of Things, which permits two-way communications with intelligent devices – sensors, micro-controllers and embedded computers installed in equipment, for instance. This enables the equipment in question to be controlled remotely, or to report that it needs maintenance or replenishment.

Analyst firm Gartner Group has forecast a thirty-fold increase in internet-connected physical devices by 2020, with the overall size of the Internet of Things likely to reach 26 billion installed units by 2020, up from 0.9 billion just five years ago. This, it adds, will "significantly alter how supply chains operate".

For while the applications of the Internet of Things within the four walls of the enterprise are obvious enough, as at Berendsen, it's those applications within the supply chain that may turn out to be significant.

Internet-connected intelligent devices, located at strategic points within the manufacturing supply chain, can do much to eliminate the uncertainty that drives raw material and component inventories. Visibility is transformed, too. With the Internet of Things, individual consignments – shipping containers or pallets, for instance – can also keep in touch in real time.

That said, businesses are understandably asking searching questions about the security and resilience of Internet of Things-enabled supply chains. The World Economic Forum, for example, has commissioned Hull University Business School's Logistics Institute to explore models of how the associated policies and governance might work.

"Billions of devices will be automatically transmitting potentially sensitive information across national boundaries," points out the Institute's Prof Amar Ramudhin. "If a sensor somewhere is seeing and reporting something, then there need to be controls over how that information is accessed and shared, so that I can see it, but my competitors can't. Right now, those rules don't exist."

Again, manufacturers can build Internet of Things capabilities into their products, adding value in the process. German industrial giant Bosch's UK gas boiler manufacturing subsidiary Worcester Bosch, for instance, has launched an Internet of Things-enabled remote gas boiler controller.

An easy-to-use app, installed on consumers' smartphones or tablets, provides at-a-glance information on such things as the current temperature of consumers' homes, energy usage, and the present boiler settings, explains Bosch UK's president Steffen Hoffmann. And provided that they have access to a wireless internet connection, consumers can then switch their boiler on (or off), from wherever they happen to be, ensuring that they never return home to a cold house.

Coming during 2016, Hoffmann adds, is a further Internet of Things-enabled boiler enhancement, developed in conjunction with British Gas, which will automatically report problems to British Gas' maintenance team, summoning a technician to service the equipment.

Nor is this all. Even more fundamentally, whole new business models open up. The concept of servitisation, for example, sees customers paying for equipment on a usage basis, rather than through outright capital purchase – palletisers, say, paid for per pallet, rather than on a time-rental basis, or purchase.

TRIGGERING INVOICES, ISSUING ALERTS...

Again, it's Internet-connected intelligent devices that enable the equipment in question to "call home", triggering invoices, and issuing alerts when consumables need topping-up or replacing.

That said, successfully enabling all this is likely to call for more than just an

INTERNET OF THINGS, SURVEY OF COMPANIES, 2015

Only a small number of respondents – **4%** – were planning an Internet of Things initiative in the next six months

A further **16%** of respondents were planning an investment over a longer six to 12-month period; an additional **16%** were planning an investment over a still longer period of one to two years

The remainder of the respondents – some **64%** – were unclear as to the precise timing of any Internet of Things investment

Source: Henrik Research / Microsoft

Source: Richard Wilding

Interfacing the Internet of Things to back office systems will pose challenges.

Richard Wilding, Cranfield School Of Management

in-house Internet of Things initiative. Richard Wilding, professor of supply chain strategy at Cranfield University's Cranfield School Of Management, for instance, worries about how businesses will interface their conventional – and sometimes batch-based – back office systems to the real-time streams of high-volume data arriving, as at Berendsen, from the Internet of Things.

"With the Internet of Things delivering signals at frequent intervals, ERP systems and processes such as sales and operations planning can struggle to keep up," he says. "They're running at different clock speeds, and ways will have to be found to synchronise the two."

HIGH VELOCITY, HIGH VARIETY HIGH VOLUME

Big Data is characterised as data with high levels of what are known as the three Vs – velocity, variety, and volume: it typically requires specialist technologies such as Hadoop or MongoDB in order to handle data at a scale that would choke conventional database technology.

On its own, however, Big Data is of only negligible use. What matters is the ability to interrogate and analyse data at Big Data scale. Only that way can companies glean meaningful insights and understanding not previously possible.

Hence, although the term Big Data is often bandied about, the value comes only partially from acquiring the data – although, as seen at Berendsen, the challenges involved in this should not be underestimated.

But the real benefit arises from the underlying analysis of the data, either in terms of conventional business intelligence, customer analytics, predictive analytics, or ad hoc analyses of any number of specific business problems involving data of Big Data proportions.

