



**THE  
NEW  
ECONOMY**

PRESENTS

# Cognitive building blocks

Our lives are built around data.  
Unlocking it could bring exponential  
customer insight, boundless business  
collaboration and unprecedented profit

IN ASSOCIATION WITH



# Let your company think for you

In an increasingly hyperconnected world, cognitive enterprises are revolutionising the way business is done and will more often than not win out over the competition

By 2020, billions more individuals will be 'always on' – connected to the internet – as the Internet of Things becomes a reality. Many won't even know they're always-on because sensors, beacons and other embedded technology will work away autonomously, transferring volumes of data about what they're doing and where they're going. But one way or another it will become just about impossible for anybody with an intelligent device of any kind to be anything other than always-on.

As such, enterprises will have to learn to think like the consumers who are the very means of their existence. This will require businesses to harness reams of data in creative ways that meet the needs of their customers, whether other businesses or individuals. In this world, every kind of business will be affected, including those that don't necessarily

see themselves as dealing with a mass of consumers. In a report titled *Asset Management 2020: A Brave New World*, consultancy PwC casts a speculative eye at the very different environment that wealth managers will inhabit in just four year's time. Between now and 2020, total assets under management are forecast to exceed \$100trn, up from around \$64trn today, as more people become wealthier.

So far, so good. But PwC points out that wealth managers will have to change dramatically to service this hyperconnected generation. By 2020, most of their clients will come from the Millennial generation and they will have no memory whatsoever of a pre-internet age. Even older Millennials will have grown up accustomed to text messaging and video communication.

Thus, in a glimpse into how the hyperconnected era will change the makeup of this vast and global industry, PwC imagines a young Chinese woman who checks a dating app on her mobile device. The dating company has a sister investment company and the app automatically matches her dating preferences to an ideal financial strategy that proposes a selection of appropriate funds. The woman then selects a fund, which plays a video providing useful information about it. If she's sufficiently convinced, she can invest via her mobile account with one touch.

Like the young Chinese woman, the next generation of investors will expect asset managers to be able to communicate with them in a seamless fashion that shows a familiarity with their interests and aspirations. »

Because their primary, habitual means of gathering information will be social media networks and specialist applications, they will expect information to be presented in a dynamic, interactive manner that allows them to quickly access the detail they want. And that detail must be instantly relevant and tailored to their individual circumstances. They will have little patience for delays or disconnects between the systems they use to organise their lives. Thus, the wealth management industry will need to ensure that touch-points between their organisation and clients are more numerous, more in-depth, and spread more evenly across the whole process. All this will require cognitive, cloud-based businesses – that is, ones that harness vast amounts of data in a way that enables them to think.

### Bridging the digital gap

PwC's example of a young Chinese woman is particularly apt because China, along with the US, is leading the world in the digital evolution that underpins cognitive enterprises. By contrast, Europe is lagging behind and in some cases far behind. As Bhaskar Chakravorti, Senior Associate Dean of International Business and Finance at Tufts University, and Ravi Shankar Chaturvedi, research fellow at Tufts, point out in an article in Harvard Business Review, "the old continent is in the midst of a digital recession."

They point out that of the 23 European countries included in their 50-country study, only three were rated as outstanding. This means their high levels of digital development are attractive to global businesses and investors and that their digital ecosystems are positioned to nurture start-ups and internet businesses that can compete globally. These are the essential foundations for the cognitive enterprise.

In terms of digital evolution, no less than 15 European countries have been losing momentum since 2008, with the Netherlands coming in dead last. Worse, European countries occupy the nine bottom spots in the list of 50. Alarmingly, the digitally receding countries include the supposed powerhouse economies like Germany, UK (albeit improving) and France. "Across the rest of



To transform digitally based businesses into truly cognitive enterprises as rapidly as possible, IBM Watson works with **70,000** developers and partners with more than **350** companies



The global cloud computing market will grow from **\$41bn** in 2011 to more than **\$241bn** in 2020



By 2020, **1.7MB** of new information will be created every minute for every human being on the planet

Source: Forrester, PwC

Europe, the state of digital evolution has been mediocre and the pace of improvement [has been] tepid", the authors argued. "This dismal performance points to a glaring – and growing — digital gap as Europeans watch the US and China take the lead in tech innovation."

The authors attribute various reasons for Europe's digital lag but two important causes they advance are the preponderance of red tape and sometimes-hostile regulation. At one point, they remind us, the European Parliament voted to break up Google over alleged anti-trust abuses as the dominant search engine, a position that many would say is a laudable achievement rather than a situation to deplore.

### Digital single market

However, Europe is waking up. The President of the European Commission (EC), Jean-Claude Juncker, has announced a "digital single market"

that is intended to deliver the equivalent of \$471bn (€439.82bn) a year and 3.8 million jobs to the regional economy by 2016. As for Britain, it's already woken up. The percentage of retail penetrated by business-to-consumer e-commerce is nearly twice the European average. Indeed it's higher than in the US.

Among a range of remedial measures that Brussels must introduce rapidly if it's to meet its self-imposed deadline is to take an axe to the many roadblocks that greatly inhibit cross-border digital networks. Territorial licensing, for instance. As the EC explained in a 2014 statement explaining a directive on multi-territorial licensing, which is an endless headache for license-holders, this is a €6bn-a-year market. Some 250 collective management organisations handle this sum every year mainly on behalf of authors and they jealously guard their turf in each member state.

On the bright side, Brussels has begun to tackle these obstacles to the inevitable digital revolution, paving the way for genuinely cognitive enterprises that leverage cloud-based technology into revenue-growing propositions.

