IoT FOR BUSINESS

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Overcoming the obstacles to IoT

Despite the benefits of adopting the internet of things, implementation can be slow and challenging

SOPHIE CHARARA

I t's complicated, expensive and will probably take twice as long as planned. But implementing the internet of things (IoT) in business is a wonderful and worthwhile adventure.

Rather than just admit it's difficult for big businesses and small enterprises alike, it's worth digging into just what exactly the IoT challenges are, how they're slowing down adoption and whether unrealistic expectations play a role.
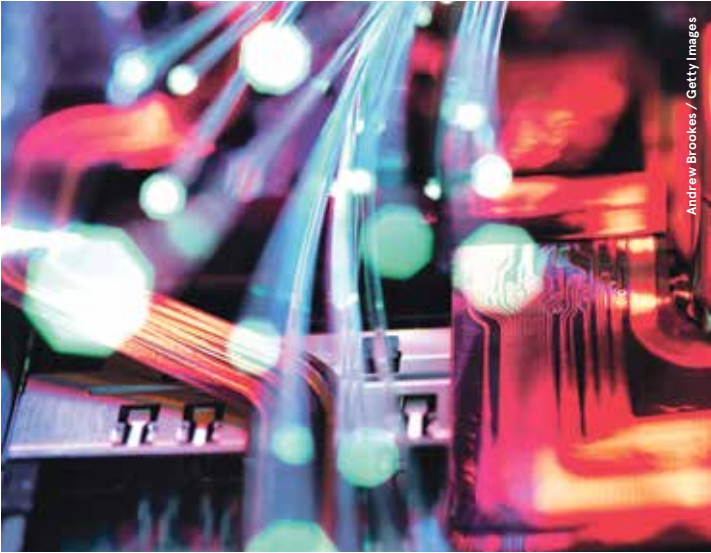
Firstly, connecting devices and operations takes time, lots of it, and it's a very common hurdle to overcome. The quip about it taking two times longer? That's based on research firm Gartner's estimates that in 2018, 75 per cent of IoT projects will take up to twice as long as originally planned.

Rainer Schroeder, chief sales officer at Nexiot, which delivers an end-to-end, sensor and software solution for freight logistics and supply chain management, says: "The pure rollout of IoT sensors takes two to five years. Especially in the beginning, when only a limited amount of assets are equipped with IoT sensors, there are very limited benefits. Projects with a two-to-five-year horizon aren't sexy."

Next, the cost. IoT deployments can involve costs of between $10 and $50 a sensor, with mounting prices and Mr Schroeder estimates that most large-scale environments require budgets of $1 million or above for IoT projects. Such budgets require executive approval and this involves an entirely different set of IoT challenges, notably the lack of expertise and confidence among business executives and board members when it comes to complex deployments of machine or IoT technologies.

"Challenges can be multi-fold, from not knowing where to start, to lack of internal expertise and resource, and the complexities of driving deployments securely," says Rob Sheppard, UK IoT director for Intel. Mr Sheppard adds that IoT is now increasingly a board-level discussion and there is probably an over-emphasis at this level on bottom-line operational cost-savings.

It's a sentiment echoed elsewhere when discussing common IoT challenges. According to Telefonica, because IoT is still a new concept to many businesses, teams "often see uncertainty among business leaders when implementing new technical architecture, especially when supporting large-scale business transformation".

There are a number of reasons for this including the expectations of business leaders. Sanjaya Ranasinghe, director of product in Europe for WiredScore, the company behind the international digital connectivity rating Wired Certification, says the speed of the consumer market may play a part. "Most IoT user experience is from smart-home tools such as those from Google, Nest and Amazon," he says. "Enabling these forms of automations and integration in the corporate environment is not the same."

What binds all these different IoT challenges together is the scale of transformation IoT can have on business operations. It's complex, costly and long term, and so requires a sometimes decades-long strategy and much expertise to make it successful. That's where proof of concepts, trials, standards and case studies come in.

Nexiot's Mr Schroeder says the whole industry needs to work on case studies and benchmarks on how IoT deployments can generate benefits. In the freight sector, for instance, the Technical Innovation Circle for Rail Freight Transport in Europe has created a resource for rail freight operators to calculate the benefits before implementation.

"We've found that many companies are approaching integration by enabling new business models based on various new factors, such as connectivity, apps, security, big data and artificial intelligence," according to Telefonica. "Most customers will start with a proof of concept or trial of our O2 Smart Compliance Solution."

This productivity and compliance product is designed to be flexible and assist businesses in the digital management of processes and compliance with real-time insights, bespoke to each location. One example of a case study is ScotRail which, Telefonica reports, was able to meet the Department of Transport's complex and demanding legislation criteria as a result of the implementation.

While IoT challenges for enterprise are largely separate to consumer smart-home tech, the one similarity is concerns of privacy and security remain. "The key to addressing both is a proactive rather than reactive approach to these matters," says WiredScore's Mr Ranasinghe. "Developing policies for both these matters, for all new IoT devices under consideration to be tested against, will maintain the integrity of the network and ensure user expectations are maintained."

It's a problem that the whole IoT industry is working to address. "IoT sensors generate tons of data," says Mr Schroeder. "Every IoT project thus collides with data privacy concerns: 'Is my data secure or can my competitor do espionage? Who owns the data? Am I allowed to track an asset or does this tracking indirectly also track human beings, for example the truck driver?'"

Intel's Security Essentials and Service Onboard were built specifically to enable security professionals to protect the platform and data it generates, essentially acknowledging how much of a barrier this issue of trust in the technology can be in enterprise.

"With the number of connected devices set to reach 26 billion by 2020, the number of potential attack points is staggering," says Mr Sheppard. Intel has also been working with Sogeti High Tech, a subsidiary of Capgemini, on an end-to-end solution of hardware and software that is pre-validated for interoperability. "They secure the entire IoT ecosystem, from edge to cloud and offer a path to IoT security accreditation," he says.

So when it comes to rolling out IoT enterprise-wide, there are almost as many strategies as challenges. Some companies trial ideas with existing operational staff, others bring in third-party integrators to define the deployment from proof of concept.

"Every IoT integration project is a new one, as standards and standardised interfaces are rare," says Mr Schroeder. "IoT integration thus needs human labour, great data scientists and time." ◆

Andrew Brookes / Getty Images

Most significant barriers limiting adoption of IoT and analytics solutions

Percentage of companies that have experienced the following barriers

50%		
40%		
30%		
20%		
10%		
0%		
Security	Information/operational tech integration	Unclear return on investment

Allocadia 2017

SECURITY STARTUPS
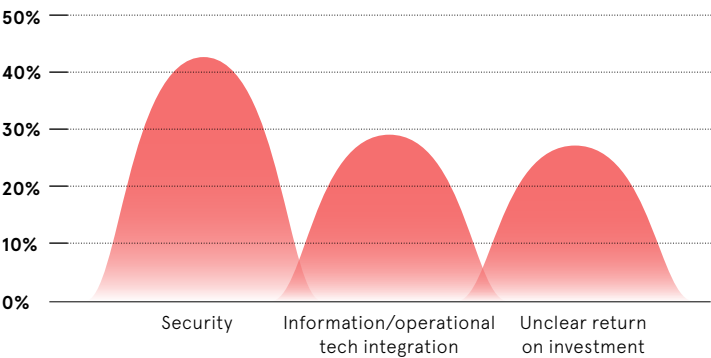
Top startups to watch in the New Year

Exciting new tech companies are innovating to make the internet of things more secure. Here are five to watch

DAVEY WINDER

01

Crypto Quantique

Crypto Quantique is quite literally redefining the concept of internet of things (IoT) security by introducing quantum computing. This UK company has developed the world's first quantum-driven secure chip on silicon. The Crypto Quantique chip can be integrated as part of the development process or retrofitted into any connected device. "It has been developed using the most advanced techniques in cryptography and quantum physic, which means each chip is unique to every device and unclonable," says company co-founder Shahram Mossayebi. "Of course, he won't say it is unhackable, but it's certainly as near to it as anything can be. Today, millions of devices are sent to facilities around the world to have secret keys 'injected' into them. Our product completely eliminates this huge cost and security overhead, and establishes a root of trust in a way that nothing else available today can." Here's the scientific bit: each chip can generate large numbers of unique and tamper-evident cryptographic keys by harnessing quantum processes in nano-devices. This eliminates that need for secure key storage on the device as the keys can be retrieved on demand. What's more, this chip is meant to be foundational, so the problem of IoT security being a bolt-on for legacy products could become a thing of the past. "This kills the 'feature function' conversation in IoT security," says Dr Mossayebi.

