

The Connected Business

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Developers look beyond the app

Competition is forcing companies to skip the download stage, reports *Tim Bradshaw*

Measured against any metric, Apple's App Store has created a whole new economy since its launch in 2008. Owners of iPhones and iPads spent \$20bn on apps in 2015, the company said in January.

However, just like the wider economy, Apple and Google's app stores have a growing inequality problem.

While the rich — such as social media site Facebook and King Digital Entertainment, developer of the *Candy Crush* video game — get richer, other developers are finding it ever harder to get their apps noticed. More than 1.5m are available for download from Apple's App Store alone.

But a study by Activate, a tech and media consultancy, showed that users spend more than three-quarters of their time on just five apps.

"App adoption and monetisation are heavily skewed towards the top few apps," says Alex Austin, chief executive of Branch Metrics, a mobile app technology provider, in a November blog-post. He added that "99 per cent of the value is centralised to the top 0.01 per cent" of apps.

Yet at the same time it has never been more important for companies to build a mobile presence. ComScore, an internet analytics company, found that usage of mobile apps overtook time spent on desktop PCs in the US past year, with 18-34-year-olds now spending 61 per



cent of their digital media time on smartphones. Flurry, a mobile analytics service owned by Yahoo, found that time spent on mobile more than doubled overall in 2015.

The dominance of the smartphone is something of a challenge for developers hoping their app will become the next big thing. This has pushed some companies to experiment with different kinds of mobile engagement, including some that do not require apps to be installed on devices at all.

From virtual assistants — software

that performs secretarial-type functions — embedded in messaging services to apps that can be "streamed" instantly, as one would an online movie, technologies are emerging that offer different ways to avoid downloading apps.

Ryan Hoover, founder of technology

recommendation site Product Hunt, coined the phrase "invisible apps" to describe companies that use instant messaging services such as Facebook Messenger, business focused chat app Slack or simple text messages as the main way to reach their users.

"Some of the hardest things for every company is gaining attention, distribution and becoming a daily part of someone's life," he says. "That's one of the reasons Slack has had so much traction with developers."

Mr Hoover says he is reminded of about a decade ago, when everyone was building on top of Facebook's platform instead of having their own isolated portals in their efforts to attract customers. For instance, after initially launching as a mobile app, Paris-based expenses tracking start-up Birdly decided a Slack "bot" — an autonomous computer program — would do the same job faster. Users send a photo of a receipt to the Birdly bot, which scans the data to a spreadsheet.

Other examples of "invisible apps" include Ukraine-based PocketTour, a travel agency accessed via messaging app Viber, while San Francisco company Digit helps users to manage their finances via text messages.

Using messaging apps for more than just chatting is already widespread in Asia thanks to the likes of WeChat and Line, which have long been used to send money or hail a taxi.

In Silicon Valley, Facebook has so far been the most aggressive in promoting this behaviour outside Asia. In 2015, it opened up its Messenger app to other developers. They can create extra features, such as emoji keyboards for embedding graphic symbols including