Heard of predictive analytics? That, combined with demographic data, is what progressive stores rely on to help keep their shelves stocked with hot-selling products. A major online store in the Netherlands, for example, uses IBM's cloud platform to do just that.

Although the 'thinking company' might sound like something Jules Verne would've written about, the difference between Twenty Thousand Leagues Under the Sea and the cognitive business is that the one was (an albeit prescient) work of imagination while the other is happening right now. And it's happening at a furious pace.

### Lines of code

To take the automotive industry as an example: most F1 fans probably assume that the Mercedes-Benz that Lewis Hamilton has just driven to his second straight World Drivers' Championship has little in common with their new family car. In fact, the apparently mundane family vehicle embodies the full impact of the cognitive revolution. It may carry passengers about, but it's also been turned into a platform for software intended in the long run to enhance the driving experience. No less than 100 million lines of code have gone into that ve-

hicle (see below) – 93 million more than in an advanced passenger jet.

Once we understand that our cars have been quietly turned into cognitive machines, we can understand what the cognitive era can do for our own enterprises. The world is being rewritten in code. So this isn't pie in the sky – an esoteric exercise in computer science that promises much and delivers little. Executives don't need to know that an API is an Application Programming Interface, only what it does for the enterprise.

Think of cognitive applications as voracious maws that devour data in much the same way as basking sharks ingest plankton. The difference is that the sharks convert plankton into energy, while IBM's



### The world in code

100,000,000  
lines of code in a new car

5,000,000  
lines of code in smart appliances

1,200,000  
lines of code in a smartphone

80,000  
lines of code in a pacemaker

**"IBM's cloud-based platforms transform data into stuff you can use. Data is taken in, analysed and understood, and finally converted into value-adding information"**

cloud-based platforms transform data into stuff you can use. As a result, even unstructured data is taken in, analysed and understood, and finally converted into value-adding information.

To transform digitally based businesses into truly cognitive enterprises as rapidly as possible, IBM Watson works with 70,000 developers and partners with more than 350 companies. That number is rising all the time. In this collaborative process all the parties are learning. Rather than try and shoehorn an off-the-shelf product into an enterprise, what they do together is design bespoke, highly malleable solutions. In this way IBM Watson has launched 100 cognitive platforms, and that number too is growing all the time.

What cognitive platforms can do continually amazes. One of the most arresting qualities of the truly cognitive product is that it reflects Darwinian theories of adaptation. For instance, a toy dinosaur that IBM is helping create with a Watson partner can answer a child's questions, help her learn spelling, vocabulary, math and much more. Amazingly, the toy listens, learns and adapts to a child's personality, even to her sense of humour. And, wondrously, over time the dinosaur evolves to match each stage of the child's development.

In the more sober world of the law, IBM is helping to answer legal questions that are framed in ordinary speech. This will cut research time from hours to seconds. Yes, just seconds. This highly disruptive breakthrough with implications we can only imagine is just around the corner. It's being piloted in 20 of the world's top law firms right now. You could say that IBM is putting another kind of thinker between the counsel and his legal tomes. □

# The great cloud journey

Sebastian Krause, Vice President of IBM Cloud Europe, spoke to *The New Economy* about how cloud computing is disrupting markets

The shift to digital threatens all manner of consequences for businesses across the globe, and only those with a finger on the pulse will emerge out the other side the better for it. Of the many changes, one important area certainly is cloud computing, where it's reasonable to suggest that the technology has inspired ground-breaking changes on the operating front. Sebastian Krause, Vice President of IBM Cloud Europe, spoke to *The New Economy* about the cloud and how he thinks the technology will enhance business operations in the future.

## How integral is the cloud to digital transformation?

There are some key trends shaping the IT landscape, driving more and more enterprises and IBM clients to cloud – the most paradigmatic of which is in cognitive. This shift to a cognitive business model holds profound implications for virtually every industry, sector and point along the business continuum.

As an inextricable driver in the acceleration of the cognitive business model, cloud computing makes for a market opportunity of perhaps unprecedented proportions. That's because the more data any cognitive model incorporates into its insight – be it real-time or predictive

– the more robust, actionable and transformative that insight becomes.

As such, the enterprise is moving all manner of data sets and workloads to cloud. We see these trends in thousands of interactions with customers across all industries, many with different challenges and opportunities that cloud presents to transform their business.

In the early-adoptive phase of digital transformation, as systems of record and other critical business information moved from an analogue platform to electronic, there occurred an exponential explosion of data, which compelled innovation in the form of finding ever-more extraordinary ways to store all of this world being reinvented in code.

Similar to the early days of the internet, today there is a massive digital transformation underway as organisations increasingly turn to cloud computing to transform their business operations. The cloud brings speed-to-market, global scale, a platform for collaboration as well as innovation and operational efficiencies.

Of far greater importance, however, are the possibilities for aug-

menting human capabilities with the combination of cloud and cognitive technologies. At that juncture, unlimited opportunities for business value are being created for our clients.

## Having seen cloud through its earliest stages of adoption, where do you think we are on the 'cloud journey'?

As with most major tech shifts, cloud's earliest adopters were all about experimentation with the very concept, which led in turn to innovations advancing cloud functionality and capabilities and empowered developers to innovate better, faster. Retrospectively, we view these great paradigmatic shifts as single tipping points, but of course, each really happened in waves; so yes, as for the tipping point. I contend we are living it, right now.

The first wave, I think, was set off when the explosion of data surpassed the capacity of traditional computing. Yet an astounding 80 percent of this data we have ourselves created is still dark – and that figure is highly conservative, all things considered. When we »

**“The more data any cognitive model incorporates into its insight – be it real-time or predictive – the more robust, actionable and transformative that insight becomes”**



are able to truly unlock our capabilities to 'see' all of this data – in all its structured, unstructured and exponential glory – that will be our true Prometheus moment. And that moment is well within reach. As a point of view, 'cognitive business' empowers our clients to capitalise on the perpetual positive feedback loop potential presented by cloud migration.

