

What's Hot in 2014

Technology Trends

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Never before has such a breadth and depth of technological advancements had so much impact on our lives as the one we are now experiencing. Developments are impacting all touch points of the value and supply chains, with consumer empowerment, mobile, social, data and digital capabilities all redrawing the business environment in profound ways.

The evolution of technology has undoubtedly brought many benefits to consumers and companies, with radical redesigning of processes, work styles and industries not only possible, but increasingly taking place. However, 65 percent of the world isn't even online yet. In essence, we are only at the beginning of technology enabling a radical shift in society and in the technologies themselves, in terms of diffusion, utility and impact¹.

The capacity of humankind to adapt at an ever shortening interval to technology is also being tested. There's... is not so much a concern about the nature of the technologies themselves, but rather about humans' continuing ability to influence how they operate to the benefit of the organisation, its customers and other stakeholders,' notes the Economist Intelligence Unit². An EIU report also suggested that nearly four in ten worry that '...their organisations will be unable to keep up with technology change and will lose their competitive edge.' On the other hand technology has the potential to usher in a happier, more prosperous world.

McKinsey suggests that closely aligning technological choices with structural and organisational forms will have the greatest impact on the future of work. 'The next leap forward in the productivity of knowledge workers will come from interactive technologies combined with complementary investments in process innovations and training. Strategic choices, such as whether to extend collaboration networks to customers and suppliers, will be important³.'

Ultimately, as stated by theorist Richard Florida '...it won't be technology that defines our future. It will be our ability to mould it.'⁴ In essence '...the change will be more about the business model, and how technology is used to change an organisation and its interaction with customers, rather than some major technology change on its own⁵,' says Jack Bergstrand, the former CIO of Coca-Cola.

This paper will profile the most transformative technologies that will emerge, mature and/or dominate the discourse of 2014 and provide business with a short list of actions needed to ensure that the technology is transformative, rather than disruptive.



In a Deloitte survey, business executives said that social media and data analytics were the two technologies that posed the greatest risk to their business model

2014

1. Building frameworks for mobile

The global mobile workforce could reach 1.3 billion by 2015⁶, or 37 percent of all adults⁷. The benefits, both to the organisation and to the individual have been well documented, with the proliferation of personal devices being a key driving force behind this trend. However one unintended consequence of BYOD has been to increase the complexity levels associated with the mobile workforce by 2-3 times says Gartner⁸. The IT department and finance operation of many organisations are stretched as a result; hardly a position of strength from which to map out and account for the various privacy and security issues resulting from BYOD growth. Clearly defined policies for BYOD, such as an enterprise mobility strategy, and technological boundaries allowing the separation of personal and work related apps on devices will both become clear imperatives for organisations in the coming year.

What does it mean:

This will require the CIO to take a more strategic view of the organisation, which in some cases may necessitate relieving them or their department of some more mundane tasks. If the prediction that by 2020 IT will act as orchestrators of technological input⁹, rather than the sole source of such input, is to ring true, we would expect some in the coming year to build the strategic framework, or backbone, necessary to accommodate future growth in the organisation.

IT faces an overwhelming challenge as it attempts to provide a consistent end user experience across inconsistent platforms, while maintaining corporate and regulatory policy compliance¹⁰.

What to do about it:

- IT functions need to blend disparate software elements and their functionality together in a way that delivers the desired experience across the expanding range of devices and operating platforms.
- Concurrently, they must remove the burden of network or software knowledge from the end user in order for any benefits to be realised¹¹.
- Policies must be backed up with technological solutions - they cannot stand alone: 81 percent of workers admit to using their devices to access their employer's network without their employer's knowledge or permission - and 58 percent do so every single day.

2. Perpetually connected

The social and business implications of an increasingly 24/7 connection is only beginning to emerge. Transformational change and implications for business are around the corner. There is already anecdotal evidence that customer expectations have increased as a result of the immediacy of digital technology. Despite an economic backdrop that may have tempered expectations in the past, the disappearance of lines, delays and even delivery times has become the norm for online shoppers. It is no longer enough to have instant handheld access to a world of information, products and services – we increasingly want objects that are easy to use, learn our preferences and do it in as economical a way as possible. Despite privacy concerns, it is increasingly likely that we will come to expect our personal information to be accessible anytime, anywhere and from any device.

What does it mean:

This isn't a transformation that will impact a single industry, or department or even a process within a company. Rather it signals a new normal in market conditions. Those wishing to compete in this world will need to embark on root and branch reform of their digital presence in profound ways¹².

As a start, technology, from the back end throughout the delivery chain and ending at the interface staff use, customers use will need to re-evaluated to ensure it delivers the optimum experience to the user. However, as is common with digital transformation, the most crucial aspect is to readjust the organisation itself, and not just the technology involved.