02

Karamba

Karamba has taken a sideways look at IoT security by looking at one of the 'things' that we trust to be secure but often isn't: the automobile. Yes, that's right, vehicles are not only increasingly part of the IoT ecosystem but come with myriad IoT technologies built-in. Connected cars are changing what we expect from our vehicles, but as numerous high-profile hacks have exposed this often comes with insecurity as the factory default. Israeli start-up Karamba decided to change this by sealing the electronic control unit (ECU), the brains of a connected car, to factory settings that cannot be tampered with. "Karamba Security's software automatically hardens IoT devices according to factory settings" David Barzilai, chairman and co-founder explains, continuing "the software is integrated as part of the IoT device software creation process." So, without requiring any developer cooperation, it automatically extracts factory settings from the device binary code and is embedded seamlessly into the device's software. "In runtime, when a deviation from factory settings, a cyberattack, is detected then Karamba's software prevents the attack" Barzilai says, adding that with this software "IoT devices do not rely on costly, cumbersome to deploy, updates. Utilising sub 5% overhead, the software hardens the devices without requiring any hardware or software changes." Of course, this same technology can work outside the vehicle space and in most any IoT infrastructure.

Ultimo Digital Technologies

Ultimo Digital Technologies (UDT) is developing a blockchain-enabled ecosystem that aims to trace and authenticate IoT data. The Sydney-based startup has created the Ubique Chain of Things (UCOT) "to disrupt a trillion-dollar global supply chain economy". By combining the cutting-edge technologies of 5G narrowband telecommunications infrastructure and blockchain to track every step of the supply chain, UDT aims to prevent the sale of counterfeit products. This is of concern to its Chinese backers as fake baby formula milk has become a life-and-death problem in China. As UDT says, UCOT will enable "manufacturers to monitor their products' journey from the factory floor right into consumers' hands". Of course, component and supply chain tracking itself is nothing new, but a system that requires no third-party scanning at any point certainly is. UCOT works by embedding microchip "labels" with their data securely stored in the blockchain. What this means is the data cannot then be forged, so product integrity is maintained. It also means this kind of technology could see UDT become a big player in IoT security as a blockchain-embedded chip within IoT devices would negate the risk of distributed denial of service, or DDoS, attacks that have become prevalent. With no central system vulnerable to attack, the DDoS threat becomes impotent.

03
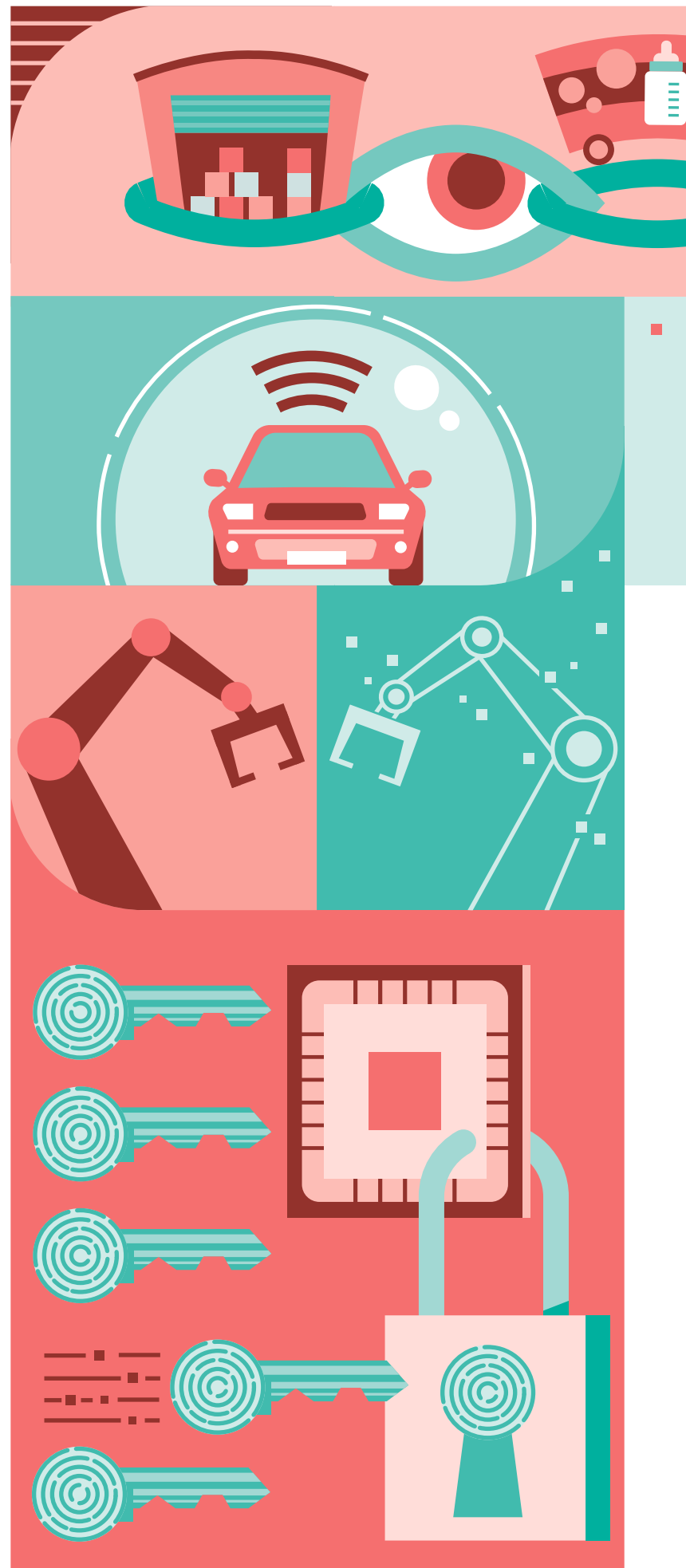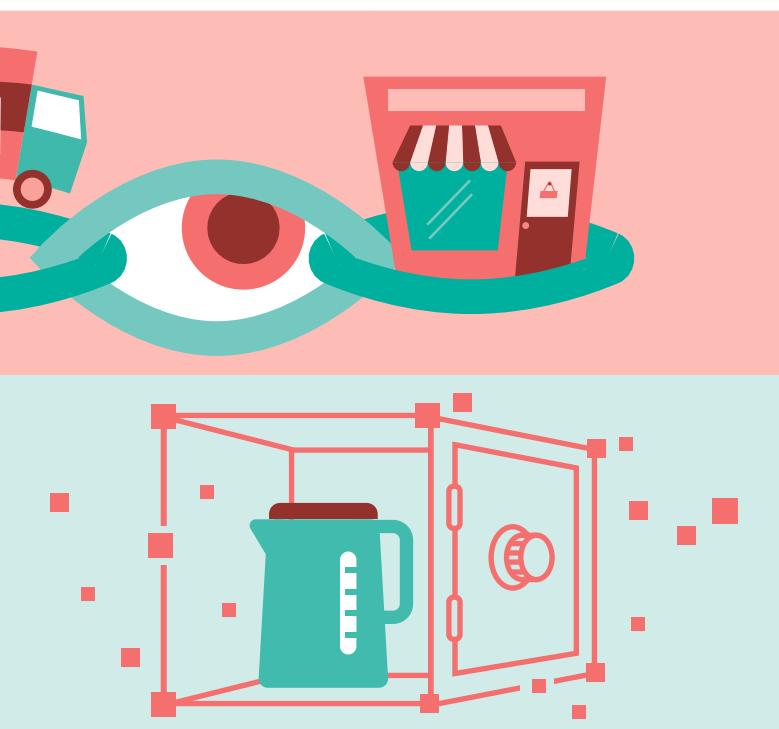
04

Iotic

Iotic helps make dumb machines smart by creating intelligent digital twins of connected IoT devices and the wider data estate using a cloud-hosted middleware space. Last year, Gartner heralded digital twins as a top-ten strategic technology trend. What they deliver is something often regarded as impossible: IoT security coupled with open interoperability. Imagine different platforms, services, networks and devices securely interrelating with public and private third-party sources. Robin Brattel, Iotic's chief executive, explains that this patented technology "enables secure programmatic interoperability of data and controls for interactions across organisations, supply chains and silos". Unsurprisingly,

it is garnering support in the high-value manufacturing and construction sectors. "It is the digital twins that interrelate, with actual devices, data sources and equipment never exposed," says Mr Brattel. "These interactions are securely brokered with granular access control; the source or control is always in charge adaptively choosing when and to whom they are visible." What this means is that by using an intelligent abstraction layer, Iotic can overcome the well-documented challenges of IoT security that have led to the creation of data siloes and vertical technology stacks that previously limited return on investment. "Our technology is being adopted by market-leading global enterprises to achieve the impossible," Mr Brattel concludes. These abstracted digital twins become a single source of truth, enabling solutions from simulation models to reality and minimum viable product to scale.