#### **How can big data be harnessed by cloud computing to enhance businesses operations?**

New forms of data and analytics demand the need for these transformative technological capabilities. From the perspective of technology transformation, analytics capabilities promise ever-accelerative levels of speed, agility and consumability. And in realising business potential, as technology changes, it creates opportunities to disrupt.

This changes how a firm can define and 'realise' business potential within its industry, as well as deliver insight and context at the heart of the business problem. It's about focused expertise and contextual data in the business moment. Business potential also has a 'half-life' – disruption is increasing the pace of business, the speed of making decisions and changing strategy. Solving business problems with the best insights and data in real-time is critical. We are moving towards a democratisation of data and insights, and as more Lines of Busi-

ness are exposed to the IT process, the more they see the potential of IT and the role it can play in the facilitation of insight generated from big-data sets. This is where a business can create entirely new value propositions based on objective data science, rather than on the limited interpretation of far smaller data sets by humans, as has historically been the case.

In the consumer world, data is freely available and everyone can become a 'near expert' at home. Broken lawnmower: not a problem; fixing the garage door opener: easy, with just a YouTube video and repair forum or community, without the need to buy, read and synthesise an 800-page manual.

IT developers and data scientists demand the same 'ease of' data and tool availability. They want to focus on innovative development and not the infrastructure layers below. They demand abstraction and agility, not to become infrastructure experts. And they are being pressured by business to disrupt, and do it quickly and flexibly.

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Big data insights help create differentiated service experiences based on the expectations and requirements of individual customer segments, and in turn have created entirely new possibilities for service transformation and customer empowerment.

We help enterprises integrate new service models that appeal to a more varied consumer base, target the right sets of customers and use technology to produce value-based service experiences. In a recent study, 67 percent of end users expressly requested self-service analytics when polled about how to improve customer experience.

#### **How can businesses utilise the cloud to disrupt their markets?**

Let's look at The Weather Company. Just like most every other company in the world right now, this company looks very critically at its core business, what it represents and how it fits into the emerging new paradigm of digital business. People know them historically as 'that one channel with a weather person standing in front of a screen'. While it takes pride in where it is rooted as a company, it believes that, in the midst of rapid technological evolution, it can apply this technology to infuse weather data in myriad applications and enable companies in completely unprecedented ways.

Earlier this year, IBM announced a groundbreaking alliance with The Weather Company to integrate real-time weather insights into business in order to improve operational performance and decision making. The Weather Company has shifted its massive weather data services platform to the cloud and integrates its data with IBM analytics and cloud services. The Internet of Things (IoT) and cloud computing allows for the collection of data from more than 100,000 weather sensors, aircraft and drones, millions of smartphones, buildings and even moving vehicles. This forecasting system ingests and processes data from thousands of sources, and results in approximately 2.2 billion unique forecast points worldwide, geared to deliver over 26 billion forecasts a day.

In October last year, IBM announced its plans to acquire The Weather Company's product and technology businesses. The planned acquisition will serve three strategic objectives for IBM. First, it will capitalise on the largest big data opportunity in the world: weather. Second, it will combine two of the world's largest data

## **24 of the top 25 Fortune 500 companies use IBM cloud computing**

cloud platforms: IBM's cognitive and analytics business with weather. Finally, it will bring together technology and expertise from the two companies and serve as the foundation for IBM's new Watson IoT unit and Watson IoT Cloud platform – to deliver solutions with valuable data and embedded with intelligence.

#### **Security is obviously a priority. What is IBM's position on this highly contentious topic?**

Because so many of our longest-standing enterprise clients from all over the world deal in exceedingly sensitive data – not just in banking of course, but also medicine, government systems of record, etc. – we have also gleaned intimate insight into the types of data many of these industries prefer to retain on-premises. In fact, many organisations maintain they will consistently keep certain types of core systems of record and engagement types of operations on-premise. This may include historic customer data, company financials and all other types of sensitive information.

Insight is invaluable to any industry in which customer experience is paramount, and we are of the point of view that 'hybrid cloud' is the definitive solution for clients with security and customer experience mission-critical business imperatives. For instance, a bank could use public cloud computing capabilities and services for general computing, but store customer and sensitive data in its private cloud to ensure security. The infrastructure in a hybrid cloud consists of a combination of both private cloud and public cloud features, allowing for a seamless delivery across multiple cloud and traditional IT platforms.

Of course, we haven't simply rested on our laurels with the promise of hybrid cloud as the singular solution for every client. With BYOD quickly becoming the rule

rather than the exception for employee device use and one third of Fortune 1000 employees reporting they share and upload corporate data on third-party cloud apps, according to a recent IBM Security study, we know we have to continue evolving our security measures.

As part of our continuous bid to maintain a healthy lead in front of such nefarious applications of technology, we are in a perpetual state of R&D. Earlier this year, we released Cloud Security Enforcer to address some of the most harrowing tech threats to business. Immediately thereafter, we announced the acquisition of an extraordinarily forward-acting company in Cleversafe. The company uses unique algorithms to slice data into pieces and reassemble the information from a single copy, rather than simply making multiple copies of the data, which is how storage traditionally has been done. As a result, Cleversafe can store data significantly cheaper and with a greater promise of security.

#### **Is the concept of cognitive business limited to Watson, or is it about more than that? And what role does IBM see for itself in terms of cognitive capabilities?**

Cognitive business is most easily recognisable in Watson, but it is indeed much more. To become a cognitive bank, a cognitive retailer, a cognitive hospital or to build a cognitive supply chain, businesses must be able to draw from the largest-possible data sets relevant to any given business objective.

