IOT: Risk or Reward?

As the hype around the Internet of Things continues, what are UK business leaders' expectations and concerns?

Guest Foreword

It is a real privilege to write the foreword for this very timely research report, commissioned by cybersecurity specialist Webroot and data centre organisation IO.

It is nearly two decades since the term 'Internet of Things' (IoT) was first coined as a way to describe the network of physical objects that could communicate and share data with each other. We've heard a lot about how it can help to improve processes and create new efficiencies in the business world in the intervening period. But just how real is the IoT, and what kind of progress are we really making in building it?

Today, the world's objects are indeed more connected than they ever have been. By some estimates there will be 50 billion objects connected to the internet by 2020, in every country, environment and habitat that we can imagine. Yet it is estimated that 40% of the potential of IoT is dependent on the interoperability of the data it creates. Fully realising the potential of the IoT requires more work than simply connecting objects to the internet.

Networks must be optimised for different data types and strategies. Considerations around interoperability, privacy and trust in sharing data are essential. Data platforms need to be able to handle both static and streaming data and integrate with disparate data sets. As such, data centres will need to be smarter and more flexible than today's server farms. A new generation of people with the right skills must be nurtured and above all, this vast new network must be highly secure, if it is to win the trust of businesses and consumers.

Much of this work is already underway, but collaboration is essential if we are to advance the development of IoT solutions through open innovation activities. Crucially, this report shows that the appetite for doing that work is strong, and that the UK's business community's imagination really has been fired by the IoT's promise. Barriers inevitably remain, but the overall prognosis is extremely positive – a harbinger of great and highly connected things to come with the promise of delivering real value back to the UK.

Idris Jahn is Principal Consultant for Middleware and Data Interoperability at IoTUK, which is powered by the Digital Catapult and Future Cities Catapult.

Introduction

If there were doubts about just how seriously UK businesses are taking the Internet of Things in 2016, this research goes a long way to dispelling them. 87% of all UK businesses (and 92% of enterprises) are implementing IoT-focused projects and strategies in 2016. Even more organisations – 94% – are investing in initiatives to prepare for the IoT, spreading those investments across infrastructure, security, R&D, skills and personnel. The fact is that everywhere you look, companies are preparing to reap the potential rewards that they see in the IoT – regardless of their size, location or industry.

The scale of this trend is substantial. This year, 60% of UK businesses say that they are increasing their investments in IoT projects, by an average of 42%. Crucially, they're doing it not because it's fashionable but because they expect real, tangible results; not just pilot project data but increased revenues and greater competitive advantage too. Overall, 68% of business leaders are expecting to reap actual benefits from their IoT investments in 2016; a huge progression from the one in five who say that they're already seeing benefits today.

This report looks into these trends in more detail, right across the spectrum of IoT activity and expectation. The survey itself was conducted across organisation types, from micro-businesses with fewer than ten people to enterprises with over a thousand; and across a wide array of sectors from financial services to healthcare, education, manufacturing, retail, construction and beyond. To help interpret its findings, we asked three key industry spokespeople for their own insight and analysis: Maria Hernandez, IoT lead at Cisco UK; Andrew Roughan, business director at IO, a US-based data centre organisation; and John Sirianni, VP of IOT Strategic Partnerships at security specialist Webroot.

60%

of UK businesses say that they are increasing their investments in IoT projects, by an average of 42%

68%

of business leaders are expecting to reap actual benefits from their IoT investments in 2016; a huge progression from the one in five who say that they're already seeing benefits today

Findings

1. The fourth wave

First, the big question: what's driving the burst of IoT activity in 2016? Maria Hernandez says at Cisco we call IoT the 'fourth wave' of the internet; not just another trend, but a phenomenon that is already affecting businesses of every kind, and one which is likely to dwarf its predecessors. "The first internet wave was about making information digital. Then we moved into making processes digital, particularly with e-commerce. The third wave was about making interactions digital with cloud, mobility social media and video. Now the fourth is about making everything digital – organisations, cities and even countries. We believe that this wave is going to have more impact than the previous three waves together". IoT is a key enabler of the digitisation journey that many organisations have started.