What to do about it:

- Processes must be reworked to enable people who know how to best use the technology at their disposal to use it, throughout the organisation. This will require, in many cases, restructuring of workflows, perhaps even departments, and will invariably require new management thinking and processes such as internal budgetary systems able to capture the fluid business environment.
- Perhaps most important is to remain flexible enough to be able to accommodate new technologies and further evolve for success in the future.
- Executives must think carefully about how to carry out digital business initiatives in their organisations.
- McKinsey notes that such transformation '...speaks to the potential need for a different operating paradigm—and the fact that traditionally siloed functions (for example, marketing, product development, or IT) could obstruct a dynamic approach to digital business that requires speed and flexibility to create the most value. Also required is a new approach to managing talent by utilizing flexible team structures, engaging outside collaborators, and increasing corporate tolerance for failure¹³.'
- Executives and companies also need to focus on building and acquiring the skills necessary to carry out a digital business agenda.

3. Personalised customer interactions

In November 2013, it was announced that Tesco '... is rolling out screens with built-in cameras at its petrol stations that can identify people by their gender and approximate age, and customize ads based on who is watching¹⁴.' We are at the beginning of a fundamental shift in how businesses '... formulate and manage their interactions with customers¹⁵.' The reasons are simple enough - personalisation has a tremendous impact on customer acquisition by improving customer conversion ratios. It also improves customer satisfaction across the entire customer relationship lifecycle¹⁶.

In a 2012 survey of 266 business decision-makers, Forrester found that improvement of customer experiences is the highest customer priority. The study yielded three key findings¹⁷:

1) Companies are moving to much more sophisticated customer modelling. A striking number of organisations have moved from broad to micro segment targeting during the past two years. 52 percent indicated that messaging to individuals was a goal for the next two years. Retention-sensitive firms, for example, use models to determine why customers don't renew - and then seek to prevent those factors from recurring.

2) Companies are speeding customer model and operational system changes. Three-quarters of respondents plan to adopt at least monthly revisions of their customer models within two years, whereas today about 60 percent make revisions either quarterly or annually. Eighty percent expect to change their operational systems to incorporate new insights about customers in six months or less.

3) Decisioning platforms are the key technology investment. On a list of strategies to improve customer interactions, 'adding technologies to automate decisions' was ranked most important by almost 30 percent.

What does it mean:

In order to fulfil these immediate goals business will need to invest in the analytical talent able to initiate and drive these sorts of projects. As a result the benefits may not accrue for a while, but we nevertheless expect significant movement around personalising customer interaction in the coming year.

What to do about it:

- As demonstrated by Tesco and evident elsewhere, a range of technology exists that enables ever deeper levels of personalisation.
- However, as Accenture notes, '...it is critical that the technology CMOs choose is able to support the company's personalisation vision¹⁸.'
- Attempts to deliver personalisation have sometimes fallen flat between the business intent and the execution of the technology¹⁹.



Findings suggest that business process redesign must occur in tandem with cloud adoption if organisations hope to achieve the full potential of their cloud investments

4. Infrastructure intelligence

'Businesses around the world are looking to gain an edge in the race to digitize—to seamlessly incorporate new computing, communications, and collaboration technologies; to streamline their operations; and to connect more closely with customers, suppliers, and partners. To do so, they must look to the continually evolving ecosystem,' says Booz²⁰.

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What does it mean:

A CommScope report notes that one of the most significant IT game-changers over the next half decade will be infrastructure intelligence. Infrastructure intelligence, as CommScope defines it, '...encompasses technologies like network asset management or data centre infrastructure management that help IT keep closer tabs on their network infrastructures²¹.' Demand is being driven by the simultaneous rise of business-critical apps, mobile devices and the cloud.

Nearly one in three respondents of CommScope's survey said infrastructure intelligence will significantly affect their IT decisions and network operations over the next five years. Thirty-three percent of those that took the survey said they are hoping to embrace infrastructure intelligence as a means of reducing human error related to network operations²².

Clearly there is a need to develop an efficient IT backbone given the rise in data volume. By 2020, there will be 4 billion people online creating 50 trillion gigabytes of data. Storage capacity requirements in business are growing 20-40 percent each year. This means that an enterprise with 100 terabytes of storage capacity today will require over 370 terabytes within five years²³.

What to do about it:

- These immense quantities of data demand ever-smarter computing architectures, networks, and storage solutions.
- Today's infrastructure is built on old protocols²⁴, and requires revisiting.
- There is a clear tie in to the Internet of Things, and framing infrastructure intelligence in the wider IoT world would help develop a more robust showing.