In order to do that, IBM empowers business leaders with the ability

to capitalise on all the work they've done to deploy cloud, analytics, mobile, social and security. Leveraging this ever-expansive potential for cloud storage, our clients can take these investments to the next level when developing their singular cognitive strategy.

IBM's cloud platform is unique, delivering value that helps all types of clients thrive. Open by design, the platform supports OpenStack, Docker and Cloud Foundry, and aligns with our vision of the 'connected cloud' for future business transformation. Today, more than 500 IBM engineers are actively engaged in the development of open cloud offerings and innovations.

Via our predictive and cognitive advances in analytics, IBM has the capacity to bring together IoT and data insights on a cloud infrastructure and equips clients with the means to take advantage of the data that resides within their company and share it in a truly integrated and actionable way. Cognitive capabilities from Watson, in conjunction with leading analytics engines, add informed intelligence to business processes, applications and customer interactions.

With a globally integrated network of cloud data centres in every major financial market, IBM is providing enterprises the means to collect and extract meaningful data at a global level in the cloud, analyse it and then integrate it across applications in an environment where only IBM's global footprint can deliver. Through a hybrid model, our clients can gain faster intelligence from data from multiple cloud environments and seamlessly weave data and services within seconds. □

# The dangers of data

Digital proliferation has brought many great advantages, but also risks. Companies need to employ a range of defences to prevent cyber attacks

**In the US alone, cybercrime costs an estimated \$100bn each year**

When UK's TalkTalk telecommunications group was hacked in late October, it shut down all its online sales sites for three weeks, leading to one-off repair costs, including extra IT and technology expenses, of around £30-35m, not counting loss of revenue.

Compared with some of the monumental damage caused by headline cyber attacks in 2014, such as that suffered by Home Depot when its payments system was compromised or by the JP Morgan Chase & Co breach that affected 76 million households and seven million small businesses, TalkTalk's outage and data losses were relatively modest. But the event served to highlight what has become a scourge. So far in 2015 alone, no less than 90 large UK organisations of varying stripes reported breaches, up from 81 percent in 2014.

In 2014, the average organisation monitored by IBM Security Services experienced around 81 million security 'events'. Incidences of hacking and other breaches are reflected across the whole of Europe, where 92 percent of corporations have suffered data invasions of different kinds.

As the World Economic Forum's latest report on global risk observes, none of this was foreseen when the worldwide web was designed. But now, the WEF points out, "the risk of large-scale cyber attacks continues to be considered above average on both dimensions of impact and likelihood, reflecting both the growing sophistication of cyber attacks and the rise of hyper-connectivity, with a growing number of physical objects connected to the Internet and more and more sensitive personal data – including about health and finances – being stored by companies in the cloud."

WEF's report cited data fraud or theft as ninth in the list of the top-10 most likely risks to occur. The support

for this assessment is conclusive – in the US alone, cybercrime costs an estimated \$100bn each year.

### Data leakage

But loss of sensitive and commercially valuable data is an even bigger issue than cyber attacks. Much data leakage is the result of careless (or criminal) behaviour by employees in the era of bring-your-own-device (BYOD) as information is inadvertently or deliberately put out on Facebook or other social media sites. As well as the cost and disruption, such leakages raise privacy issues that almost routinely land companies in trouble with regulators and lawyers.

The price per firm of breaches is mounting all the time. In the encyclopaedic 2015 Cost of Data Breach Study by IBM and Ponemon Institute, which should be obligatory reading for any internet-linked enterprise, it was revealed that the average total cost of a breach for the

**“Although complete protection is impossible, enterprises can do a lot to reduce the likelihood and severity of breaches”**

threats as cyber attacks, unplanned IT and telecoms outages, and data breaches.

Unsurprisingly, this makes some enterprises hesitant to embrace the opportunities presented by the hyper-connected world. "Senior executives understand that risk alone undermines trust and confidence in the digital economy, reducing its potential by as much as \$3trn by 2020", estimated McKinsey in a 2015 report. "[They believe] the global economy is still not sufficiently protected against cyber attacks despite years of effort and annual spending of tens of billions of dollars.

### A range of solutions

According to McKinsey, too many institutions run on technology- and compliance-centric cyber security models that don't scale, limit inno-

350 participating companies was \$3.79m. Nor is this a game. As IBM points out, cyber attackers in the last few years have changed their approach from one of exploitation of enterprises to their destruction.

So the hyper-connected society comes with risk attached. As UK's Business Continuity Institute's latest Horizon Scan Report points out, the growing commercial dependency on the Internet of Things poses risk. Polled organisations cited their main



**IBM Security**  
**6,200 security professionals**  
**36 centres worldwide**  
**133 countries monitored**  
**20 billion 'events' every day**

vation, and fail to provide sufficient protection. Therefore, organisations need to develop a whole range of solutions to what is seen as a problem that demands multiple solutions. These include much more insight into the risks enterprises face, the implementation of differential protection for their most important assets, the building of security into broader IT environments, the leverage of analytics to assess emerging threats, the improvement of incident response, and the enlistment of frontline users as stewards of important information.