05

MagicCube

MagicCube co-founder and chief executive Sam Shawki, a former global head of remote payments with Visa, pondered why IoT transactions couldn't be as secure as your phone. Applications for everything from driverless cars to medical devices face the same fundamental problem: they're for IoT devices that can't be secured using legacy technology. He understood that the common methods of securing mobile transactions, such as secure elements, using a programmable SIM or trusted execution environments on the processor itself, offer high degrees of security, but neither are suitable for an IoT security

implementation. "IoT devices are more diverse than mobile phones," Mr Shawki explains. "Most IoT devices don't have SIM cards or security chips, either for cost reasons, form factor or due to the complexity of hardware security." This is where MagicCube steps in by virtualising the function of such hardware and creating a virtual vault that can practically reside in any IoT device regardless of its maker. "The disruption will be massive as is always the case when hardware is successfully replaced," Mr Shawki insists. "Suddenly, securing IoT becomes downloadable, remotely upgradable and instantly deployable." If MagicCube succeeds in this, it could shake the sector in the same way Netflix did with the video tape rental market. Indeed, IoT security could face the same Kodak moment that happened when a camera became just an app. ◆

Connectivity crucial to human productivity as offices get smart

With smart buildings and intelligent offices on the horizon, digital connectivity has some catching up to do before it can truly enable workspaces of the future

In a rapidly evolving digital economy where technology is increasingly central to operations, fast and reliable connectivity is the lifeblood of modern business. The widespread transition to cloud-based applications, smart devices and flexible workspaces has made digital connectivity vital in enabling employees to be more productive.

However, a recent study of business leaders by WiredScore has highlighted the large discrepancies between what companies expect from their office building's digital connectivity and what they get. While the vast majority (97 per cent) said quality of internet and mobile connection was important when choosing an office space, six in ten experienced connectivity problems on a monthly basis.

As the company behind the international Wired Certification standard, WiredScore is playing an important role in improving the UK's internet infrastructure through its ability to evaluate a building's digital connectivity and technological capacity. Its measurement focuses on four components that tenants require from an office space: to get set up straight away, pay an appropriate price for the speed they want, ensure optimum mobile experience and reassurance that the internet will not go down.

"We used to sip data, now we gulp it," says William Newton, president and Europe, Middle East and Africa managing director at WiredScore. "That's resulted in a changing set of requirements for businesses which the property world hasn't kept up with. It hasn't understood the seminal importance of digital connectivity in enabling business today. Having problems with office connectivity every month isn't acceptable, particularly with Gartner estimating

the average cost to a business of just one hour's internet downtime is $300,000."

WiredScore launched Wired Certification in partnership with the City of New York in 2013, with endorsement from mayor Michael Bloomberg. Following success in the United States, it launched its service in the UK in 2015 after winning the Greater London Authority's tender to be the official Mayor of London's Digital Connectivity Rating Scheme. Since then, demand has seen the company also expand operations to France, Ireland, Germany and Canada.

As a result of recommendations from WiredScore, 68 per cent of certified buildings have better digital connectivity. More than five million people globally now work in over 1,700 buildings undergoing Wired Certification, occupied by tenants who can be totally confident that their employees have the tools and connectivity to work to their maximum potential.

"Many of the landlords and buildings that WiredScore works with offer a best-in-class connectivity experience," says Mr Newton. "However, with proper guidance, any office building has the ability to improve the connectivity experience for its tenants, as long as landlords are willing to prioritise connectivity from the initial stages of development and across the building's life cycle.

"Wired Certification empowers landlords and developers to understand and implement the highest levels of digital infrastructure into their developments and refurbishments from the earliest possible design stage. It also allows them to understand the digital infrastructure of existing assets and prevent obsolescence and reduce risk".

The need for access to strong digital connectivity is only set to grow further as cities seek to introduce more smart buildings and intelligent office space, driven by the vast amounts of data at their disposal. But while the UK is already trialing 5G networks, many buildings are still far from being able to enable the superfast speeds needed.

Smart buildings use sensor technology to collect information about the inner workings of their infrastructure.

70 St Mary Axe, London: a Wired Certified Platinum building

The information is shared between systems to optimise each building's performance and then actioned to create truly intelligent offices that enable humans to work in the most efficient way.

"We are already seeing office space integrating deeply with building systems to drive the development of the intelligent office as more and more employers look to embrace the internet of things to increase productivity and talent retention," says Mr Newton. "Buildings will be user-experience focused, becoming more than just a workplace or home.

"Landlords will become brands people want to associate themselves with based on the amenities and community that will form around their developments. Future buildings will see seamless integration with the built environment as digital technology drives the world around us. All this will need to be enabled by great connectivity."

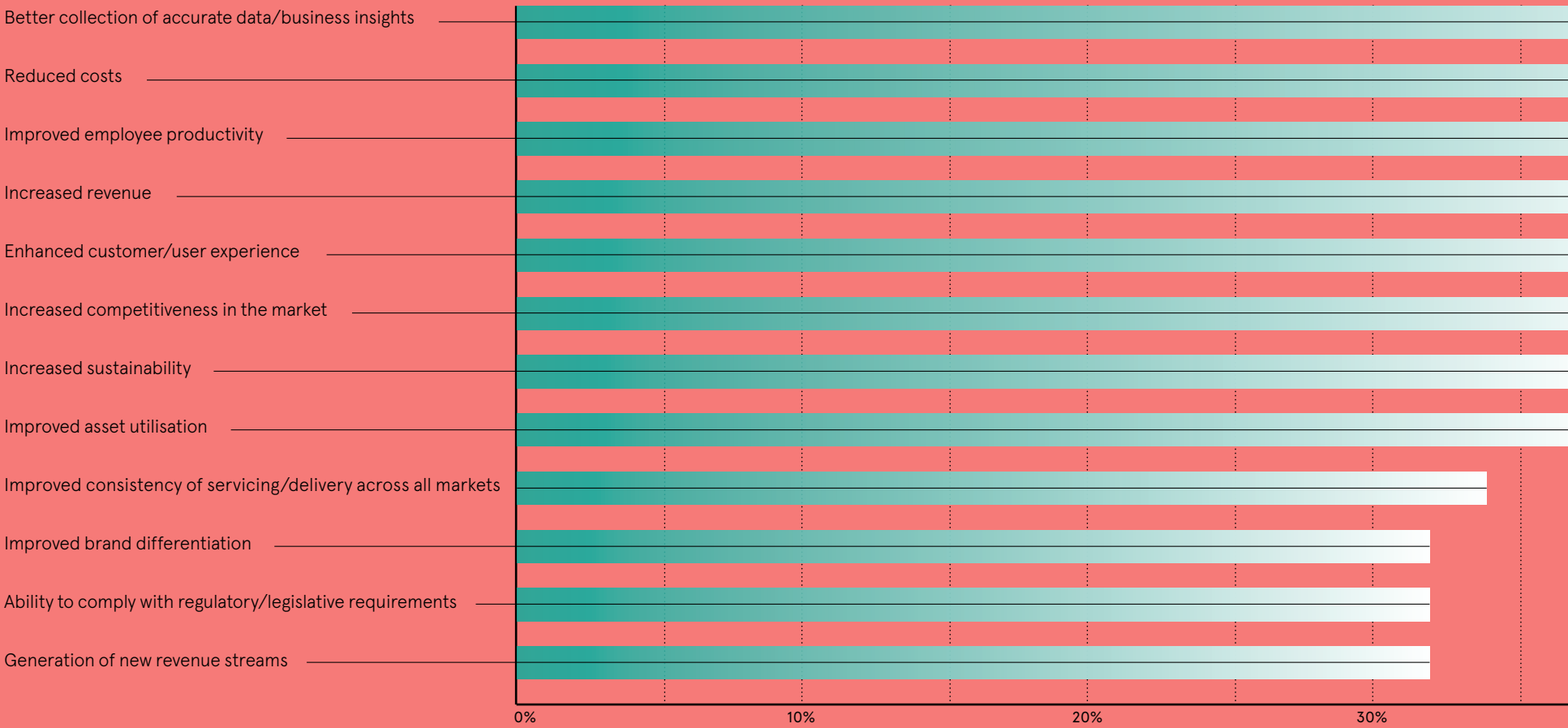**For more information please visit wiredscore.com**