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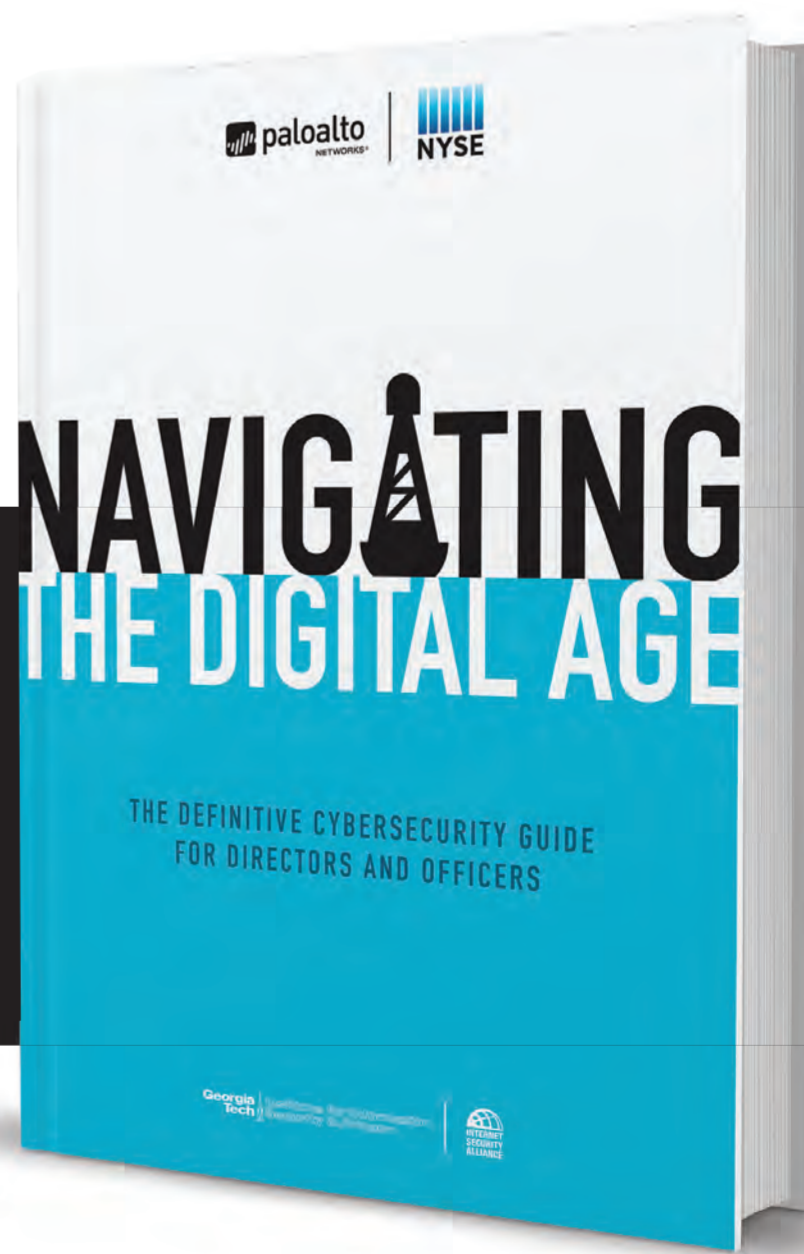
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Augmented and virtual reality are on the way but still face hurdles

Hot topic High prices and a lack of awareness by executives could hamper success, says *Jane Bird*

Virtual reality is helping developers to build homes at West End Gardens in the smart market town of Stockton-on-Tees in England's north-east. They can see how finished buildings will look without having to go on site. And those who do go can use augmented reality on a smartphone or tablet to see how the properties will appear when they are completed.

The software has revealed some minor flaws in design plans, enabling errors to be rectified more quickly and cheaply than at the construction stage.

The building consortium that commissioned the virtual application was "blown away" by it, says Dan Riley, managing director of Spearhead Interactive, which developed the software.

Martin Hawthorne, group director at Thirteen, which is building West End Gardens, says: "The software has huge potential in helping builders work with planners... if we are to build the hundreds of thousands of new homes we need in the UK."

The global market for virtual reality will reach \$6.7bn this year, and is estimated to hit \$70bn in 2020, according to Taiwan-based TrendForce, a market research company. Large companies are seizing on the technology, which has led to a spate of takeovers such as Facebook's \$2bn acquisition of Oculus VR, which makes the Rift headset, in 2014.

Rob Gear, an IT expert at PA Consulting, says that after several false dawns for virtual reality: "Near photorealistic

simulations, unthinkable eight years ago, have become the norm." So far, virtual reality has been used mainly for computer games, advertising and marketing, often blurring the boundaries between commerce and entertainment.

Another UK company, Bristol-based Opposable VR, developed an application for a client that shows how it protects internet data.

Dan Page, a consultant at Opposable, says: "It's different from conventional advertising because it is so immersive. We create vast landscapes for single brands that would be impossible in real life without colossal budgets."

Augmented reality, often seen as a rival to its virtual cousin, has also been used in advertising. This technology allows information to be superimposed on the real world while users remain fully aware of their surroundings. It is beginning to play a role in industrial training and assisting engineers in hazardous environments, such as the nuclear and oil and gas industries.