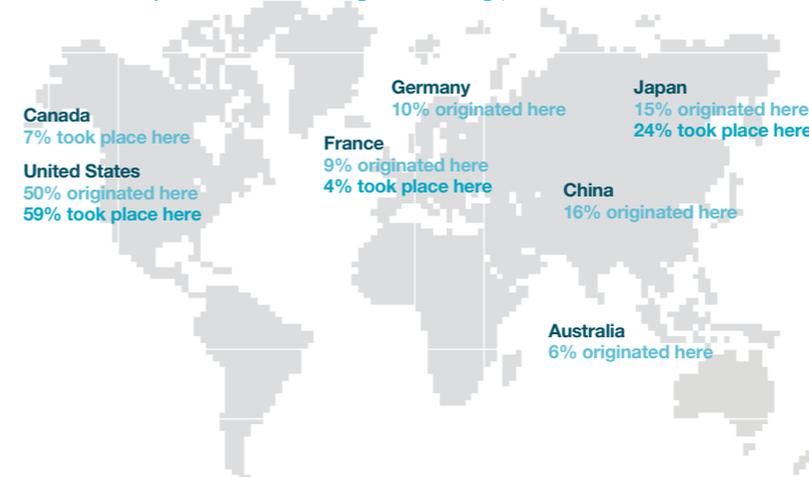
Clearly then, a tall order. However, as McKinsey goes on to point out, risks must be taken – "competitive imperatives mean executives must accept a certain level of cyber-attack risk." A chief information-security officer at an investment bank told the consultancy: "If I did as thorough a security assessment as I would like before we nailed up a direct connection to a hedge fund, our prime-brokerage business would cease to exist."

Thus, in order to protect themselves without limiting their ability to innovate, companies need to make sophisticated trade-offs between risks and customer expectations. And after all, there are solutions out there. After the JP Morgan Chase breach, Chief Executive Jamie Dimon earmarked \$250m for IT security and beefed up the department's staff to 1,000.

Although complete protection is impossible, enterprises can do a lot to reduce the likelihood and severity of breaches, beginning a top-down assessment of the risks the company faces. Some of these cost relatively little but produce rapid results, such as instilling a culture of awareness of the dangers throughout the organisation.

But the heart of protection lies with specific IT platforms. As IBM explains, "security and analytics tools can actively monitor and correlate data activity across multiple security technologies." To do this properly, enterprises need heavyweight firepower. IBM Security, for example, has 6,200 security professionals in place in 36 special centres worldwide. Between them they monitor 133 countries and – wait for it – an average of 20bn events every single day so they can detect and deflect the attack before it happens. □

### Where are cyber attacks coming from/taking place?



Source: IBM

# The deductive powers of Watson

Watson is IBM's data processing supercomputer. It's already revolutionising businesses in a variety of sectors, providing a glimpse of our digital future

You will be hearing a lot more about IBM's Watson supercomputer over the next few years as it races through in seconds, days or weeks enormously complex tasks that might otherwise have taken years. Many of the results are life-enhancing and even life-saving, such as comparing the efficacy of pharmaceutical doses.

Consider, for example, that it would normally take three scientists with PhDs an average of six months to read through all the existing clinical trials of pharmaceutical products so they can locate the precise results that are relevant to particular ailments. But, working with Watson, one pharmaceutical group is greatly accelerating the process and thus producing safer medicines faster.

And in the fight against cancer, Watson was teamed up with scientists from a leading medical school to help identify six proteins that modify p53, a protein related to many cancers. Normally it would take the life science industry years to achieve such a task. Watson accomplished it in a few weeks.

## Not just a storehouse

Watson does all this and much more. Most people think of the cloud as a secure repository for information – usually their own information. In fact the cloud, as IBM sees it, is much more than a storehouse of data. Watson in the cloud is a cognitive, thinking entity whose most valuable function is to serve the broader business community by ingesting, processing and leveraging volumes of data in highly creative ways, as the above examples show.

There are hundreds of similar examples of fruitful cooperation between Watson and forward-looking organisations. IBM Cloud has worked with Apple and Twitter among many other companies with products and services that are at the forefront of commerce (see *boxout*).

Used properly, the cloud can re-tool entire enterprises by developing business-critical applications, processes, transactions and workloads anywhere along the commercial spectrum. And there are many clouds. For instance, IBM's hybrid cloud is an industrialised service that

can be accommodated to the multiple requirements of an enterprise. Not all organisations need to move everything to the cloud, so the hybrid cloud harnesses what should be up there – such as IT economics and faster app development – while leaving the rest alone. In this way, cognitive cloud-equipped enterprises can more fully engage their customers through the design and delivery of the kind of products and services that take them forward.

## Adapting to change

Hybrid cloud also makes businesses much more nimble-footed and able to adjust rapidly to changing circumstances such as consumer trends. One way of making this happen is through new technologies such as 'native containers' that allow businesses to easily move data from one location to another (the container) according to the commercial imperatives. It's all about rapid response.

Many companies have invested heavily in their own servers to deliver bespoke operations such as Software-as-a-Service (SaaS). But



IBM offers more than **140 SaaS business applications that save individual companies billions by making them more functional and profitable**

third-party providers are starting to dominate cloud services, whether cognitive or not, because it's more economical – but also because of the usefulness of the products they have designed. In what is known as Infrastructure-as-a-Service (IaaS), companies such as Microsoft, Google, IBM and Rackspace rent out their cloud facilities. Netflix, for example, is a customer of Amazon's cloud services.

IBM believes the cognitive cloud is the future. That is, the thinking cloud fully armed with proprietary software that enterprises can use. And 24 of the top 25 Fortune 500 companies who use IBM's cloud-based Software-as-a-Service (SaaS) agree. IBM offers more than 140 SaaS business applications that



## Shop Direct (on a cloud)

When an enterprise delivers 48 million products a year and books a million visitors a day across a variety of online and mobile platforms, logistics start to become difficult to manage. That's the challenge faced by Shop Direct, one of Britain's biggest online retailers whose flagship brand is Very.co.uk, an £800m a year digital department store.