UK businesses have clearly started to ride this wave. And according to Webroot's John Sirianni, they're not just buying into the underlying technology – they're thinking about exactly where the IoT can offer them business advantage. "IoT is not a technology per se; it's an economic and societal improvement initiative. It can be providing assets as services, or about greater performance and utilisation. It may be something as simple as greener and more efficient systems. Having hyper-connected systems and devices is just the next tool that we have to enable these important goals".

For all its business benefits, it is perhaps inevitable that the technologists are still funding the IoT in its still-early days. The IT department is still managing IoT investments in 68% of organisations surveyed here, although its reach is clearly being recognised by many other areas of the business; R&D (31% of respondents), customer service (25%), product and service line development (21%) and marketing (20%) are all investing some parts of their budgets in IoT initiatives.

"IoT is not a technology per se; it's an economic and societal improvement initiative…"

John Siriani, security specialist at Webroot

68%

The IT department is still managing IoT investments in 68% of organisations surveyed here, although its reach is clearly being recognised by many other areas of the business; R&D (31% of respondents), customer service (25%), product and service line development (21%) and marketing (20%) are all investing some parts of their budgets in IoT initiatives.

2. Infrastructure: the key to IoT success

Today, network infrastructure is attracting the bulk of investment among the business community. 71% of business leaders agree that improving network infrastructure and capacity is a primary focus for IoT investment, often driven by the inadequacy of their existing networks; nearly a quarter of businesses (24%) say that their current ICT infrastructure is a barrier to successful IoT adoption.

IO's Andrew Roughan is in no doubt that large organisations in particular are making important investments in the technology they need to bring IoT to life. "We're definitely seeing a move in enterprises. In recent years, we have seen a large and growing infrastructure investment to build digital infrastructures for the future". But he also thinks that we're still in the very earliest stages as far as real IoT deployments are concerned; scale is one thing, he says, but utilisation is another altogether. "I don't think we have seen the tipping point yet in terms of how that has been utilised, the type of traffic that could flow through and the type of utilisation that will flow through both data centres' network infrastructure and devices".

Roughan talks about what IO calls the 'build or buy' scenario: "The cloud movement of the last five to ten years has seen enterprises move much closer towards consuming things as a service, taking advantage of the scale investments made by service providers and the expertise that those providers can bring. Digital strategies for mature enterprises won't forget those lessons; they'll continue their sourcing strategies, rather than building their own hardware and infrastructure from scratch for the IoT era". Those sentiments are broadly reflected in the survey results, which show that more companies are now investing in infrastructure-as-a-service (34%) than building or buying their own (28%).

The key, Roughan says, is to invest in the infrastructure for the long term, not just to think about quick wins. "There are some initiatives that can drive change quickly and deliver some customer-facing and online benefits, but this is about more than that – it's about defining the next era of the enterprise, beyond five or ten years. The infrastructure to support IoT needs some careful consideration, as typical enterprise-scale infrastructure investments won't enable the IoT to scale economically".

71%

of business leaders agree that improving network infrastructure and capacity is a primary focus for IoT investment

---

"The cloud movement of the last five to ten years has seen enterprises move much closer towards consuming things as a service, taking advantage of the scale investments made by service providers and the expertise that those providers can bring…"

Andrew Roughan, business director at IO

---

3. Security matters

Scale is clearly one important barrier to successful IoT deployments. Top of business leaders' list of potential barriers, though, is security; an issue which 80% of them believe to be impeding innovation, but which only a quarter (27%) of businesses are re-engineering to cater for greater connectedness across their organisation.

Concerns around digital security are a constant and inevitable source of concern for modern businesses. Data security in particular is a perennial problem, so it is unsurprising that business leaders are worried about its impact on IoT initiatives. 37% of respondents expressed specific concerns about data security, which they think is impeding progress; and 57% of business leaders think that security in general is likely to be compromised as organisations try to innovate quickly.