Mr Riley says: "Virtual and augmented reality let us bring products and components to life, adding voice-overs and graphics that look like the real thing. It's easier to understand and more engaging [than conventional video]."

But such technology is power hungry. California-based graphics chipmaker Nvidia says only about 1 per cent of current PCs can handle virtual applications using headsets such as the Oculus Rift and HTC Vive, both of which are due to go on sale this spring. Most PCs would



Executive fest: visitors to January's World Economic Forum in Davos try out the Oculus headsets
Matthew Lloyd/Bloomberg

'Some people will use such technology responsibly, others will use it to the detriment of their health'

require a sevenfold increase in performance to work properly, Nvidia says.

Another problem is that virtual reality headsets can cause nausea. This can be solved by improving the frequency at which images are displayed and the stereoscopic view.

But Mr Gear also warns there could be psychological repercussions, such as reckless behaviour from those who no longer know the difference between the real and virtual worlds. In a 2009 study by Stanford University, a group of children was immersed in a virtual simulation of playing with whales. When asked about this a week later almost half recalled it as if it actually happened.

Mr Gear adds: "How technology like virtual reality will play out over time in a mass population is still to be determined. Some people will use it responsibly and others will use it irresponsibly, to the detriment of their health."

A further potential downside was highlighted in research by Siemens, an engineering company, which showed that people performing a manual task using a head-mounted display did worse

than those using conventional methods.

Mr Gear says there is scope for more research to understand how companies may gain real business benefits rather than digitising to no advantage.

Cost may also be a barrier to people taking up the technologies. The Oculus and HTC sets are expected to be priced at \$600 or more and need a PC costing about \$1,500 to operate. However, Google Cardboard headsets cheaply turn any smartphone with the right apps into virtual reality viewers.

In future, virtual reality will be less about wearing headsets and more about social interaction and collaboration, Mr Gear says. People will be able to create 3D video on social media, capturing and sharing their real-world experiences.

The biggest threat to the technologies may be that the industry itself is raising unrealistic expectations of what it can deliver, Mr Gear says.

And Mr Riley adds that an additional risk is the lack of awareness on the part of company bosses. "You don't have a budget for something you don't know exists," he says.

Which is best? Comparisons are inevitable but they are also unfair

Last year, I spent some time under the sea, playing with a giant whale but without getting wet. Later, I led an army storming castle walls, then took a break to wash some dishes and was unexpectedly killed in a robot uprising. A busy and emotional half-hour, all told.

I was, of course, testing out the latest advances in virtual reality — in this case, the nascent platform being developed by Taiwan's HTC. It felt like a corner was being turned in taking it from a much-hyped novelty act to something that could genuinely become part of the next generation of home entertainment.

But while the technology behind virtual reality feels like it is taking leaps forward every year — as groups such as Facebook and Sony are drawn to the huge potential in consumer applications — there is a lack of similar innovation in the market for augmented reality.

The biggest news for the latter in recent years was the decision by Google to slow its Google Glass project, a pair of bulky spectacles that contain a small internet-connected screen that can be navigated by a side mounted touchpad.

I never found Google Glass wholly pleasant, and it was not overly useful for everyday life. The privacy difficulties of a head-mounted camera were obvious and the fact I looked a bit weird did not help. However, augmented reality should not be dismissed. Indeed, as a productivity tool, its applications will eventually have a profound effect on

the way we work and play.

In fact, it is unfair to compare augmented and virtual reality. Augmented reality adds to whatever is already around you, with helpful information, directions and labels, while virtual reality takes the user away to somewhere else entirely.

Last year, I tested out a pair of glasses that would help a worker find the right pallets in a large warehouse, speeding up the time taken to fulfil orders. Elsewhere, people in museums used an augmented reality application to learn more about the exhibits.