90 percent expect to move at
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2014

5. Cloud services deepen

IT managers expect the rise of cloud-based applications to have a major impact on the way in which they manage their data centre and enterprise infrastructures. 90 percent of the enterprises surveyed expect to move at least some of their applications to the cloud by 2017, while 52 percent expect more than half of their applications to make the move²⁵. Cloud services enable the rapid transformation for all business processes and will be increasingly embraced by business of all sizes, as this represents a major shift in how organisations obtain and maintain software, hardware, and computing capacity²⁶. The push for more personal cloud technologies will lead to a shift toward services and away from devices. The type of device one has will be less important, as the personal cloud takes over some of the role that the device has traditionally had with multiple devices accessing the personal cloud.

What does it mean:

Security will no longer be just an IT issue²⁷. Taking greater control of the future means business leaders need to know more of access management, data privacy, and impacts of security breaches.

Greater expectations of IT role and function. In a recent Economist Insight Unit study, almost 6 of 10 IT executives expect their function to change significantly in the next three years while some predict a 'complete overhaul' of IT.

Collaboration through community clouds has also taken off, largely as the result of public clouds and easy cloud integration, merging data between on-premise and off-premise clouds.

What to do about it:

- 'Gartner suggests that bringing together personal clouds and external private cloud services is essential. Enterprises should design private cloud services with a hybrid future in mind and make sure future integration/interoperability is possible. Early hybrid cloud services will likely be more static, engineered compositions, and Gartner suggests that more deployment compositions will emerge as cloud service brokerages evolve²⁸.'
- Findings suggest that business process redesign must occur in tandem with cloud adoption if organisations hope to achieve the full potential of their cloud investments²⁹.
- IT structures, roles, and cultures will transform to get closely aligned with innovation, experimentation, and outcomes.



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6. 3D printing

3D printing represents a revolutionary type of manufacturing where 3D printers build things by depositing material, typically plastic or metal, layer by layer until the final product is finished. Originally designed to print prototypes, they are increasingly being used to print final products³⁰. Over 20 percent of 3D outcomes are final products rather than prototypes and this could reach 50 percent by 2020. Indeed, it is estimated that 29 percent of consumers could order and print their own goods by 2020.

The growth of 3-D printers is projected to be 75 percent in the coming year, and 200 percent in 2015. Gartner suggests that '...the consumer market hype has made organisations aware of the fact 3-D printing is a real, viable and cost-effective means to reduce costs through improved designs, streamlined prototyping and short-run manufacturing³¹.' 3D printing is forecast to grow to a \$3.1bn market by 2016 and \$5.2bn by 2020³².

What does it mean:

The numbers alone suggest that this topic will be of major interest beyond just the hype in the coming year- 320 million, or 12 percent of the global workforce, is involved in manufacturing's \$11 trillion economy³³.

It is unlikely that many businesses will realise, in theory or practice, the full impacts of this technology in 2014, but it is likely that plans made in 2014 – encompassing the supply chain – will start to factor in the disruptive/transformational effect of 3D printing. In certain industries, this could include decisions about where to locate production and even whether current business models are sustainable under the various scenarios of the technology's future.

What to do about it:

- Sainsbury's IT department is currently preparing its strategy for 3D printing, which it predicts will make a radical change to the supermarket business.
- Sainsbury's IT director, Rob Fraser, suggests 'We have to prepare for the fact that consumers may soon not want to buy pre-packaged iPhone cases of the shelf, but build and design their own³⁴.'
- Nokia has already released to the public a set of documents, templates, recommended materials and best practices for consumers to build their own cases for the Lumia 820.
- Marc Andreessen suggests that due to leverage, few retailers can survive a decline of 20-30 percent in revenues³⁵. If this is true, 3D printing could plausibly be the vector by which this scenario is manifested. Revisiting business models is clearly a required for many manufacturers and retailers.

7. Under the radar: smart machines

'CEOs are missing what could quickly develop to be the most significant technology shift of this decade³⁶.' Perhaps the most worrying aspect is not just that this shift is being 'missed,' but that 60% of CEOs believe that the emergence of smart machines capable of absorbing millions of jobs within 15 years is a 'futurist fantasy.' Robots such as the \$22,000 Baxter are being designed so that workers can teach it to do tasks and David Bourne, a robotics professor at Carnegie Mellon University in Pittsburgh suggests '...this is a harbinger of things to come³⁷.' Despite the lack of concern amongst CEOs about smart machines, some 71 percent of companies say machine-to-machine (M2M) data will develop new business opportunities and by 2020 sensor data could be worth \$1 trillion³⁸.

What does it mean:

The era of smart machines is in ways, already starting to take shape. 'In fact, even today, there is already a multifaceted marketplace for engineering a 'digital workforce,' backed by major players on both the supply and demand side. This marketplace comprises intelligent agents, virtual reality assistants, expert systems and embedded software to make traditional machines 'smart' in a very specialised way, plus a new generation of low-cost and easy-to-train robots and purpose-built automated machines that could significantly devalue and/or displace millions of humans in the workforce³⁹.'