Webroot's John Sirianni agrees that security concerns are warranted in the IoT era, and that organisations will need to adopt some new thinking. "The speed at which the cyber-criminals innovate is generally faster than the speed at which enterprises can react. We believe that it's the IoT solution providers who will invest in the best automated self-learning security and bring the most effective cyber protection solutions to the critical operational enterprise. The enterprise can only hire so many security professionals – and they need to make sure that when they do, they invest in the best technologies, practices and training too". One finding of particular note from this survey is that companies in every sector are worried about IoT security and its impact on innovation, particularly in financial services, education and healthcare but also in construction and manufacturing. John Sirianni says that they are wise to be cautious: "We have already seen every class of critical infrastructure hacked – power plants, oil and gas refineries,

aeroplanes, etc. They have all been compromised at some level. The industrial base represents a new playground for cyber-criminals to experiment with new toys and techniques. 'Can I get into this building? Can I get into that control valve?' Fortunately, they have not yet figured out the best way to monetise their experimental intrusions, but that will not last much longer – ransomware criminals and DDoS activists are becoming much more aggressive".

57%

of business leaders think that security in general is likely to be compromised as organisations try to innovate quickly.

―――――――

"The industrial base represents a new playground for cyber-criminals to experiment with new toys and techniques. 'Can I get into this building? Can I get into that control valve?' Fortunately, they have not yet figured out the best way to monetise their experimental intrusions…"

John Siriani, security specialist at Webroot

―――――――

4. What's first?

Just as cyber-criminals are as yet unclear how best to monetise the IoT, so businesses are unclear as to where they are likely to see its first manifestations. Much of the early public IoT noise has been around large-scale public infrastructure projects, especially in transport and smart city environments, but nearly half (49%) of UK businesses think that their first benefits will be on a much smaller scale – from newly connected products and apps. Others, though, think that the first important changes will be closer to home; 44% of business leaders believing that the first real changes will come in the so-called connected office and the way in which employees work, while 39% believe IoT will make an early difference in more intelligent logistics and processes in the daily running of the business.
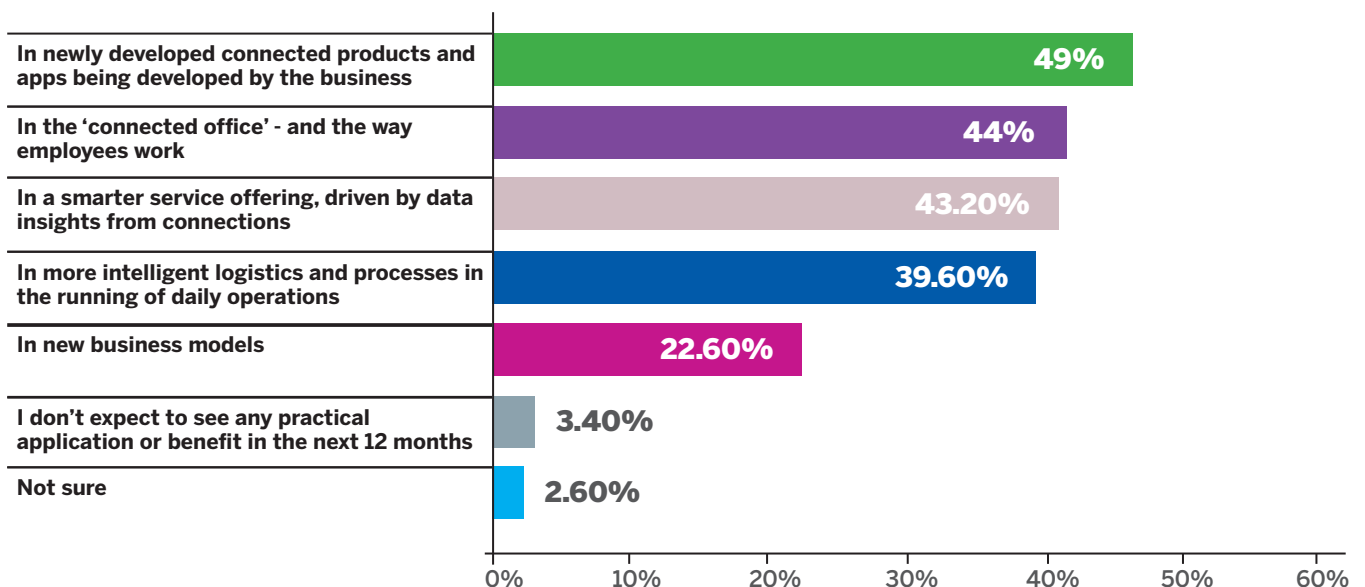
Cisco's Maria Hernandez agrees. "We're already seeing a lot of changes to the way people work. If you have a manufacturing plant running at 50% utilisation rate, you would probably close it. However there are a lot of buildings right now not being fully utilised. With IoT, and the intelligent connection of things, people, data and processes