I led an army and was unexpectedly killed in a robot uprising

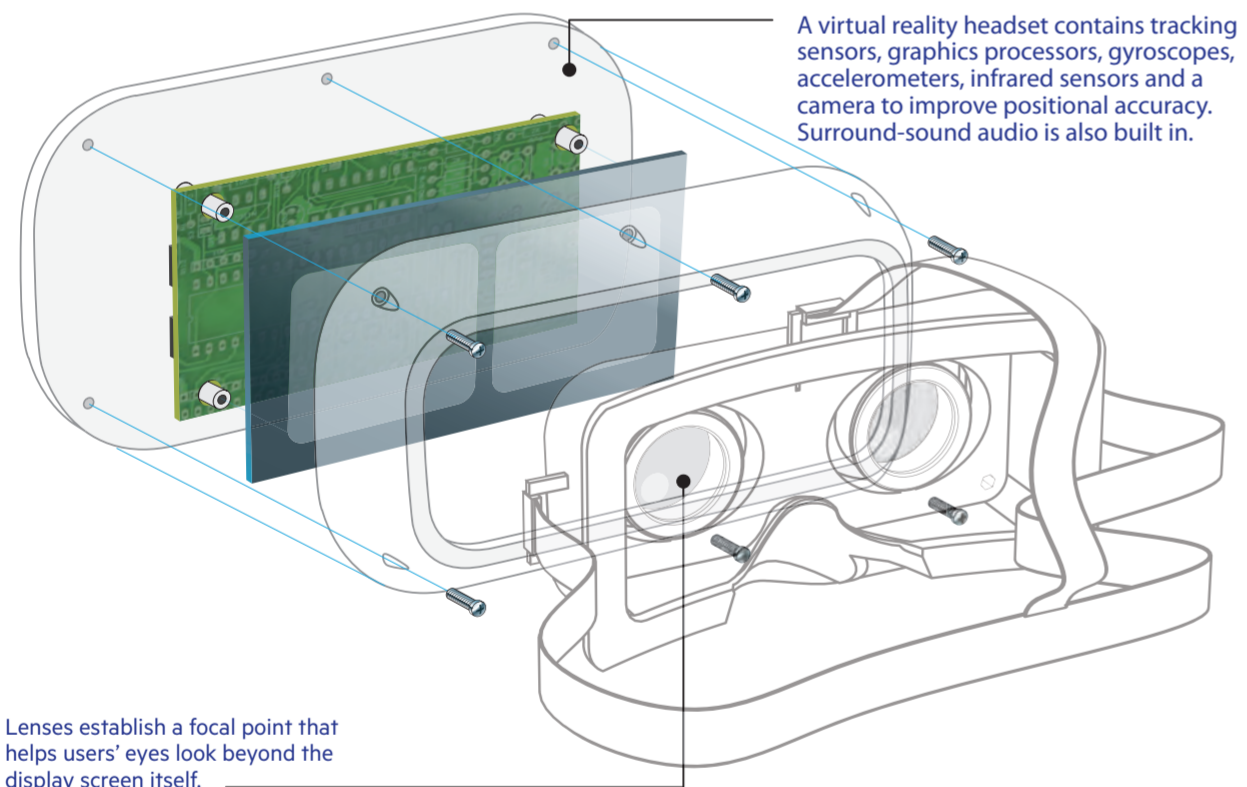
Shopping centre owners are considering how to use augmented reality to help people move around the stores and choose clothes. Google has promised to come back with the next generation of Google Glass, which will doubtless improve the design and applications.

Of course, people with augmented reality glasses can play games, watch videos and communicate, but I would have little hesitation when given the choice between a tiny screen in the corner of my eye or the virtual reality experience of sitting on the Moon in a 1950s-style drive-in to watch a blockbuster film. In this case, virtual beats augmented every time.

Daniel Thomas

Virtual reality

A wholly immersive 3D, computer-generated experience that, with the use of devices such as headsets, waistbands, jackets, treadmills and special gloves — or PCs and video walls — enables us to see and take part in a simulated real-world environment.



A virtual reality headset contains tracking sensors, graphics processors, gyroscopes, accelerometers, infrared sensors and a camera to improve positional accuracy. Surround-sound audio is also built in.

Lenses establish a focal point that helps users' eyes look beyond the display screen itself.

Augmented reality

This 'overlays' additional information on whatever you are looking at on your device. So if you are looking for a railway station, hotel or restaurant, an app on your device could bring up the distance and direction to the nearest one or show you a menu or tariff. If you are looking at famous building, you could be shown points of interest while you look at it.