Shop Direct prides itself on its ability to provide a customer-winning experience, even to the extent of anticipating customer requirements. So the company contracted IBM to provide a 10-year, large-scale

services agreement that would allow it to respond quickly to changes in demand. The solution was a hybrid cloud model that underpins a suite of features – analytics, mobile, social and security – that improve customers' online shopping engagement. As well as making customers happier, hybrid cloud also empowers the workforce to collaborate more easily and productively.

Shop Direct's army of consumers will never know why their experience has gone up a notch or three, but that's how the hybrid cloud works. Seamlessly.

**“Even the best-run companies are routinely amazed by the insights and efficiencies that hybrid cloud can bring them”**

save individual companies billions by making them more functional and profitable. Along with many exciting start-ups, these Fortune 500 giants subscribe to IBM-developed applications that they access over the internet. Even the best-run companies are routinely amazed – and sometimes shocked – by the insights and efficiencies that hybrid cloud can bring them.

## Monetising data

The really amazing thing is that these applications are getting better all the time. In October 2015, Watson Analytics was tooled up with even better data discovery as well as question-and-answer capabilities. Taken together, these help companies monetise the value of the data they already have in their systems as well as that of the high-value external data of which they may not even have been aware.

Here's an example. In collaboration with industry partners, IBM is embedding 'expert storybooks' into Watson Analytics that help guide users in understanding, learning and reasoning with different types of data sources to uncover relevant facts, patterns and relationships. One such expert storybook is The Weather Company that enables businesses to incorporate weather data into their revenue analysis to see how it may be affecting their business. And, to their surprise, it often does. It's this that enables businesses to undertake forward-looking strategies with more confidence – IBM calls it predictive decision-making. □

# Disruptor or disrupted

By embracing modern networks and cloud-based systems, companies who failed to fully embrace the digital era can compete with fleet-footed tech upstarts

In early 2014 Jamie Dimon, CEO of JPM Morgan Chase, warned shareholders that cloud-equipped, fintech-based start-ups “want to eat our lunch”, and he’s being proven correct. In the latest available figures, fintech lenders attracted \$12bn in capital, up by three times compared with 2013.

Nor is it just fintech that wants to dine at the table of the traditional banking industry. Social media senses the opportunities too. Citing the collapse of the natural monopoly the financial services have long enjoyed behind a walled garden of regulatory protection, high barriers to entry and other forms of exclusivity, consultant Egon Zehnder warns: “A wave of entrepreneurial disruptors, as well as offerings from well established ‘dig-

ital native’ firms outside the banking industry such as Alibaba, Google, Lending Club, Simple and others threaten traditional banks across the product spectrum from payment systems to wealth management.”

Britain and Europe are two particular bastions of fintech. In 2014, the volume of funds invested in UK’s peer-to-peer lending sector nearly trebled in size to over £1.2bn while cumulative lending now stands at over £3.15bn, according to trade body P2P Finance Association (P2PFA). “We have passed yet another milestone with P2PFA members facilitating over half a billion pounds of new loans in the last six months. At this rate we may hit £4bn by the New Year,” enthused Chairwoman Christine Farnish.



**Global investment in fintech ventures**

2013  
**\$4.05bn**

2014  
**\$12.21bn**

Source: Accenture

## Digital frontiers

Where there’s a ‘digital frontier’, there’s a fast-emerging fintech sector. Launched as recently as 2012, Shanghai-based peer-to-peer lender Lufax has arranged more than \$2.5bn in loans. Its latest \$485m fundraising valued the firm at nearly \$10bn and, according to CEO Gregory Gibb, a former McKinsey & Co partner in Taiwan, the firm’s market is growing about four to five times a year. By any definition, these are disruptive forces.

But the banks are just one example of ‘old-economy’ industries that are under threat from nimble, cloud-based operators. Transport group Uber has triggered a revolution in the taxi industry, while Airbnb is transforming the hotel industry to its roots. Just about everywhere you look, digital services are giving customers new and compelling options in previously inflexible, slow-response sectors.

Yet while some of these threatened industries are frozen in the headlights, others are reacting in kind by adopting the very tools that the start-ups are employing to disrupt them. In short, they are converting themselves into disruptors. And, as the giant Marriott hotel chain is finding, it’s perfectly feasible for a long-established brand to adopt cloud-based technologies to head off disruptive competitors such as Expedia.

In early 2015, Marriott began the adoption of an IBM-built hybrid cloud environment. With more than 4,000 properties across the world, the chain had sound reasons for embracing the electronic frontier. Loyal as many

of its customers are, they have become web-savvy and Marriott saw that it needed to offer faster-paced digital services for them. By interrogating more creatively the data it could accumulate about them, the chain could elicit deeper insights into what their preferences were.

Like other hotel chains under pressure from disruptive entrants, Marriott also needed to know more about the next generation of travellers. What kind of experience did they want? This is the harder-to-please Millennial generation whose expectations are shaped by their interaction with other disruptive forces; namely, social media and mobile devices.

To achieve these goals, Marriott will therefore migrate a significant portion of its core IT systems and applications to IBM’s open cloud platform over the next few years. It’s a flexible solution that minimises the need for ongoing, on-site support or upgrades. And it can be scaled up according to need.