> Having problems with office connectivity every month just isn't acceptable for a modern economy

WIRED SCORE

SECRETS OF IoT SUCCESS

With enterprise spending on the internet of t[...]
and analytics expected to explode in the com[...]
years, the future looks bright for the industry.
While many issues are still standing in the way
of adoption, such as concerns over security a[...]
integration, this infographic looks at the bene[...]
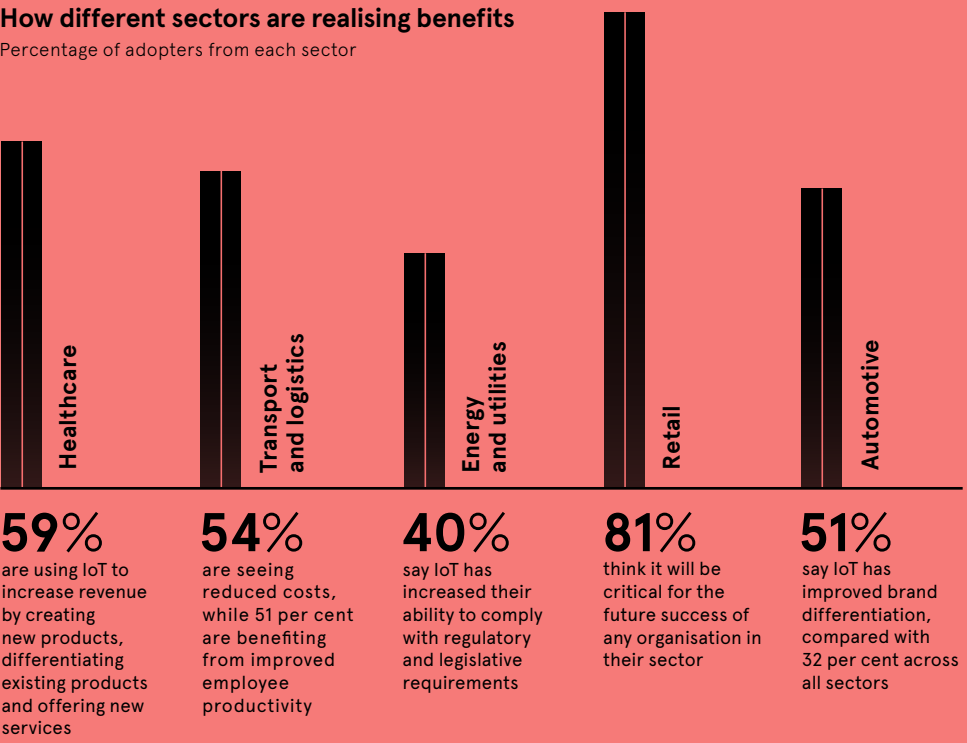being realised by the early adopters and what[...]
those on the fence can learn

Top benefits of IoT adoption
Percentage of adopters reporting benefits only

- Better collection of accurate data/business insights
- Reduced costs
- Improved employee productivity
- Increased revenue
- Enhanced customer/user experience
- Increased competitiveness in the market
- Increased sustainability
- Improved asset utilisation
- Improved consistency of servicing/delivery across all markets
- Improved brand differentiation
- Ability to comply with regulatory/legislative requirements
- Generation of new revenue streams

0% 10% 20% 30%

How different sectors are realising benefits
Percentage of adopters from each sector

Healthcare
59% are using IoT to increase revenue by creating new products, differentiating existing products and offering new services

Transport and logistics
54% are seeing reduced costs, while 51 per cent are benefiting from improved employee productivity

Energy and utilities
40% say IoT has increased their ability to comply with regulatory and legislative requirements

Retail
81% think it will be critical for the future success of any organisation in their sector

Automotive
51% say IoT has improved brand differentiation, compared with 32 per cent across all sectors

Vodafone 2018

Return on investment of IoT adoption
Reduction in costs and increase in revenues from IoT adoption

1-5%
6-10%
11-20%
21-30%
31-40%
41-50%
>50%

30% 20% 10% 0% 0%
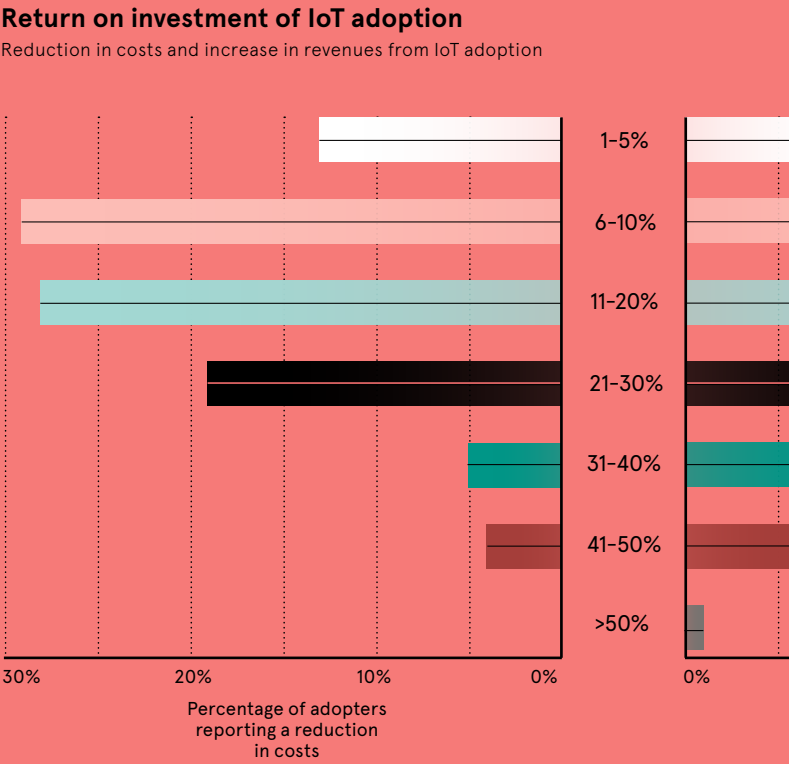
Percentage of adopters reporting a reduction in costs
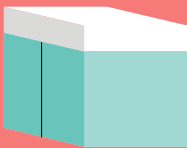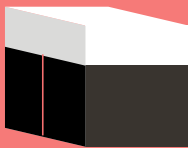
80%
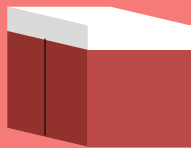
of global companies say they are more positive about the potential of IoT than they were 12 months ago
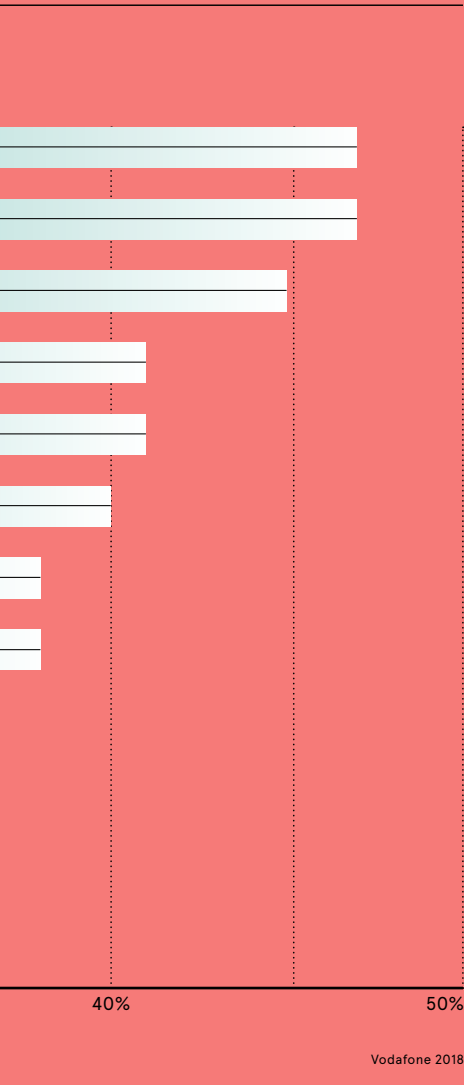
79%

believe that more than half of business processes will include IoT sensing/controls in five years