The danger is that in being ignorant of the issue, CEOs will be unable to craft any sort of policy for adapting to the future environment until it is too late. As tools for enhancing worker productivity or, in some cases, replacing the need for workers, this is clearly an issue that CEOs cannot afford to ignore beyond 2014.

What to do about it:

- Get ahead of the smart machine trend and start investigating.
- Determine the impact on IT.
- Organisations need to examine and judge its impact on the human disruption and ethical, moral and social issues.
- Gartner analyst Kenneth Brant said by 2020 smart machines will absorb millions of jobs. CIOs that don't prep for a digital workforce will likely have short careers, says Brant. 'It's worth remembering that IT cost is typically about four percent of annual revenue, whereas the labour costs that can be rationalized by smart machines are as high as 40 percent of revenue in some knowledge and service industries⁴⁰.'
- Smart machines will ultimately create new jobs: mapping out where this could occur in the supply chain will help an organisation assess the impact.



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2014

8. Software-defined networking (SDN)

ZDNet defines SDN as an '...approach to networking where the control of the network is de-coupled from the physical hardware and is instead handled by a software application, called a controller. The purpose is to remove the physical limitations of networks. HP is one company that believes that the move into SDNs represents a sea-change in network technology. 'When you use an application you use a certain bandwidth and you have to allocate that beforehand,' said HP's marketing VP for networks, Nick Watson. 'Now, that bandwidth can be totally dynamic which we believe is absolutely revolutionary'⁴¹."

What does it mean:

Accenture notes that it '...helps companies reconfigure the connectivity of systems without changing the physical characteristics, making it easier to manage change, integrate cloud services and get more return from their network investments'⁴²."

SDN has been hyped for a while, and adoption hasn't progressed as rapidly as some thought it would, with less than 10 percent of enterprises running significant production traffic through virtualized networks⁴³. Nevertheless, some remain optimistic, with HP's VP of networking, Mike Banic, predicting the SDN market is about to boom, hitting \$3bn by 2016⁴⁴. The Dell'Oro group meanwhile foresees 600 percent market growth through to 2017⁴⁵.

End-customers stand to benefit from simplicity, cost reduction opportunities, and the possibility for consolidation⁴⁶, whilst SDN is said to better support cloud deployments⁴⁷.

What to do about it:

- As with most technologies, the issue of what to do goes far beyond the technology itself. In some cases a complete business transformation is needed, or at the very least, reworking of processes.
- For example, purchasing decisions will likely need to involve more than just one department. Wired notes that under SDN, '...teams must understand that their job is to evaluate deeply how purchases in areas adjacent to theirs might impact how they can work together to deliver optimal user experience'⁴⁸."
- Similar cross silo and department actions would also be needed on budgeting, the reporting structure and even performance metrics. Collaboration across the organisation is an essential prerequisite.

9. Data analytics

Big Data '...is a term used to describe the technologies and techniques used to capture and utilize the exponentially increasing streams of data with the goal of bringing enterprise-wide visibility and insights to make rapid critical decisions⁴⁹.' Not all data that will help inform such decisions is 'big' however, as multiples of smaller data loosely joined could potentially provide just as much worth in some situations.

What does it mean:

Oracle rightfully asserts that '...organisations in every industry are trying to make sense of the massive influx of big data, as well as to develop analytic platforms that can synthesize traditional structured data with semi-structured and unstructured sources of information⁵⁰.' However, an October 2013 survey by the Wall Street Journal revealed that only 16 of 400 businesses say they are getting demonstrable value from their big data analytics investments⁵¹. Out of the 64 percent of organisations have invested in or plan to invest in big data tech, only 8 percent have started using it⁵². In a Deloitte survey, business executives said that social media and data analytics were the two technologies that posed the greatest risk to their business model⁵³

There is some confusion, even amongst experts on the precise meanings of both big data, business intelligence (BI) and the interplay between the two. BI is effectively built on asserting insights against a data set and requires considerable human input in the decision making⁵⁴. In this sense it is always built on past experiences and human insight. Big data is effectively computer driven and represents a predictive methodology – and is likely to replace BI in many a context. Human action is still needed, and will be crucial, but is not as extensive as with traditional BI⁵⁵.