## Cloud infrastructure

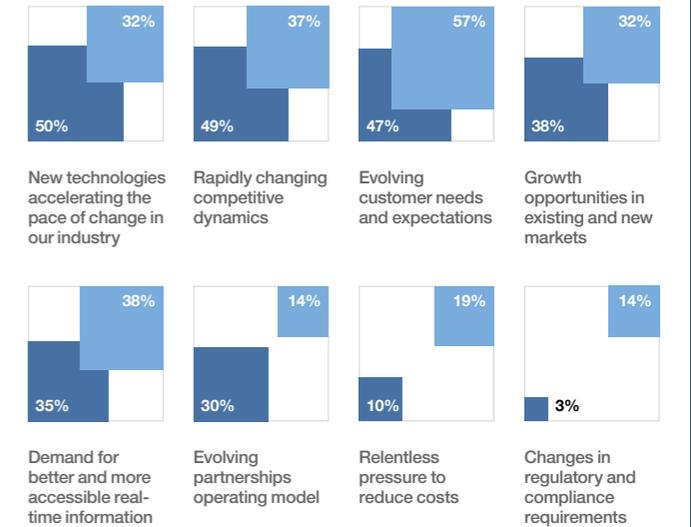
The prime tool for Marriott’s entry into the world of cognitive enterprises is IBM-owned SoftLayer, a high-performance cloud infrastructure that integrates and automates into a single platform any number of data centres around the world that are packed with the widest possible range of cloud computing options. The infrastructure seamlessly spans physical and virtual devices. Built for internet scale, SoftLayer has been deployed to a broad range of customers from web-based start-ups to other global enterprises besides Marriott.

In Germany, for example, companies in a broad range of sectors began adopting SoftLayer throughout 2015. This was not only to jump aboard the cognitive train, but to meet their country’s strict laws on data privacy and security. Under German – and EU – law, there are tough penalties for data breaches. To make the most of the flood of

**“Digital services are giving customers new and compelling options in previously inflexible, slow-response sectors”**

## Key drivers behind digital transformation

(% of respondents) ■ Ahead of the curve ■ Behind the curve



Source: Economist Intelligence Unit Survey

guest-related data enabled by its enhanced digital capabilities while still preserving privacy regulations, Marriott will deploy an IBM ‘Software-as-a-Service’ tool known as Big Insights, which leverages all this information into guest-pleasing initiatives. As Marriott’s President and CEO Arne Sorenson wrote around the time the chain committed itself to IBM’s hybrid cloud solution, its future depends on welcoming rather than resisting new methods and technologies. “Innovation is the result of deliberate applied curiosity”, he blogged. “Businesses with innovation at their core are more profitable.”

Not even the most established business can afford to be outsmarted by new entrants. As Marriott’s Global Chief Information Officer Bruce Hoffmeister put it: “IBM Cloud provides the analytics to see early-stage data patterns and the scale and flexibility to enable timely, innovative new services that will meet guests’ expectations in a predominantly digital world.”

Meanwhile, the banking giants, many of them saddled with dated ‘legacy’ systems, are struggling to harness the power and flexibility available in the digital world that would equip them in the battle to avoid disruption. □

# The cognitive era is here

IBM's Bluemix innovation platform promises to smooth the transition for any business looking to plug into the cognitive economy

From the outset, IBM created Bluemix to deliver highly tailored, enterprise-level services that work easily with a company's existing cloud applications. And because Bluemix is based on Cloud Foundry rather than on a vendor-owned proprietary platform, it means enterprises are free to rapidly create, deploy and manage their own cloud applications. Complete with three delivery models (public, dedicated and local), IBM's Bluemix caters for DevOps and application lifecycle management, API management and a syndicated catalogue of over 120 IBM, third party and community services.

British charity organisation Comic Relief probably never heard of Cloud Foundry or Bluemix before it turned to software developer Amakuni. But between the two of them, these late-model technologies have helped raise a lot of money that might otherwise have passed the organisation by.

Owing to the marriage of Cloud Foundry and Bluemix, the charity can now process more than 400 credit card transactions per second, and Comic Relief has shed its earlier concerns that the system might struggle at peak donation times, not least over Red Nose Day, one of Britain's big televised charity shows of the year.

## Learning tech

Solutions such as the aforementioned Bluemix and Cloud Foundry are part of a growing response to the cognitive economy and the resulting transformation of industries ranging from retail to medicine. In most industries, the demand for data capacity is growing at an exponential rate. Consider for a moment that healthcare data is forecast to grow by 99 percent in volume by 2017. Now is the time for organisations to make the switch to a more advanced cloud-based system capable of dealing with their ever-increasing need for big data services. Moreover, with the advent of cognitive computing, not only can the latest technology process large amounts of data, it can also learn from it in all of its various forms, including even unstructured data.

Going back to Comic Relief, the charity now has a robust and reliable solution based on a Bluemix-enabled architecture. Perhaps its most important feature is that the platform can be deployed and tested programmatically every day; that is, without any human input. Previously, software and hardware operated independently of each other and modifications to either were both slow and costly. In technical terms this monolithic application was based on a single complex code that was hard to develop, maintain, deploy and scale.

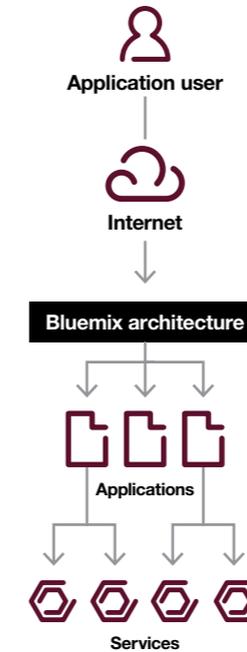
With Cloud Foundry, the solution is an elegant example of open-sourced computing architecture in that it encourages revenue-creating creativity. As IBM senior software engineer Angel Tomala-Reyes put it: "Cloud Foundry abstracts the underlying infrastructure needed to run a cloud, letting you focus on the business of building cloud applications... Thus, the beauty of Cloud Foundry is that it gives enter-

prises more choice and scope to develop company-specific tools."