67%

of adopters say their IoT projects are mission critical to their business
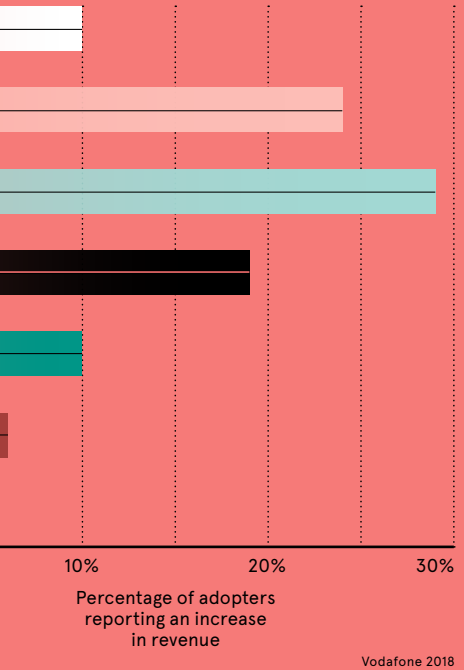
Vodafone 2018

Financial opportunities from IoT deployment

Where companies expect the biggest payback from IoT

16%

We will retain more customers who might otherwise walk away

25%

Customers will pay extra for premium services and support

18%

We can create efficiencies that reduce our cost base

22%

Better and more cost-effective products/ services that will attract new customers

16%

We can resell valuable data to third parties

Fujitsu 2018

Vodafone 2018

40%   50%

Percentage of adopters reporting an increase in revenue

10%   20%   30%
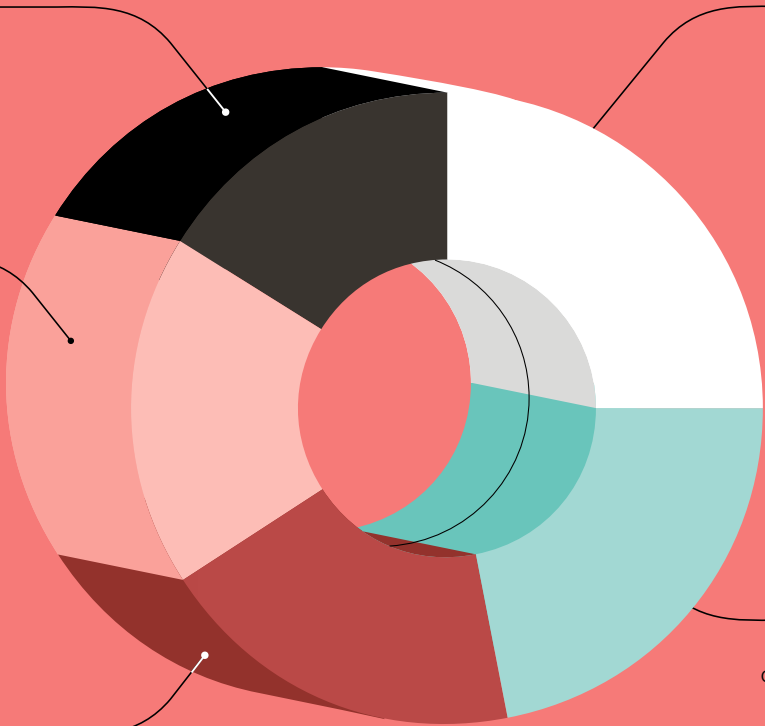
Vodafone 2018

IoT adoption remains low, but is slowly improving

Percentage of companies by stage of adoption

◆ Planning/ discussing   ◆ Proof of concept/ some implementation   ◆ Extensive implementation

100

80

60

40

20

0

2016   2018   2020 (estimate)   2022 (estimate)

Bain 2018

It's time for execs to take notice

Edge computing looks set to transform organisations across the public and private sectors

SOORAJ SHAH

United Airlines personnel at the departure gate, on the runway and in the plane have critical flight information at their fingertips. Medical professionals can use a virtual reality headset and tablet to assess and monitor brain impairment in athletes and soldiers using SyncThink's EYE-SYNC platform. Soon, a fleet of autonomous vehicles will be able to share data on road and traffic conditions, and update their journeys accordingly.
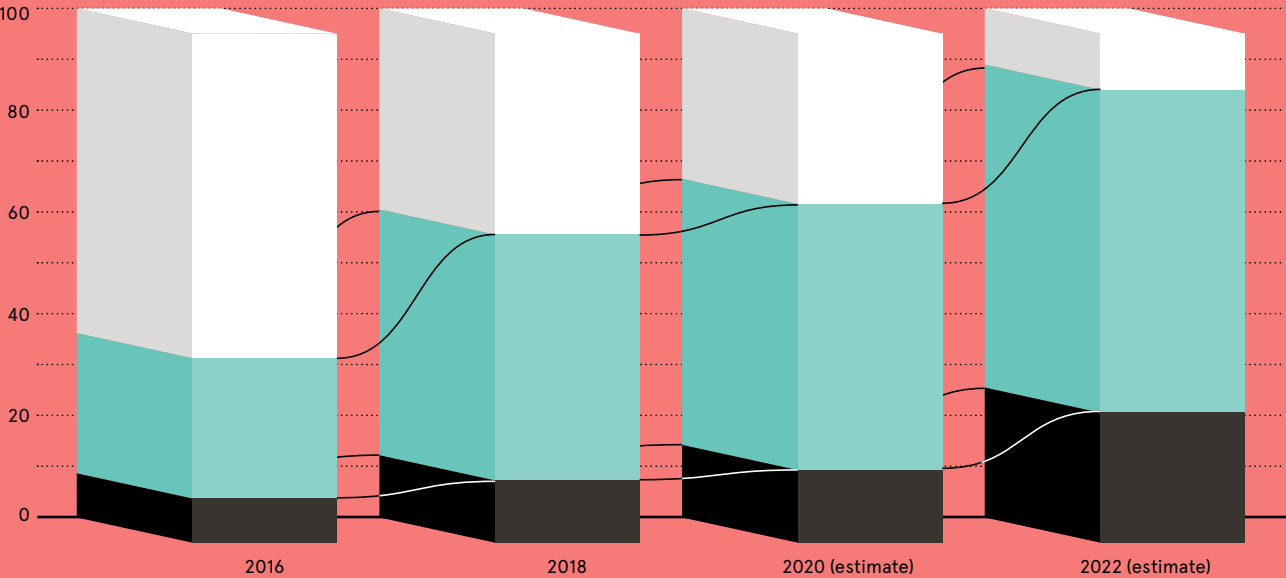
The common thread in all these examples is edge computing. Defined by research firm Gartner as products that facilitate data processing at or near the source of data generation, Ed Fowler, vice president and head of digital engineering services in Europe, the Middle East and Africa at Virtusa, says businesses should care about the concept. Why? The speed of results from edge-compute applications is vastly higher than traditional architectures and this can result in revenue-making opportunities, cost efficiencies and better services.

But do C-suite executives really care about edge computing? And is it really making its mark in business. According to a survey of 450 IT leaders, conducted this summer by Vanson Bourne and commissioned by Couchbase, edge computing is already being used or will be in the near future by 14 per cent of respondents. In fact, 10 per cent say they will use the technology within the next six months, nearly a quarter (24 per cent) say they will within a year and 31 per cent aim to adopt edge computing within five years.

The Couchbase research echoes the prediction from Gartner of huge growth in edge computing. Earlier this year, Gartner said only 10 per cent of enterprise-generated data is created and processed outside a traditional centralised datacentre or cloud. By 2022, it predicts this figure will reach 75 per cent.

So what is so special about edge computing that it can spur such growth in a short time? According to Marco Argenti, vice president of IoT at Amazon Web Services (AWS), there are three "laws" which call for edge computing.

"One is the law of physics where sometimes you need latency which is short; for example, moving a robotic arm or triggering an alert and needing to react instantly and there is no physical time to go back to the cloud, and for that you need to be able to act on data locally," he says.

The second law is of economics where it might not be economical to transfer all the data on the edge to the cloud and therefore it might be better to pre-process it locally.

The third is the "law of the land", in which a business might have particular requirements whereby certain data needs to stay local, such as regulation.

There are numerous examples of companies using edge computing already. Guitar maker Fender has used AWS products to align wood when it builds a guitar so that if the grain expands or contracts it doesn't break the instrument. Japanese design and engineering firm Yanmar uses AWS Greengrass ML Inference for image recognition intelligence at the growth stage of plants inside greenhouses, so it can automatically react to dispense water or fertiliser at the right times.