What to do about it:

- Herein lies the importance of big data. It will transform how we manage our enterprises, operating processes and business models. It represents a structural transformation in how enterprises are managed from top to bottom⁵⁶.
- The level of data integration and analytics will require many new skills and cross-functional buy-in in order to break down the many data and organisational silos that still exist within businesses. The rapid increase in data makes this a fast growing trend that cannot be ignored.
- More than half of the top performing organisations said that they are struggling to overcome political or executive resistance to capitalize on their investments.
- IBM suggests that '...while many have a solid analytics strategy in place, they aren't focusing enough on the people and their organisational structure to support their strategies.'
- Executives need to consider the cultural impact and changes required to operate as a fact-driven organisation and be able to measure success when it occurs⁵⁷.
- Leaders must be willing to work across roles and organisational silos to share data, information and insights.



Smart building technology investments typically pay for themselves within one or two years by delivering energy savings and other operational efficiencies

2014

10. Smart building investment

The need to transition, whether through new buildings or retrofitting older ones, to an era of green buildings is pressing. IBM suggests that by 2025, buildings will be the largest emitters of greenhouse gases on the planet⁵⁸. Nick Zieminski, writing for Reuters, suggests that '...the cost of leased assets like buildings is increasingly the concern of finance chiefs, especially under accounting rules that make such assets more visible on the balance sheet. Those CFOs will push for smarter use of space, while more tenants are also demanding green work spaces⁵⁹.'

What does it mean:

In addition to improving the CSR profile of tenant companies, major trends driving smart building technology and greener buildings, as noted by Jones Lang LaSalle include⁶⁰:

- 1) Rapid return on investment (ROI). Smart building technology investments typically pay for themselves within one or two years by delivering energy savings and other operational efficiencies.
- 2) Operating-expense (op-ex) advantage. Using automated systems, smart buildings generally cost less to operate than buildings operating solely on legacy systems. By combining smart building systems and data analytics with facilities management, a smart building management system can detect and resolve building issues before equipment failures and capital expenditures ensue.
- 3) Energy savings. Smart building technology can generate energy savings of 8 to 15 percent annually almost immediately after deployment, with the potential for incremental improvements over time. A 2012 report estimates that every dollar invested in energy efficiency produces three dollars of operational savings.

Ecobuild notes that '...energy regulations have got progressively tougher in response to European and UK government targets. The EU's non negotiable Energy Performance of Buildings Directive requires all new buildings to be nearly zero carbon from 2020; in response the UK government has proposed zero carbon standards for all new houses by 2016 and all new non-domestic buildings by 2019. The Climate Change Act (2008) requires an 80 percent reduction in greenhouse gases on 1990 levels by 2050 with 30 percent achieved by 2020. Refurbishing and retrofitting existing buildings will also contribute to achieving these aims⁶¹.'

What to do about it:

- Some 69 percent of companies use energy efficiency as a risk-management tool whilst energy usage plays an important role in most building-sector companies' investment decisions, and is a major factor for 63 percent of survey respondents⁶².
- However, one major barrier identified was that many companies underestimate the financial significance of their energy consumption.
- Only 31 percent audit their energy use, and two-thirds of respondents substantially overestimate the cost of constructing energy-efficient buildings. However, four in 10 are going as far as rethinking their buildings' design to maximize natural light.

11. Wearable technology

The definition of wearable technology has shifted over time but is widely used to refer to body worn computers, often in the form of head or wrist mounted user interfaces. Wearable technology revenue is forecast to hit \$19 billion by 2018, up from \$1.4 billion in 2013⁶³. Recent research by US cloud technology company Rackspace found only 6 percent of businesses had provided such devices to their staff⁶⁴, but many experts are calling wearable technology the next logical step after mobile⁶⁵.

What does it mean:

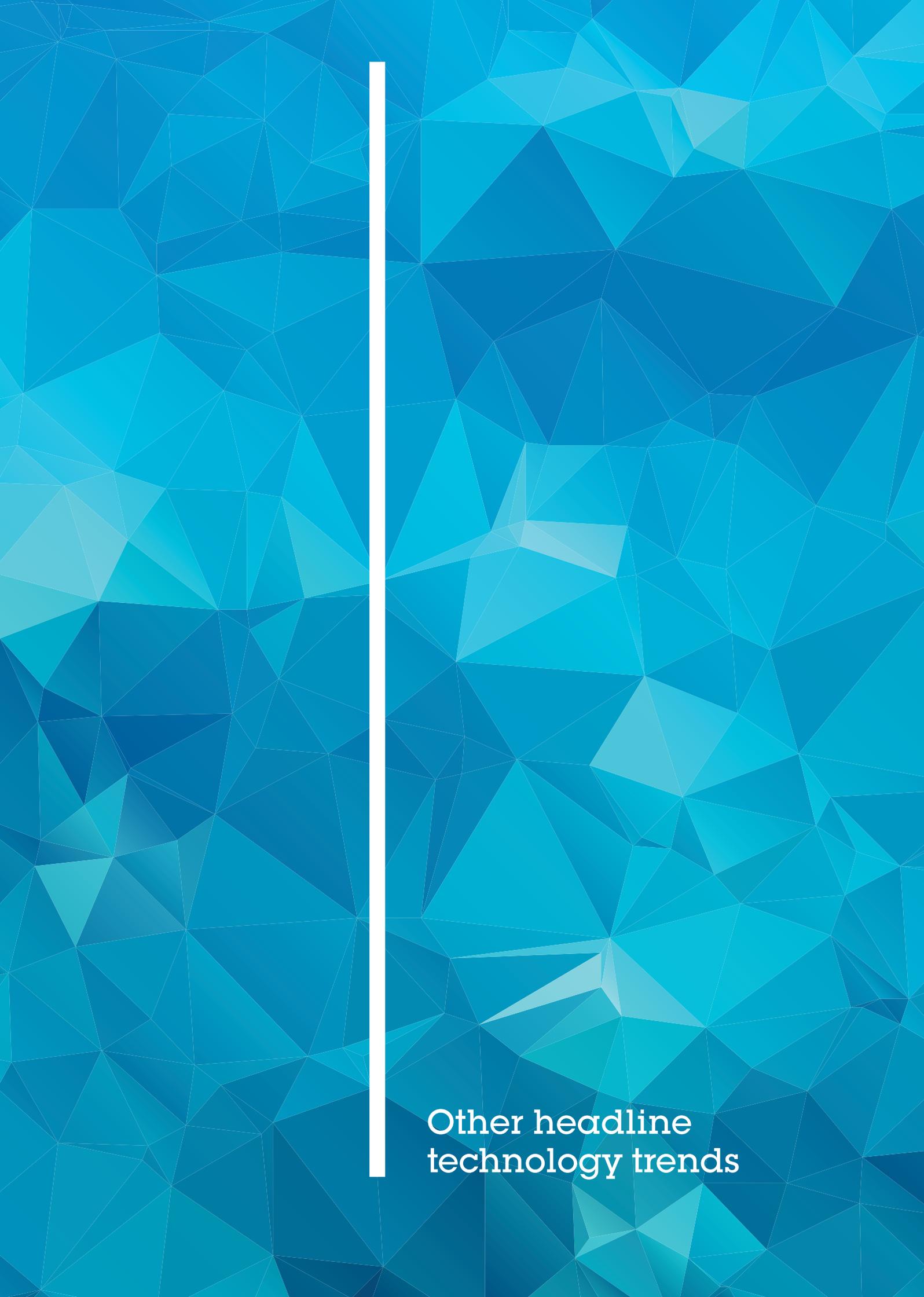
The effects are potentially far ranging and profound. We are looking at a big data mash-up where the wearable tech human cloud meets the productivity and performance corporate cloud to amplify the role of the human cloud at work. To say nothing of the potential consumer and social impact, '...for businesses experimenting with these technologies there are implications for occupational psychology, systems development, insight and analytics, leadership, competitive advantage, environmental analysis and workplace design⁶⁶.'

However, wearable technology may also lower barriers to entry for start ups. 'Wearable technology should help the tech startup community save an immense amount of time. Whether it's a smart watch, Google Glass or even a shirt that charges a smartphone, these devices will allow tech startups to operate more efficiently,' notes Andrew Schrage of Money Crashers Personal Finance⁶⁷.

The flood of data, often unstructured, from wearables will stress current analytics engines. With voice input, and contextual monitoring back-end processing must be able to handle unstructured input, and for this, the necessary infrastructure level must be suitably assessed and implemented⁶⁸. The tie is to the Internet of Things and to big data are undeniable, and as such, security and privacy concerns are concerns for many – some 50 percent of Americans view wearable technology as being '...just a fad⁶⁹.'

What to do about it:

- Organisations that actively engage with the challenges of wearable technology in terms of policies, security, network management and monitoring will find themselves at a huge advantage⁷⁰.
- Google Glass and similar wearable technology represents a new paradigm. It cannot just be seen as a new or novel way of carrying a computer since it is effectively a dynamic new way of fusing digital and physical worlds.
- Business will need to adapt to this new virtual physicality in many contexts, from customers and clients to assets and equipment and also in the context of their own employees, business processes and, importantly, security and privacy policies.



Other headline
technology trends

12. The Internet of Things (IOT)

Cisco estimates that 99.4 percent of the 1.5 trillion physical objects in the world are still unconnected⁷¹. The Internet of Everything (IoE), links people, process, data, buildings and even larger built environments together and thus enhance existing networked connections. In total, Cisco estimates that IoE will create \$14.4 trillion of Value at Stake for companies and industries over the next 10 years (2013-2022).