So what's the difference?

With augmented reality you are aware you are still in the real world, but virtual reality allows you to be completely 'absorbed' in whatever fantasy or training environment you have entered.

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The Connected Business

Smallholders turn to message service to share farming advice

Agriculture Basic mobiles help growers around the globe to swap information, writes *Andres Schipani*

Coffee plants belonging to growers on the edges of the Peruvian Amazon basin have been infected with a fungus said to have originated in Kenya more than a century ago.

For many smallholders, advice from African growers on how to cope would be as welcome as water in the desert. But, as many do not have internet access, it can be just as hard to come by.

That is what WeFarm, a London-based start-up, is aiming to achieve for the more than 43,000 smallholders signed up to its services, who use simple mobile phone text messages to share advice and information. For Arianna Valentini, WeFarm's Peru-based Latin America co-ordinator, the service is "creating a social network of farmers".

With established programmes in Peru, Kenya and Uganda, and pilots in Haiti and the Dominican Republic, it offers a peer-to-peer service that lets farmers ask questions and receive crowdsourced responses. WeFarm is now looking to move into Colombia, Brazil, Ivory Coast, Tanzania and India.

"This has been useful to coffee farmers here, especially because many like me do not have internet at home but do have mobile phones," says Celia Aysana, part of a co-operative of coffee growers near San Martín de Pangao in Peru. "You can get quick answers from Andean as well as African farmers."

Even if most smallholders do not have access to a computer or a smartphone, many at least do have basic phones.

According to Peru's statistics agency, 85 per cent of households have at least one mobile, while just 40 per cent of the country's population uses the internet. Moreover, a report in January by the World Bank says that "nearly 70 per cent of the bottom fifth of the population in developing countries own a mobile phone".

Carolina Trivelli, an economist and Peru's former minister of development and social inclusion, who now runs a nationwide mobile money initiative, says: "There is huge potential in trying to squeeze as much as possible out of these basic mobile phones, particularly in rural areas."

Kenny Ewan, WeFarm's chief executive, developed the service following experience working in Latin America with Cafédirect Producers' Foundation, a UK-based charity, and other non-governmental bodies. It was launched last year with £500,000 seed funding from tech company Google through the Google Impact Challenge, and Wayra, the incubation hub of Telefónica, a telecommunications company.

Mr Ewan says he wanted to challenge the traditional model of how information is shared. "In international development, the power usually resides with the people who are 'experts', but in reality farming communities already have lots of expertise," he says. "We're giving farmers a voice and showing them that their knowledge is valuable, and I think that that's a very powerful message."

WeFarm now hopes to raise £2.5m so



Real-life bean counter: a farmer in Peru inspects his coffee plants — Pilar Olivares/Reuters

it can grow its service to reach 1m farmers around the world by the end of 2016.

Smallholders using WeFarm send texts to an in-country shortcode for free. The message is then processed and filtered automatically by the organisation's online system. An algorithm determines who are the most relevant people to receive each question and WeFarm forwards the answers.

For instance, answers to coffee questions are directed to coffee farmers. The farmer who asks the question receives a handful of messages from local, national or international peers. Ms Aysana has already had tips on how to deal with rust, a fungal disease affecting coffee plants.

WeFarm has a network of volunteer translators for international answers — say from a Kenyan farmer replying in English or Swahili to a Spanish-speaking one in Peru — and can also provide answers in French and Haitian Creole.

Ms Valentini says WeFarm is also

looking at providing translations in Quechua, which is widely spoken in Bolivia, Peru and Ecuador.

In Peru, Ms Valentini first started spreading the word through coffee and cocoa co-operatives and appearances on local and national radio shows.

What started as an advice service for coffee and cocoa growers now deals with problems related to banana, cotton and other crops.

Increasingly, says Ms Valentini, there are questions about animal husbandry. For example, a coffee farmer from Kenya's Meru district has boosted his income by rearing rabbits.

After sending a text message, he started receiving answers from a woman who had bred rabbits for more than 20 years in Peru's region of Cajamarca. She offered advice on the best rabbit breeds, how to raise them and what to feed them. Six months later, the Kenyan farmer had sold 50 rabbits.