Retail is another industry that could look to benefit from edge computing in a different way as businesses wouldn't need to send all data back and forth between a store and datacentre. River Island head of architecture Charles Wilkinson explains there is an interest to use the technology to build out richer experiences in-store.

"There's only so much you can do over a 1 megabit connection. With some of the challenges that apply to the retail estate, where you have quite a few systems running and stores that have flaky internet connections, there are some interesting things we can do," he says.

Healthcare is perhaps the most interesting area where edge computing could make a difference.

"Edge allows you to manage your connectivity and disperse processing closer to where the data actually is. In the blurring of what you need in your network, compute and application space, edge is a natural evolution as you're trying to optimise one portion of your stack in the network by providing more localised services for your application or compute," says GE Healthcare chief technology officer Aaron Thomann, adding that edge is definitely an area the company is focused on.

Richard Corbridge, chief information officer of Leeds Teaching Hospitals NHS Trust, believes that moving the initial analysis of clinical information to edge computing is crucial for healthcare organisations that truly want to benefit from going digital and is the answer to many digital healthcare problems.

"We have a basic pilot of edge compute underway; in the renal ward of our hospital we collect data from IoT devices that are monitoring patients, we transfer this information directly into the trust's electronic health record (EHR) from bedside, with the authentication of clinical staff to the IoT devices through proximity cards, and then again at the 'head of the bed' EHR unit," says Mr Corbridge.

"The edge element allows national early-warning scores (NEWS) for patient care to be analysed, compared to the information during the length of stay of the patient and, where necessary, alerts or tasks are created."

And this is having a positive impact; in 2018 the organisation had collected almost 1.6 million NEWS scores by the end of November and these created automatic actionable information for clinicians to act upon.

> ## Edge allows you to manage your connectivity and disperse processing closer to where the data actually is

In the future, Mr Corbridge hopes the organisation will be able to use edge compute and machine-learning to consider environmental factors such as road traffic density, air quality, weather, school holidays and other open data sets. The compute power will apply these factors to the healthcare data collected at the point of admission, enabling a date to be set when the patient should expect to be discharged.
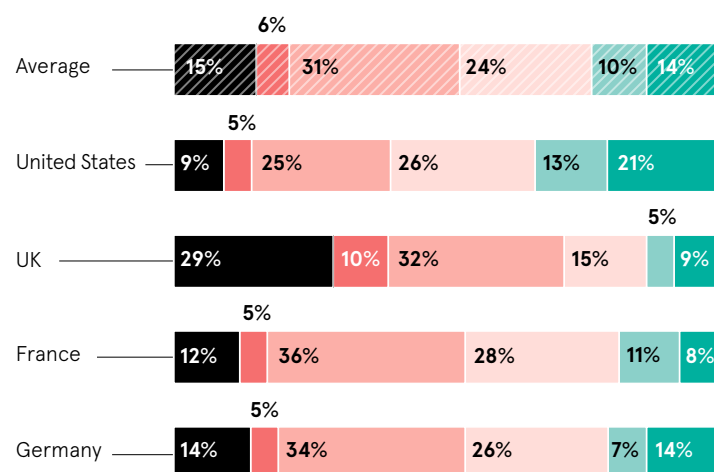
"This will enable the whole system to plan towards a date that is built from 15 years of experience, but continues to learn and apply new environmental factors," he says.

Without doubt, there's movement from businesses in all sectors to consider and use edge computing. It's time for C-level executives to sit up and take notice, especially the 15 per cent who believe it's impossible to tell when they'll be using it. ◆

Estimated timescale for companies to begin using edge computing

Survey of digital and technology leaders

◆ It's impossible to tell ◆ Within ten years ◆ Within five years ◆ Within a year
◆ Within six months ◆ We're already using this technology

	It's impossible to tell	Within ten years	Within five years	Within a year	Within six months	We're already using this technology
Average	15%	31%	24%	10%	6%	14%
United States	9%	25%	26%	13%	5%	21%
UK	29%	10%	32%	15%	5%	9%
France	12%	36%	28%	11%	5%	8%
Germany	14%	34%	26%	7%	5%	14%

Couchbase/Vanson Bourne 2018

Commercial feature

Perfecting IoT operational management

Management is the biggest challenge of the internet of things, but new tools are here to address it

DevicePilot customer and IoT founder, Erik Fairbairn, with his operational management dashboards

Once considered a hyped-up novelty, IoT has now become a transformational force in the world of business, estimated to be worth $619 billion by 2026. From innovative new startups to major conglomerates, companies of all sizes are searching for ways to take advantage of the opportunities unlocked by IoT.

For example, by connecting a product, businesses can transition from being just a pure hardware provider to become a service provider, which can generate significant recurring revenues. "If you are an existing hardware manufacturer, connecting your product isn't just another feature, it can totally reshape your business model," says Pilgrim Beart, chief executive and founder of IoT management company DevicePilot.

Fully embracing IoT can give companies unprecedented insight into not just the condition of their products, but also the user experience. "Businesses can see when, say, a boiler is close to failure or when paper towels in a dispenser are running low. Good for the vendor, as you're not servicing products unnecessarily, and good for customers because of higher availability levels, as problems are anticipated and addressed before they even occur," says Mr Beart.

It isn't only existing products that are being added to IoT; connectivity is making entirely new types of business possible.

Smart food waste company Winnow is one of hundreds of ambitious startups relying on the connectivity offered by IoT. Winnow need to be able to see what their customers are putting in waste bins, so they can provide feedback around menu planning to help clients reduce their waste. Without IoT, their service would be impossible to deliver.

These exciting new IoT-driven firms are highlighting a risk to established businesses. "It's important that legacy companies understand the potential power of IoT because to some extent, if they do not, they will be replaced by innovative firms with new business models," says Mr Beart. "IoT is not just a new product feature, it's a whole new way of doing business."

Businesses no longer have to wait for customers to call with complaints about products not working. The connected product can flag up problems and perhaps even be fixed before the customer knows. This is a major opportunity to meet customer needs, but only if the entire business becomes more proactive in identifying customer concerns.

Mr Beart has been working at the cutting edge of IoT innovation throughout his career. In 2006, he co-founded smart home platform AlertMe, later purchased by British Gas as the basis for their Hive offering, an experience which gave him unique insight into how IoT companies need tools to help them manage their devices better, rather like a "Google Analytics for IoT".

"I think IoT was definitely in the 'gimmick' category when it first became known, but after the initial explosion of creativity, over time the ecosystem worked itself out and the true value has been discovered," says Mr Beart. "IoT is now about delivering essential services that power our daily lives and form the basis of business. Whether it

be healthcare monitoring, energy production or flood defence systems, IoT is everywhere and increasingly driving our critical systems."

The growing importance of, and reliance on, IoT technologies means high uptime levels are required at all times, especially as the number of IoT products around the world increases at a massive rate. There will be more than 30 billion IoT devices in operation by 2020, according to Statista.

"Many IoT products are complex and the underlying technology is still immature. If you think about an IoT product, there is a long chain of technologies that all need to work effectively, from in-built software to connected cloud platforms and smartphone apps. The net result of this complexity is that uptime is often pretty poor; in our experience, many IoT services struggle to achieve even 90 per cent uptime," says Mr Beart.

Even a relatively short downtime in an IoT device can damage both the bottom line and corporate reputation. Not a week goes by when IoT problems aren't wreaking havoc. Just a few weeks ago, smart home security provider Yale came across an "unforeseen issue" during unplanned maintenance, leading to reports of some customers being locked out of their homes and unable to open their front doors, or arm and disarm their alarms.

According to Mr Beart, businesses need a means of monitoring their customers' experience closely, so they can be the first to know about potential problems and be able to nip them in the bud.

"Companies need to ask themselves how large must their user-base grow before they invest in an IoT management solution, as the bigger you are, the harder you fall. As an IoT vendor, you become not just responsible for your product, but also for the service that it's delivering. You can't just sell

your product and forget about how it is being used," says Mr Beart.

In the past, adding connectivity to a product was a difficult task to achieve and required firms to build almost every aspect themselves from scratch. This time-consuming and expensive process was not ideal, especially as the resulting product would not be compatible with anything else.

But now it's possible to build many IoT products from off-the-shelf parts, making it radically faster to build a high-quality product. A robust operational management system is one of the vital IoT parts, empowering customer support teams and enabling them to gain actionable insights.