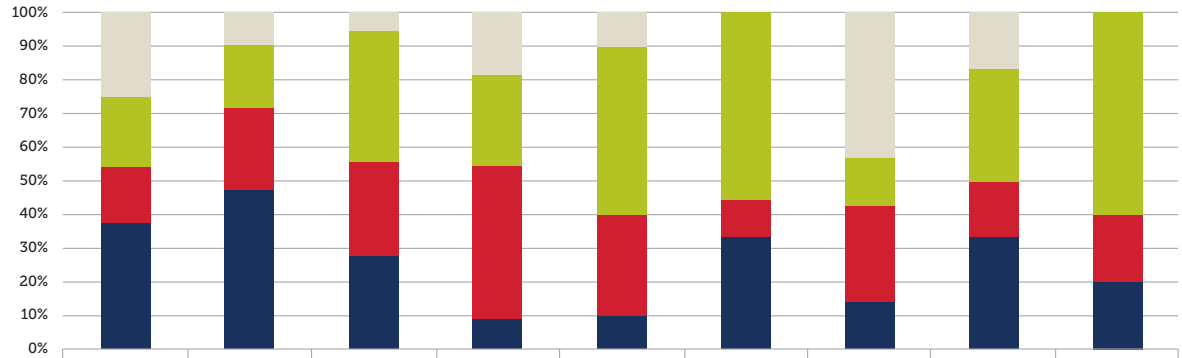
That said, the ROI from such analytics exercises depends significantly on the rigour with which the process is undertaken, says Bernard Marr. Marr is a regular contributor to the World Economic Forum and a consultant in strategic performance, analytics, KPIs and big data.

"It's not about simply collecting and gathering data on the off chance that it might be useful," he is quick to point out. "It is also important to start with significant business problems, formulate the questions which will shed light on those problems, and then go looking for the data which will provide the answers. Today, too many companies are doing it the wrong way round."

So who is getting it right? Marr, who is also chief executive of the analytics and consulting firm the Advanced Performance Institute, points to recent Big Data initiatives from companies such as oil giant Royal Dutch Shell and aero-engine manufacturer Rolls-Royce, each featured in his book *Big Data In Practice*.

Roll-Royce, for instance, which pioneered servitisation with its power by hour Total Care offering, is harnessing its clusters of high-power supercomputers to analyse the manufacturing data on the fan blades that go into each of its jet

BIG DATA DEVELOPMENT BY SECTOR



	Technology Media & Telecoms	Financial Services	Retail	Hospitality	Manufacturing & Engineering	Healthcare & Pharmaceuticals	Other	Public Services	Utilities
No requirement	25%	10%	6%	18%	10%	0%	43%	17%	0%
In development	21%	19%	39%	27%	50%	56%	14%	33%	60%
Expected 1-3 yrs	17%	24%	28%	45%	30%	11%	29%	17%	20%
Already have it	38%	48%	28%	9%	10%	33%	14%	33%	20%

Source: Coeus Consulting

BIG DATA, BIGGER PICTURE

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"In the case of small and mid-sized manufacturers, technologies such as the Internet of Things and Big Data haven't yet really filtered into businesses' thinking. UK industry is still playing catch-up."

Tom Lawton, partner and head of manufacturing at business advisors BDO.

engines. Capturing half a terabyte of manufacturing data on each individual fan blade quickly adds up to Big Data proportions, he points out: the company's new factory in Singapore produces 6,000 fan blades a year, generating three petabytes of data.

That said, hard data on the precise ROI of such initiatives remains hard to come by – partly because adoption levels are still low, and partly for competitive reasons, says Steve Dunbar, head of Microsoft's Internet of Things business group.

Source: Coeus Consulting

Despite expressing a need for Big Data, manufacturers have been slower than average to invest in it.

Matthew Headford

"The ROI being achieved is very real, but a lot of companies are particularly reluctant to put the numbers in the public domain," he points out.

Moreover, few of the most compelling case studies – at least in the public domain – are British, he adds.

"British companies are traditionally very sceptical about new technologies, and the Internet of Things is no different. Manufacturers in the Nordic countries, and in North America, tend to be more open to the possibilities," he observes.

Paul Saxton, business intelligence expert and analytics product manager at eBECS – the IT provider which built the Berendsen solution – agrees.

"There's a real need for compelling public domain use cases, to make it clearer to businesses what exactly the applications might be, and where exactly the gains will come from," he stresses.

"The more complicated the initiative – initiatives linking the Internet of Things, Big Data, and analytics, for instance – the more important it is to see the synergies that are involved."

Which may be one reason why manufacturers seem to be taking a nuanced view of timing their initiatives in the areas of Big Data and the Internet of Things.

That almost two-thirds of manufacturers were found to have no clear plan is hardly a ringing endorsement of the technology. That said, it is still consistent with Microsoft's recommendation that manufacturers should adopt a staged, exploratory, step-by-step approach to the Internet of Things.

Likewise with Big Data, reports Matthew Headford, chief technology officer at IT strategy consulting firm Coeus Consulting. In a cross-industry survey carried out in the autumn of 2015, manufacturers' exploitation of Big Data sharply that of lagged other industry sectors.

"90% of manufacturers are saying that they have a need for Big Data, but only 10% are reporting that they have already invested in a Big Data capability," he observes. "That's against an industry average of 30% – placing manufacturers in the second-lowest sector for Big Data exploitation, ahead only of the hospitality industry."

FROM DISRUPTIVE TO READILY ADOPTED

That said, observers are hopeful that 2016 will see adoption levels increase.

"In the short term, people are making these technologies out to be more disruptive than they really are," adds Ken Young, technology director at the Manufacturing Technology Centre. "Yes, they're disruptive, but adoption will build gradually, as businesses figure out their own particular use cases."

And, as Berendsen's experience highlights, if a use case can be found for low-value items such as towels and sheets, then the odds are good that such use cases will indeed emerge more generally across British industry. For technology watchers, 2016 will be interesting.

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