App aims to disrupt data providers

India

Phone pairing on chat app offers a way for those on low incomes to cut costs, reports *James Crabtree*

Indian chat app Hike faces an uphill battle to catch up with WhatsApp, the world's most popular messaging service owned by social network Facebook. But founder Kavin Bharti Mittal says one new feature is proving popular with users across the developing world.

"It came out of an insight that data [in India] is expensive," he says of Hike Direct, a service added to the group's main app in October that lets users swap files such as music and video at high speeds without having to be online.

India has about 400m internet users, most of whom use the internet via mobile devices. Roughly 250m now own smartphones but even those with expensive devices often save money by rationing data use or turning connections off.

Perhaps as many as a third of smartphone users have no data connection at all, according to IT analysts Convergence Catalyst. They rely instead on occasional WiFi or on "side loading" files to their phone using memory cards.

Mr Mittal argues Hike Direct is ideal for such users. It works like a faster, more intuitive version of Bluetooth, using an underlying technology called WiFi Direct that is built into most smartphones. The feature allows any two Hike users to pair their phones and swap files if they are near each other.

"Growth for Hike Direct is tremendous," Mr Mittal says, although he will not reveal actual numbers, saying only that users have so far swapped about 10m files.

More generally, about 100m use Hike's main messenger globally, far behind the roughly 900m claimed by WhatsApp. But Hike enjoys a comfortable second place in India, and says it is growing rapidly elsewhere.

Mr Mittal's father is tycoon Sunil

Bharti Mittal, founder of Bharti Airtel, India's leading telecoms group by market share. Hike is a joint venture between Bharti and SoftBank, a Japanese telecoms group that has invested heavily in Indian start-ups.

Some industry figures view the technology underpinning Hike Direct as a potentially disruptive force — especially if Hike and its rivals allow many users to pair phones, rather than just two at a time, so effectively creating an impromptu local sharing network.

"That is why this could be a brilliant concept, and one uniquely suited for India," says Roy de Souza, chief executive of Zedo, an India-based digital advertising business. He says that in India even rich people turn off their data connections. "What they really want is a kind of WhatsApp that doesn't cost them data. This could be it."

Services like this could be especially



Kavin Bharti Mittal: Hike Direct came about because even the rich cut data services to save money

popular on university campuses, Mr de Souza says, or in a small office buildings. But Mr Mittal has bigger ideas. "Eventually, you could think of this connecting together a whole rural village that isn't online," he says.

Making this happen will not be easy. So far, the broader network concept is untested. Any company developing the technology could face legal difficulties, given its probable use as a way of sharing pirated music and videos. Setting up a network would also drain the batteries of connected phones, a deterrent factor.

It would help if other services beyond Hike adopted it, too, says Jayanth Kolla, analyst at Convergence Catalyst. "As a feature, so far it is a useful addition to Hike, but it isn't disruptive yet," he says.

"But I would expect other chat apps like WeChat in China and Line [based in Japan] to add something like this soon, and then it could really take off."

Boiling down the problem of broken pipes in a digital world

Internet of things

Homes of the future might diagnose problems, but who will be liable for damages if something breaks down? By *Sarah Murray*

The Reality Editor, a tool developed by the Fluid Interfaces Group at Massachusetts Institute of Technology, points to a future in which everything from chairs and beds to televisions and cars can be connected, manipulated and controlled in new ways.

Household objects equipped with processors and communications capabilities can, for example, be programmed so that your bed can turn on the heating system in your car as soon as you get up in the morning.

But if such technologies might make home living more convenient, they will also usher in profound changes for businesses and society.

Critically, internet of things technologies — which include processors, software and web-enabled sensors — also allow objects to capture and transmit data instantly and constantly.

On the plus side, this can pave the way for the delivery of more efficient services. In New York, for example, rubbish bins and recycling units developed by Bigbelly, a US-based technology and waste management company, can automatically notify collection agencies when they are full.

With everything from lamp-posts and traffic lights to weather satellites generating information all the time, cities can now analyse data to improve the world around us. Harriet Green, general manager of internet of things and education for US technology company IBM, says: "Knowing from these predictive models where the pollution is coming from allows city planners to make important decisions on how to improve air quality."