The IoT will create ubiquitous services for connected consumers and will help push open source and collaborative business models. A November 2013 study by the Economist⁷² shows that 30 percent believe that the IoT will unlock new products and services from existing products and services, 23 percent believe that IoT will change their

business model or business strategy and 95 percent believe their company will be using IoT in three years.

- Invest now in research, pilot projects or even full deployments. *68% have already made IoT investments.*
- With data exchange occurring more freely than ever, re-evaluation of risk management strategies, network security, and business model will be needed.
- Transparency will become the norm for organisations: plan accordingly.

13. From social media to social enterprise

Dion Hinchliffe, notes that '...the more significant value proposition of social requires business transformation...the more profound and higher order aspects of social media including peer production of product development, customer care, and marketing require deeper rethinking of business processes⁷³.'

The monetary rewards of doing so are estimated to be significant. It is estimated that integrated business use social technologies could yield \$1.3 trillion per year of new value into the economy.⁷⁴

Two-thirds of that value could come from improved social collaboration within or between companies, which could translate into a 20 to 25 percent improvement in the productivity of knowledge workers. Interestingly, for professional services, 98 percent of its value could be derived from improved social collaboration within or between companies.

- In 2014, '...the idea that social media is a soft, networking tool will slowly give way to its acceptance as a serious business tool⁷⁵.'
- Internal social media and networks will become a key communication and knowledge sharing platform within organisations.
- Assess how social media could alter various supply chain and product/service lifecycle components and processes.

14. mHealth

As part of the wider quantified self movement, self-tracking is going mainstream. Smartphone Apps and tracking devices like FitBit, Jawbone and MyFitnessPal are rapidly expanding beyond their initial market. At the same time, insurers like Aetna have developed APIs to encourage interfaces with their health and wellness platforms⁷⁶. By 2017, research2guidance forecasts that 50 percent of mobile users will have downloaded mobile health apps⁷⁷. By the end of that year, the total mobile health market revenue could be worth some \$26 billion⁷⁸.

- There is an opportunity for UK organisations to unlock more value in their health and wellness by combining apps with existing programs.
- Issues of privacy will be central to the conversation, which will only be heightened by BYOD. The need to technologically fence personal and private apps will grow.

15. Augmented reality

Augmented Reality (AR) can be defined as '... a real-time augmented view of the environment through digital data such as text, sound, graphics, video and navigation systems that increase users' interactivity with the local environment⁷⁹.' Current mediums for AR include smartphones but bionic lenses and Google Glass type products are all emerging.

Revenues resulting from AR could reach \$600 billion by 2016⁸⁰. Analysts notes, that in addition to its marketing utility '...it's a new way to see and interact with technology that everyone should be aware of⁸¹.' Tomi Ahonen has previously suggested in a TEDx presentation that by 2020 there will be one billion AR users⁸². Other studies suggest that nearly three billion AR apps are expected to be downloaded by 2020⁸³.

- AR is poised to radically redefine and even extend our business and mobility options, social interactions and experiences in the future.
- AR could therefore shift human behaviour in quite profound ways as '...the ease of accessing a constant rich stream of data related to one's immediate environment will change our relationship to technology and to each other⁸⁴.'
- Organisations should start by examining the most obvious uses for AR – sales, marketing and enhancing the consumer experience

16. Organic electronics and photovoltaics

The World Economic Forum notes that '...organic electronics – a type of printed electronics – is the use of organic materials such as polymers to create electronic circuits and devices. In contrast to traditional (silicon-based) semiconductors that are fabricated with expensive photolithographic techniques, organic electronics can be printed using low-cost, scalable processes such as ink jet printing, making them extremely cheap compared with traditional electronics devices, both in terms of the cost per device and the capital equipment required to produce them. The cost implications of printed mass-produced solar photovoltaic collectors, for example, could accelerate the transition to renewable energy⁸⁵.' It is also worth noting that the US Energy Department expects the cost of solar power to fall by 75 percent between 2010 and 2020⁸⁶.

A related theme concerns the rise of distributed energy (DE) – smaller scale power-generation systems for homes, businesses or communities. In several European countries regulatory issues and incentives are leading to the close examination of on-site generation. Bain estimate that centralised generation in Germany will decline by 20 percent through 2020 as distributed generation rises and takes market share with DE profits accounting for €3 billion to €4 billion by 2020⁸⁷.

- Organisations should be examining their carbon and energy footprint as a matter of course, but can now start planning for different energy scenarios for the coming years.
- On-site energy generation is expected to save UK businesses £33bn between 2010 and 2030⁸⁸.