"It's about the whole customer experience. If you can't measure it, you can't improve it. A lot of IoT businesses are running blind; they have no idea what they have deployed and whether it is working properly," says Mr Beart.

Essentially, it's a problem of scale. If there are only 100 devices deployed, it's entirely possible to understand them all manually with a spreadsheet. But as soon as you reach a thousand devices or more, this manual approach becomes unsustainable.

"For a connected product, you need a tool to let you see your customers' experience in aggregate, to make sure it's a good experience, and this is what DevicePilot is focused on perfecting," Mr Beart concludes.

For more information please contact p.beart@devicepilot.com or visit devicepilot.com

Pilgrim Beart
Chief executive and founder

"
Reliance on IoT technologies means high uptime levels are required at all times

90%
uptime achieved by many IoT devices

£250k
additional annual revenue captured when using an operational management system

55%
of healthcare organisations already have IoT deployment

30bn
devices expected worldwide by 2020

20%
IoT market share of the healthcare sector alone

4x
reduction in customer support resolution time with DevicePilot

devicepilot

LOGISTICS

5G, IoT and a revolution in logistics

While mobile phone users and service providers debate the relative cost and uses of 5G, the sector most likely to benefit from the high-performance network is the logistics industry

BURHAN WAZIR

Since most consumer goods, such as clothes, TVs or laptops, travel thousands of miles and change ownership at least half a dozen times before reaching their destination, logistics presents an ideal hothouse for innovation using 5G and internet of things (IoT) devices.

The industry, including shipping, air and rail freight, is a major UK employer. Market research shows more than 56,000 businesses are directly supported by the sector, which employs around 2.2 million people or 8 per cent of the UK workforce. The UK's logistics industry is also ranked eighth in the *2017-18 Global Competitiveness Index*, according to the Freight Transport Association.

Most parcels spend the bulk of their time in transit dead-zone areas; goods are initially logged at manufacturing plants, warehouses and delivery depots, but little real-time information exists during the journeys between these points. The use of 5G and IoT would deliver live information to systems that could, for the first time, follow most items from factory to customer.

Now imagine a batch of OLED television sets produced in a factory in an industrial zone in China. After manufacture, the TVs would be loaded on to a reusable plastic palette fitted with an IoT sensor. As the TVs make their way from the factory to a warehouse, the sensor would return information about journey times, traffic surge spots or a change in ambient temperature. All the information would be stored in a cloud and used to improve services. After delivery, the TVs would be loaded on to similar plastic palettes, which would record journey information between the warehouse, distribution centres and customers.

"One of the challenges I have read about with 5G is of a few early adopters and pockets of full connectivity," says Richard Blown, head of innovation at Hermes. "We will probably see a greater uptake by 2022 and full influence of 5G by 2025." Mr Blown's role at Hermes' innovation laboratory in Leeds helps the company solve possible future problems by assessing new technologies such as 5G around 12 to 18 months ahead of introduction. The team works on proof of concepts and creates prototypes.
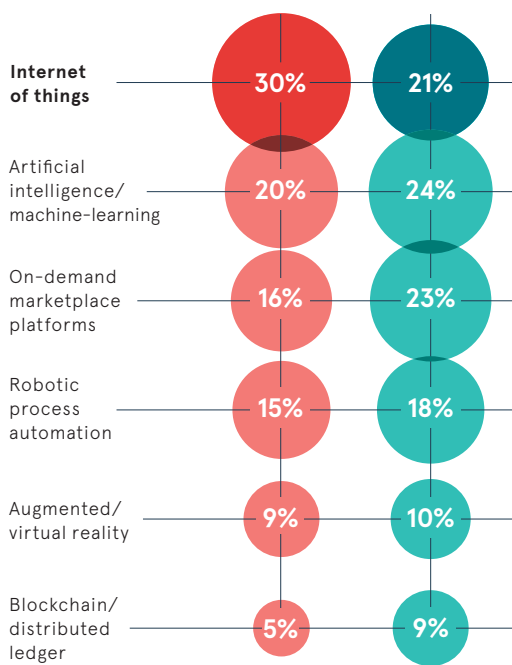
Mr Blown says the adoption of 5G, enhanced by IoT devices, could offer a host of new functions to logistics companies. "The real bonus here is the actual tracking of packages with 5G connectivity, low latency, high speed and wide availability. With that alone, you have the capacity of having millions of devices connected at the same time. The
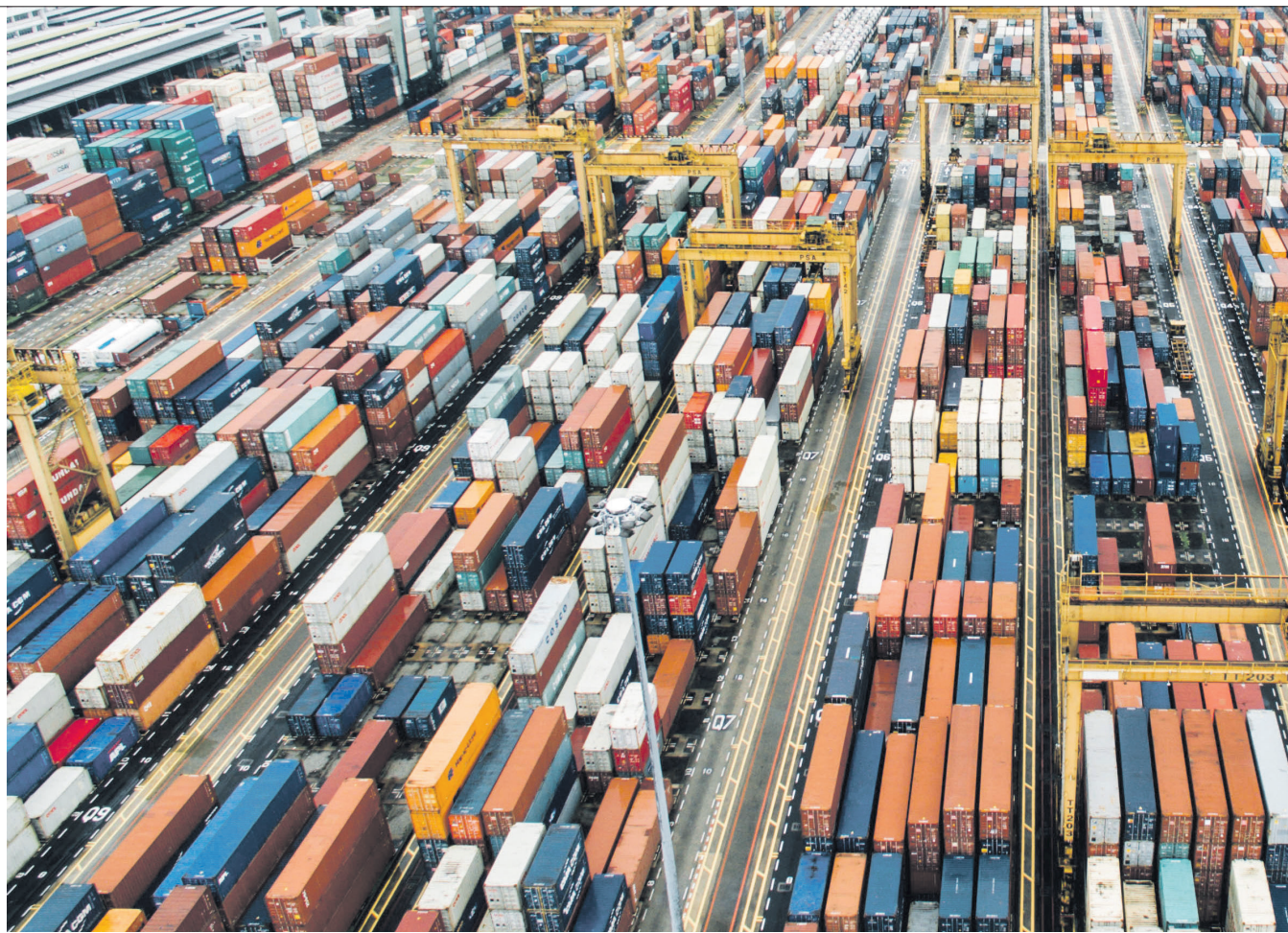
IoT receiving the most investment in transport and logistics

Percentage of chief information officers (CIOs) officers making moderate to significant investments in the following

◆ Transport and logistics CIOs
◆ All CIOs

	Transport and logistics CIOs	All CIOs
Internet of things	30%	21%
Artificial intelligence/ machine-learning	20%	24%
On-demand marketplace platforms	16%	23%
Robotic process automation	15%	18%
Augmented/ virtual reality	9%	10%
Blockchain/ distributed ledger	5%	9%

KPMG/Harvey Nash 2018

information available would be real time in its nature, whereas currently we rely on scan points. The real-time tracking would give us data with fine-grain accuracy," he says.