Such technologies offer companies the chance to cut costs, says Gabe Batstone, chief executive of

Contextera, a software start-up that develops services for industrial workforces based on machine learning — the technique behind much artificial intelligence — and internet of things technologies. With sensors generating data on the status of equipment, the work of maintaining machinery and preventing breakdowns will be transformed, saving companies large amounts of money, Mr Batstone says.

"There's information on the device, the device knows what maintenance is needed and the employee has access to a supercomputer — otherwise known as a cell phone — right there," he says. "That's going to have a monumental

Bins and recycling units can automatically notify collection agents when full

impact on business operations."

In the water industry, for example, sensors can supply continuous data on the physical integrity of pipes, helping to detect weaknesses and prevent leaks.

The same principle can also be put to work in the human body. Wearable and implantable sensors that can track everything from blood sugar levels to heart

rates will allow irregular or life-threatening symptoms to be detected early. They will also enable people to take steps — through changes to diet or exercise regimes — to manage conditions such as diabetes or to lower their risk of illness.

This could turn healthcare from a system designed to cure diseases and repair injuries to one that works to prevent illness and maintain good health.

Of course, such changes also have implications for human resources. When equipment can be fixed remotely and patients remain at home, engineers and nurses may need to take on different roles. For some companies, it will mean hiring people with new skills.

The advent of smart thermostats such as Nest, for example, means plumbing and heating companies now need IT skills since a system breakdown may have as much to do with a broadband connection as with the pipes or the boiler. "It's turned that industry on its head," says Tim Devine, a digital business expert at PA Consulting Group.

"The guy running a boiler company, where the key skill is engineering, pipes, gas and big chunks of metal, is now running an IT company."

Internet of things technologies will also create a need for new services and business models. "It's great that I can get a warning on my smartphone telling me someone is walking around my house," says Mr Devine. "But I need to be able to ring a local security service, otherwise I'm just worried."

Moreover, because these new models depend on a complex system of organisations — from software companies to broadband service providers and device manufacturers — questions of liability will arise.

Mr Devine cites the example of a home heating system: "What happens with the boiler if the thermostat turns itself up while you're away and you come back to a £1,000 heating bill. Whose liability is that?"

While such questions have yet to be addressed, Mr Batstone argues that consumer technology has already paved the way for adoption of the internet of things by a broad range of businesses.

"In our personal life, we're used to our calendar telling us what time to leave to go to a meeting, giving us a map and checking the traffic," he says.

"So what the consumer side has already done is to allow us to accept that artificial intelligence and machine learning can be useful."



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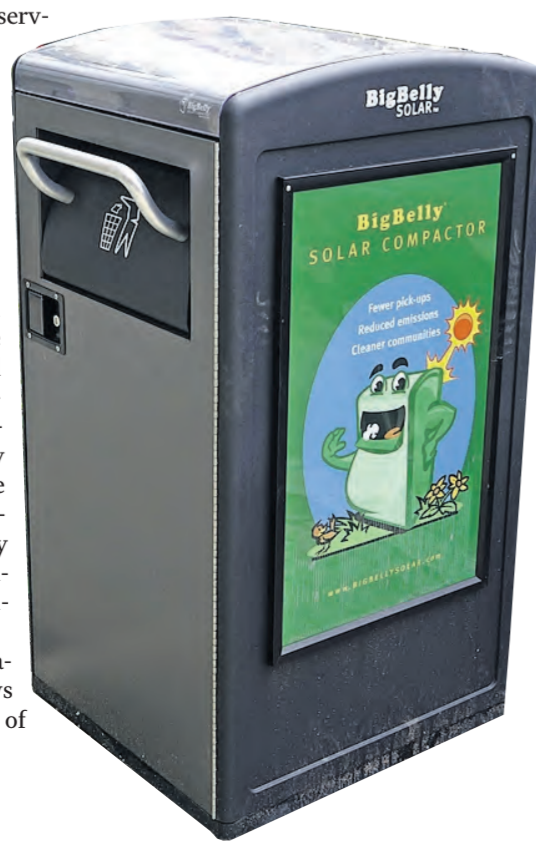


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