17. Gamification

The use of items that frequently appear in games – like leaderboards, badges, missions and levels is part of a trend that can be seen in a growing variety of industries and applications. 'Gamification can provide a reason for a customer to visit a website or a store more often. It could give employees a new way to obtain the feedback they desire on job performance. It could connect customers in a way that makes them feel rewarded and respected for their opinions and support of your business or product⁸⁹.' So wide ranging is its potential use that gamification is expected to be present in 25 percent of redesigned business processes by 2015 and a \$2.8bn business by 2016. 70 percent

of the Global 2000 are forecast to have at least one gamified app or system by 2014.

- There is a clear need to articulate the problem that gamification is trying to address. The audience must be targeted carefully.
- Determine if gamification is something that can contribute to core processes or strategy or if it simply will supplement existing plans.
- Gamified experiences must add real value to the user's experience, or they will fail to take hold⁹⁰.

18. Liquid metal batteries

Battery innovation is notoriously difficult — it takes a long time to develop and commercialise new batteries, and it can also take a lot of money⁹¹. 'Currently, grids aren't capable of storing electricity, so power utilities have to play a sort of guessing game when it comes to supply and demand, which makes for a highly inefficient system.' Using a grid-scale power cell capable of *sequestering* energy for on-demand delivery by utilities is the ultimate goal of the smart grid, but one of the key inputs is the use of liquid metal batteries. MIT Professor Donald Sadoway developed the concept and expects a prototype to be ready in 2014⁹².

Graphene may prove in time to be the ultimate material, but should the prototype liquid metal battery impress we expect it be commercialised relatively quickly given its array of uses and economical status.

- With developments in on-site generation and battery technology, energy sourcing is set to become a major issue, especially given forecast high prices in the UK. Developing a strategy now is critical.

19. Self driving cars

Driverless technology already exists and the Institute of Electrical and Electronics Engineers believes 75 percent of all vehicles will be autonomous by 2040⁹³. That date may seem distant, but KPMG foresees the first such vehicles hitting showrooms in 2019⁹⁴.

In fact, autonomous vehicles are due much sooner, with Milton Keynes planning to install a fleet of 100 self-driving pods to run between the city's central train station, shopping centre, and office parks beginning in 2015. Wired notes that 'the pods - similar to those used at Heathrow airport since 2011 - will be fully electric, with

motors mounted at each wheel and charging handled by an inductive system set up along the route⁹⁵.'

- Automated carsharing could reduce total vehicles by 85 percent, which would also free up swathes of prime urban real estate as car parks are no longer needed⁹⁶.
- Fuel consumption would decline and companies that rely on just-in-time delivery could reduce inventories even further⁹⁷.

20. Corporate app stores

Twenty-five percent of enterprises are forecast to use corporate app stores by 2017 , and 50 percent of businesses could have their own app stores by 2020 . 41 percent of marketers in a July 2013 survey are planning to develop a mobile app in the next year .

- IDC suggests that the industry is poised to reach a tipping point in the next 12 – 18 months; plans for corporate app stores need to start today .
- Whilst permitting multiple device access, these hubs will provide companies with greater control over the software their staff use.
- Understand how and why both employees and outside customers use technology. All may have different agendas and priorities .



About Advanced 365

Advanced 365 is a leading UK based provider of CIO Advisory, Business Innovation Solutions and Managed Services. Over 250 organisations rely on our expertise and service excellence to improve their operational efficiencies, control costs, and capitalise on digital business opportunities.

Advanced 365 Business Innovation has over 25 years' experience as a leading provider of pioneering software solutions, with tens of thousands of organisations using our products and services. We enable our customers to increase business value and maintain competitive advantage by maximising the potential of existing data and applications, combining core systems with latest technologies.

Within our CIO Advisory Practice, we work with CIOs, CFOs and other senior managers to address immediate and long term opportunities and issues such as:

- Business and Financial Alignment,
- Operational Transformation, and
- Technical Strategy.

Advanced 365's relationship with David Smith is one of many relationships we have with prominent industry leaders to ensure we can provide the very best ideas, innovation and thought leadership in the industry to our clients.

Global Futures and Foresight

About Global Futures and Foresight

Global Futures and Foresight (GFF) is a strategic futures research organisation. The aim of GFF is to develop views of the future to help their clients embrace change with more certainty thereby releasing the full power of their creativity and innovation. GFF helps its clients to reduce their risk of being blindsided by change and to be better enabled to adapt to the fast changing world.

GFF clients number some of the largest and most prestigious firms from around the world including: NATO, HSBC, Lloyds/TSB, RBS, Lloyds, More Than, e-sure, Kraft, Mars, Steria, CSC, Unisys, Cisco, Microsoft, Siemens, Equinix, Deloitte, Ernst & Young, PWC, CBRE, Royal Mail, Bausch & Lomb, Linpac, Kraft, Heinz, SAS airlines, Philips and many other businesses and academic institutions.

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