Recent developments, such as just-in-time deliveries, which were once only accessible to a select few, could become mainstream as 5G and IoT devices make tracking deliveries possible in real time. The IoT devices would boost efficiency between warehouses and distributors, giving customers a clearer visibility of their deliveries. IoT devices also benefit from deeper coverage in traditionally low-connectivity areas such as garages and basements. This would occur in tandem with warehouses upgrading to robot workers for manual labour and drones for deliveries.

The IoT tracking devices are key to any improvements. "For transportation and parcels, it is very important devices run on batteries and have a long battery life," says Sofia Tropé, IoT business developer at Telenor, the Norwegian multinational telecommunications company. "Both 3G and 4G devices are usually very power intensive since they are repeatedly being switched on and off. The new IoT trackers

are much more efficient at conserving energy; they are able to go into a sleep mode when they are not relaying information.

"Think of it like a 'do not disturb' sign on the door of a hotel room. The device itself can tell the network that it is asleep. When something happens like a temperature change or a change in location, it can then wake up and relay that vital information."

Few industries better illustrate the complexity of our global world than logistics. The British Property Federation's 2015 *Delivering the Goods* report estimated the sector's economic productivity is set to grow by 83 per cent between 2013 and 2035. The report also calculated that the ecommerce sector will see a 10 per cent annual increase in trade by 2021 to £48 billion.

The volume of traffic through UK ports presents unique opportunities for IoT and 5G connectivity. Ports in the UK handled more than 484 million tonnes of goods in 2017, down by 2.6 per cent on the previous year. At the same time, UK ports recorded an 18 per cent rise in traffic with 24.1 million units passing through them in 2016, a 1.8 per cent increase. Growth is also predicted in areas such as delivery fleet

British IoT proptech startup delivering a 'single-pane view' for intelligent buildings

Inefficient and costly management of building systems constrain access to data and deliver a poor experience for tenants. It's time for change. Enter the "android-style" IoT platform that gets you back in control

An award-winning UK startup Gooee is a tech spin-off from the global lighting organisation Aurora, whose serial entrepreneur chief executive and founder Andrew Johnson founded Gooee in 2014 with Neil Salt and Simon Coombes. Gooee has invested five years in developing an internet of things (IoT) Building Intelligence Platform unifying building control, communication, sensing and data analytics.

Driven by entrepreneurial innovation and value creation, their focus is on building performance solutions for tenants, facilities managers and owners. Gooee provides the necessary hardware and software that drives significant cost optimisation, operational efficiencies and enhanced occupant experiences.

To date, the term proptech has been broadly used to describe a variety of solutions that focus on real estate finance. Gooee has developed a unique way to converge IoT, the built environment and the people within it to create a truly smart real estate proposition.

The incumbent dominance of legacy companies within the building management sector has caused stagnation, where owners, managers and occupiers struggle to effectively get a grip on the buildings they inhabit. The lack of access to data is the issue and the vast majority of facility managers claim this is their number-one problem in addressing these traditional challenges.

As one of the largest British startups in IoT proptech, Gooee is disrupting this space with both innovative technology and subscription-as-a-service business models to achieve significant cost-savings and higher rentable value, while enhancing the employee experience for the occupiers, making businesses more productive.

It's about peeling back the layers of a building, its systems and data, and bringing it all together, presenting the infrastructure and data in one place, and enabling customers to build value around it – Gooee's "single-pane view".

But, first, it's necessary to understand why this march to intelligence is important.

Function vs efficiency
Traditional buildings face three central challenges: energy, space and people.

Globally, buildings contribute to a massive amount of energy consumption and this has led to legislation that demands buildings achieve energy quotas. Failure to comply will mean that potential and current developments will become unrentable.

In a commercial environment, when looking at space at any given time, 50 per cent is underutilised. At best this identifies a need to repurpose rented space, at worst this is expensive and unnecessary cost.

Finally, people represent 90 per cent of business costs, but a disengaged employee environment can cause businesses to lose billions a year in lost productivity.

Intelligent IoT backbone
Gooee helps solve these issues by converging infrastructure and unifying data sets. Their "android-style" platform combines technologies to ensure a more open, accessible and easily customisable solution.

Gooee's enterprise-scale, Bluetooth network plays a significant part in this solution. Lighting's view into spaces and dense building coverage makes it an ideal host for sensing, communications and beacon technology. Consolidating multiple systems into one MIoT (mesh internet of things) network backbone saves significant costs and future-proofs a building infrastructure.

The aim is to help businesses gain control, save money and engage employees or retail customers, using cloud technology and IoT to do this at scale, across multiple sites.

Value as a service
The convergence of physical infrastructure and technology will help businesses drive new services and revenue opportunities, while building owners can command a higher rentable rate because the building is smarter.

50%
of office space is underutilised

JLL Activity Working Report

97%
of real estate industry professionals agree digital and technological innovation will impact their business

The Road to Opportunity, KPMG 2018

40%
of global energy demand and CO_2 emissions comes from buildings

World Green Building Council and Advancing Net Zero Initiative

Businesses need to focus on people going forward and that should drive this intelligent revolution. Buildings are now about the connected community, and about how I can make my business more sustainable, streamlined, engaging and, ultimately, successful.

Pioneering the "British internet of things", Gooee is rapidly expanding operations across Europe with significant design, manufacturing, and research and development taking place in the UK.

For more information on creating intelligent buildings and connected communities please visit gooee.com

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> " The use of 5G and IoT would deliver live information to systems that could, for the first time, follow most items from factory to customer

management devices and automotive telematics.

The use of 5G and IoT will speed up transportation of goods by rail, road and motorway. "There are lots of areas where improvements could be visible," says Mr Blown. "Other examples would see more connectivity between smart cities and vehicles. At the moment, you have a large network of vehicles, trailers and carriages, hubs and depots in the UK, and vans delivering parcels. They don't often speak to each other. With 5G and IoT, all these vehicles in the network would have the capability to talk to each other."
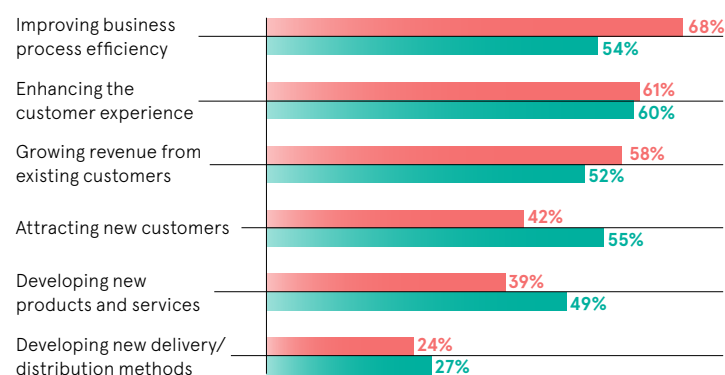
If you are a fish importer in France, your reputation relies on you serving the best and freshest fish in Paris," says Ms Tropé. "By knowing that you can tell your end-customers when your fish was delivered, where it was caught and how long it has been in storage, you can guarantee them the best quality."

Ms Tropé adds that the trackers offer myriad other functions for private users once price points drop. "We see a great demand for pet trackers," she says. "As an owner, you could buy a collar with this technology already installed in it. If your dog runs away or is dognapped, you could easily track the animal. Maybe more importantly, you could also use the tracker to register how far the dog has walked each day, who last walked it and whose turn it is next. Many dogs spend too much time on the couch." ◆

Most important goals when prioritising digital technology
Global survey of chief information officers (CIOs) in transport and logistics

◆ Transport and logistics CIOs   ◆ All CIOs

Goal	Transport and logistics CIOs	All CIOs
Improving business process efficiency	68%	54%
Enhancing the customer experience	61%	60%
Growing revenue from existing customers	58%	52%
Attracting new customers	42%	55%
Developing new products and services	39%	49%
Developing new delivery/ distribution methods	24%	27%

KPMG/Harvey Nash 2018

chuttersnap/Unsplash

GOOEE ®