39%

believe IoT will make an early difference in more intelligent logistics and processes in the daily running of the business.

we can see the flow of people and understand how space is being used. Are they being used for the right purpose? If it is a room with collaboration capabilities, is it being used accordingly?" Such insight can quickly turn into new business models, she says. "Some of these ideas are already being implemented in real estate and shopping malls, where different pricing mechanisms are applied based on footfall data. It all comes back to how you use that data to improve your processes and services".

How do you think IoT as a trend will first manifest itself in the business you work for?

Category	Percentage
In newly developed connected products and apps being developed by the business	49%
In the 'connected office' - and the way employees work	44%
In a smarter service offering, driven by data insights from connections	43.20%
In more intelligent logistics and processes in the running of daily operations	39.60%
In new business models	22.60%
I don't expect to see any practical application or benefit in the next 12 months	3.40%
Not sure	2.60%

Andrew Roughan thinks that the trend towards understanding data in the workplace will inevitably drive adoption and understanding of IoT. "Enterprises are currently getting to a position where they can understand what data can do for them. Once you have high-performance computer environments, big data analytics, skills and services, it is almost a self-fulfilling prophesy that the IoT emerges from the back of it". He cites IO's own experiences in illustrating exactly how this works in practice: "Just in our own company, we have six data centres globally and 155 billion rows of data, just looking at how fans, power units, lights and other pieces of equipment are working. If a lightbulb failure happens in Singapore, we know which batch of the factory line that came from and which light might fail next in Phoenix".

Whatever comes first, many businesses are optimistic about the potential benefits of IoT-derived data. 43% of respondents are expecting to be able to deliver smarter service offerings thanks to more data driven insights, with 1 in 5 believing that new business models will emerge first. Their expectations of tangible benefits are real ones, if slightly less ambitious: today, 44% of business leaders are expecting to gain competitive advantage thanks to IoT initiatives, but only a third of businesses are expecting to generate more revenue by creating new products and service lines.

44%

are expecting to gain competitive advantage thanks to IoT initiatives

"With IoT, and the intelligent connection of things, people, data and processes we can see the flow of people and understand how space is being used. Are they being used for the right purpose? If it is a room with collaboration capabilities, is it being used accordingly?"

Maria Hernandez, IoT lead at Cisco UK

5. The skills conundrum

However as the IoT evolves in the business world, the pace at which it does so will inevitably be governed by people with the right skills to make it happen. Today, 72% of UK businesses say finding people with the right skill-set to take advantage of the IoT trend is a key issue; while a third of businesses believe a lack of skills in the business is preventing innovation around IoT.
27% of respondents are actively investing in hiring the people they need for IoT-led initiatives, and a third (32%) are investing in upskilling existing employees.

While many of the early challenges are technology-related and will have IT-centric solutions, the IoT world encompasses many other disciplines too, many of which are hard to anticipate today; but it is evident that businesses will need to find expertise in everything from electronics to ethics as the patterns in the IoT landscape become clearer. Such considerations are driving skillset discussions in every UK business, and are at the heart of perhaps this survey's most surprising finding; that around half of businesses plan to employ a Chief IoT Officer in the next year (55%), especially in the education (63%), retail (63%) and telecomms (64%) industries.

Sourcing good IT skills is hard enough in mainstream digital initiatives, but IO's Andrew Roughan says that finding the right people to develop and run IoT projects is especially tough at the infrastructure coalface. "One thing we struggle with in skills is that the really fashionable roles like coding and software development attract a lot of young people into apprenticeship schemes, startups and beyond, into careers. At the hard end of infrastructure, it is very difficult to encourage the same people to get involved in the mechanical and electrical aspects". Maria Hernandez thinks that the way to address this has to start early, in schools: "Cisco has launched a programme

called the Little Big Awards where we challenge school kids to think what they could connect and why. Would you connect your text books? Would you connect your shoes? What would you try to achieve and what would be your business plan? With that we start linking IoT to the business world and they're really fascinated".