The rebuilt platform's simplicity is measured in how many people it takes to run it – peak staffing for the system has shrunk from 50 to just four. It's also much cheaper to run, because the number of gigabyte hours the platform needs to run at scale has been dramatically reduced. Perhaps most importantly, there is now a reliable deployment and testing strategy, which allows developers to perform zero-downtime deployments during event peaks. Similarly, further development of the platform can be done on a smaller budget. "It revolutionised our approach and defined the blueprint for all our other technology projects", explained the charity's CTO Zenon Hannick.

## Cognitive leadership

Those in a similar position to Hannick must take care to ensure they have the right skills to deliver in both the business and tech worlds, as they look to integrate cognition into their company's digital presence. Taking IBM as an example: the company's cognitive business solutions are supported by more than 2,000 specialists;



all of them working towards a coherent cognitive strategy. The next step, as demonstrated by IBM's data partnerships with Twitter and The Weather Company, is to extend cognitive with analytics, and later to a cognitive cloud. Building a cognitive infrastructure naturally follows, and last in IBM's five fundamentals is the need to adopt cognitive security. Far from exclusive to Comic Relief, Bluemix has been employed by a wide range of others, including Citi, in order to accelerate digital banking innovation; Capgemini, to stay ahead of the latest changes; Technical University of Denmark, to devise solutions for civic challenges, and many, many more.

Without doubt, the era of cognitive business has arrived, and digital is not the destination but the foundation for the future. IBM's Watson (see article on page 12) has been instrumental in facilitating this transformation, and today works with over 70,000 developers, 350 partner companies and 100 cognitive applications. Examples of IBM Watson in action include the building of a toy that can respond to a child's questions, a platform that can respond to hotel guest issues, and a travel start-up that can help travellers find personalised recommenda-

**“Digital is not the destination but the foundation for the future”**

tions. This ability to bridge the gap between start-up and enterprise by bringing together the biggest benefits of both – namely speed and agility – is one of the platform's most impressive assets.

IBM acknowledged the value of Bluemix to start-ups recently when it created IBM Bluemix garage, a consultancy that aims to empower companies big and small to design and build engaging applications. The commitment to finding the right solutions and ability to equip start-ups with the right tools to thrive on a much larger scale is testament to the platform's success and its start-up culture.

Bluemix is the digital innovation platform that enables enterprises to rapidly bring new products and services to market at lower cost, while extending their existing IT investments into cloud business and balancing agility with quality, security and governance. "With three integrated deployment models – spanning from our data centres to yours – Bluemix represents a new way to experience cloud", according to IBM. "And with the ability to easily leverage both existing IT and new SaaS tools, Bluemix is built for teams that appreciate the value of using existing data, systems and processes to power everything that comes next." □

**IBM's Watson works with over 70,000 developers, 350 partner companies and 100 cognitive applications**

# Data is BIG

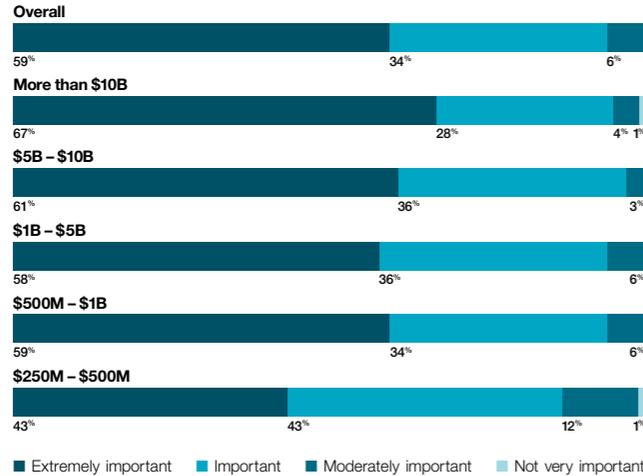
## Top 10 big data companies

by revenue

1 IBM	6 Oracle
2 Hewlett-Packard	7 SAS Institute
3 Dell	8 Palantir
4 SAP	9 Accenture
5 Teradata	10 PwC

## Importance of big data

How important is big data to your organisation?



IBM estimates suggest that over **2.5 exabytes** (2.5 billion gigabytes) of data are produced every day

Apps with advanced and predictive analytics are growing **65%** faster than apps without predictive functionality

## Data by numbers

1,000 bytes = **1 kilobyte (kB)**

1,000kB = **1 megabyte (MB)**

1,000MB = **1 gigabyte (GB)**

1,000GB = **1 terabyte (TB)**

1,000TB = **1 petabyte (PB)**

1,000PB = **1 exabyte (EB)**

1,000EB = **1 zettabyte (ZB)**

## The challenges facing big data?

(According to Accenture survey respondents)

Security: **51%**

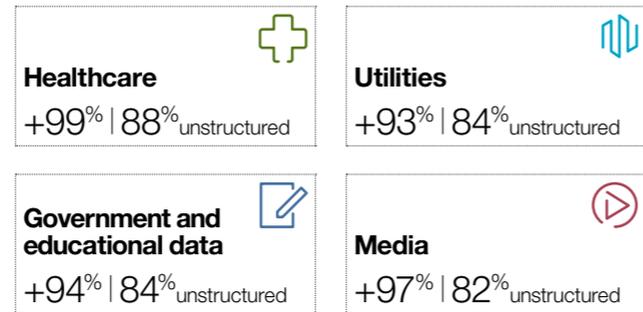
Budget: **47%**

Lack of talent to implement: **41%**

Lack of talent to run: **37%**

Integration with existing systems: **35%**

## Data growth by 2017



By 2018, **50%** of customer service agent interactions will be influenced by real-time analytics

Google is the largest 'big data' company, processing **3.5 billion** requests a day

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