On a more optimistic note, John Sirianni notes, the IoT lends itself to automation, thus reducing the need for manual intervention in many processes by humans. "A good part of what happens today unfortunately is what we call manual-mation – manual activity by people who interpret what is good, malicious or unknown. We at Webroot have removed the manual subjective interpretation of Internet-borne malware through advanced automation. With the size and scale of the IoT, cyber security cannot be about manual interpretation anymore; it requires advanced automation and purpose-built artificial intelligence to keep pace with malicious cyber activity".

"…the really fashionable roles like coding and software development attract a lot of young people into apprenticeship schemes, startups and beyond, into careers. At the hard end of infrastructure, it is very difficult to encourage the same people to get involved in the mechanical and electrical aspects"

Andrew Roughan, business director at IO

6. Community challenges

Amid the general optimism apparent in the IoT world, it is clear that many barriers to building the Internet of Things persist. Data, in particular, remains a thorny issue for many organisations, especially those handling personal data such as medical records or financial transactions. The IoT's inherently connected and distributed nature enables some of the current safeguards around UK and European data (such as the Safe Harbour initiative) to be effectively bypassed, for example, and enforcing data regulation and legislation is likely to become harder as a result. Security, too, becomes harder as data moves out of silos and onto the network.

One approach to solving such problems is to create a culture of curation within the IoT, and encourage organisations to work better and more effectively together to address the industry's biggest issues. The business community largely agrees: today, two-thirds of businesses think that interoperability between organisations is needed before businesses will really commit to investing in IoT initiatives, while 59% of businesses are engaged (or intend to be very soon) in community efforts to build shared IoT solutions in conjunction with other organisations.

Building those community programmes may not be straightforward, especially where governments and security are involved, according to John Sirianni. "Governments in particular are finding it tough to bring IOT initiatives to market, partly because they still perceive silos as a way to do security. As they look at ways to deploy network technology to deliver services in a more efficient manner, they are also struggling with the notion of data sharing across organisations".

But sharing they are. Maria Hernandez cites Manchester's recent announcement as the UK's Internet of Things City Demonstrator, won by a consortium of 23 parties including universities, councils, hospitals, start-ups and organisations as diverse as BT, SAP and Cisco. Large-scale, community-driven IoT projects are not just possible but are being realised; a fact that is inspiring businesses across the UK.

Two-thirds of businesses think that interoperability between organisations is needed before businesses will really commit to investing in IoT initiatives,

Conclusion

The IO and Webroot research shows beyond all reasonable doubt that the IoT is now high on the agenda of the UK's business leaders. Large numbers of projects are already under way across every industry sector, budgets for IoT projects are increasing and there's good evidence that businesses are taking a long-term view of their IoT investments rather than thinking about pilots. In particular, the fact that large numbers of companies are planning to hire chief IoT officers in 2016 shows just how entrenched the IoT is becoming in business life in the UK.

Encouragingly, the way that companies are investing in IoT points to growing levels of sophistication within the business community. Most business leaders agree that infrastructure must be priority – and many are now investing in that infrastructure as a service rather than a capital acquisition. And while they may not all be able to agree on exactly what their early IoT manifestations will look like or where their key benefits will accrue, there's widespread consensus that those benefits will be substantial and broad in scope.

Against this positive background are some less optimistic findings. Business leaders are fully aware of the barriers that exist to successful IoT deployments. Security, in particular, is a serious ongoing concern; so too is the widespread lack of skills needed to make their investments work. And while there is a strong sense that more community and curation-based initiatives are needed to ease the IoT's way into business, there is also a strong commitment to engaging in those community efforts as part of the industry's push to make sure that the IoT's promise is fulfilled.

There is clearly a long way to go yet. But this survey shows that the IoT is far more than just another set of ideas about our possible future. It's here, and it's growing; in the coming years, we will discover exactly how far, and how fast.

Methodology

The research on which this report is based was conducted by OnePoll, and gives an overview of the opinions of 500 CEOs and senior decision makers in UK businesses. A quarter of the respondents were from small and micro-size businesses (under 250 members of staff), half were from mid-size businesses (250-1,000 members of staff) and the final quarter from enterprises (over 1,000 staff members).