

TOP 10 TECHNOLOGY TRENDS SHAPING BUSINESS TODAY

A guide to

building the business of tomorrow

lenovo FOR
THOSE
WHO DO.

We live in a world of rapid technological change, and catching the right wave can mean the difference between business success and failure. Balancing the risks of early adoption with getting left behind is an ongoing challenge for all organisations, large and small.

What will the enterprise look like in five or 10 years? How can you select the right devices and software for your business over the next few years? How will your business interact with customers? What will change about the way we work?

READ ON TO DISCOVER THE TOP 10 TECHNOLOGY TRENDS THAT ARE SHAPING BUSINESS TODAY – AND FIND OUT WHAT YOU NEED TO KNOW TO SUCCEED IN TOMORROW'S BUSINESS LANDSCAPE.

1 THE INTERNET OF THINGS

→ The machines are taking over. They already outnumber humans on the internet, with 50 billion devices expected to be connected to the Internet of Things by 2020.

These won't just be computers and mobile devices, but also cars, household appliances, industrial machines, transport systems and utilities. More and more, these things will talk to one another and bypass people altogether, gathering information from sensors strewn all over the world.

STAT

THE INTERNET OF THINGS COULD BOOST GLOBAL CORPORATE PROFITS BY 21 PER CENT BY 2022 AND BE A \$19 TRILLION MARKET.

THE INTERNET OF THINGS

Real examples:



✦ A Dutch company called Sparked has created sensor implants to measure a cow's vital signs, including whether it's sick or pregnant, and transmit the data back to farmers.



✦ Korea's Songdo Smart City features automated systems for traffic, parking and crime prevention.



✦ Nest Labs, recently acquired by Google, has developed a self-learning, Wi-Fi-enabled thermostat that optimises heating and cooling of homes and businesses to conserve energy.



ALERT: Security issues are critical to the Internet of Things, due to the potential for serious mischief and damage through hacking.



FUN FACT: One of the first examples of the Internet of Things was the Internet Coke Machine at Carnegie Mellon University. Researchers rigged a vending machine so it would send updates about its contents to their computers.

2 BIG DATA

→ Big data – gathering it, crunching it and analysing it in real time – is the digital miracle tipped to propel your business efficiency, profitability and performance. Defined as information that's too large to be processed using traditional applications such as Excel, big data is growing by quintillions of bytes every day.

A subset of big data is open data, accessible public data that anyone can crunch and use. A good example is [Information is Beautiful](#), which provides visualisations of a variety of stats on everything from the history of antibiotic resistance to the calorie counts of caffeinated beverages.

STAT

GLOBAL SPENDING ON BIG DATA HARDWARE, SOFTWARE, AND SERVICES IS SET TO REACH \$114 BILLION BY 2018.

BIG DATA

Real examples:



✦ Big data helped US president Barack Obama win re-election in 2012, thanks to a team of analysts crunching terabytes of poll, study and survey data.



✦ Google Translate looks for patterns in hundreds of millions of documents to help decide on the best translation, going by statistics rather than grammatical rules.



✦ Police in the UK and US are using data to predict where new crimes are likely to occur down to 50 square metres. In Los Angeles, burglaries have fallen by 33 per cent and violent crime by 21 per cent, in areas where the software is being used.



ALERT: Big data may raise big legal issues – particularly around privacy, regulatory compliance and duty to intervene.



FUN FACT: Big data is already pushing into exabytes (think a million, one-terabyte hard drives) and researchers are now looking at zettabytes and yottabytes. The next order is already being called a 'brontobyte'.

3

DIGITAL

FIRST

→ Digital first is the recognition that the internet has become most people's primary window on and interface with the world, replacing physical stores, services and media. Instead of online being an afterthought or an add-on – or even developed in parallel – digital takes precedence.

Chief Information Officers (CIOs) are working harder than ever before to align IT divisions with broader business objectives and priorities, as businesses transform themselves into digital organisations. The role of chief data officer (CDO) is appearing in more organisations, as businesses look to utilise the large volumes of digital information they are creating.

STAT

THE NUMBER OF CHIEF DIGITAL OFFICERS IS DOUBLING EVERY YEAR. 23% OF CHIEF DIGITAL OFFICERS ARE IN EUROPE.

DIGITAL FIRST

Real examples:



✦ Through its digital-first strategy, *The Guardian* newspaper has grown its global audience to 90 million unique browsers per month. For comparison, its former predominantly UK circulation was less than 500,000.



✦ Australian telco Telstra has transformed its business through digital first, doubling service transactions performed through digital channels between 2011 and 2013, as well as doubling digital sales.



✦ The UK's National Health Service is saving five billion dollars through digital initiatives and migrating face-to-face contact to digital communications.



ALERT: Harvard's CDO Perry Hewitt warns not to "do digital for the sake of digital". He says businesses should stay focused on drivers and key objectives.



FUN FACT: Over 25% of Chief Data Officers are women – almost twice as many as Chief Information Officers, at 13%.

4 MOBILE TECHNOLOGY

→ Mobile computers – including laptops, notebooks, tablets, smartphones and wearables – are becoming the primary devices used in business as well as the home. In fact Forrester predicts that by 2017, nearly one-in-five of the tablets in use will be a business device.

While employee-owned devices can present a security headache for IT teams, Gartner predicts that by 2017 half of all employers will require employees to use their own devices for work. Research shows that portable devices such as tablets increase worker productivity because they can be used outside the office, such as while commuting.

STAT

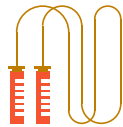
THE GLOBAL
ENTERPRISE MOBILITY
MARKET WILL GENERATE
\$140 BILLION A YEAR
BY 2020.

MOBILE TECHNOLOGY

Real examples:



✦ American Airlines has invested in 33,000 tablets, one of the largest corporate deployments ever. It includes 17,000 'phablets' that give flight attendants access to customer service information.



✦ Consulting company Appirio managed to get a reduction in its health insurance costs by issuing wearable fitness trackers to 400 employees.



✦ Virgin Atlantic is piloting Google Glass use by concierge staff, who can then greet Upper Class Wing passengers by name and provide flight information as soon as they step out of their limousines.



ALERT: IT departments are switching from bring your own device (BYOD) to choose your own device (CYOD) to try and limit the support and security demands created by numerous different personal mobile devices.



FUN FACT: The world's first 'portable computer' was the Xerox NoteTaker developed in 1976, but only 10 prototypes were built. It weighed 22 kilograms.

5 CLOUD COMPUTING

→ Computing is increasingly becoming a service rather than a product. Data, processing, software and other resources are increasingly piped into a company from a remote third-party provider, just like water or electricity. Cloud services are scalable and cost effective, since end customers only pay for usage, not total cost of ownership of the hardware.

Cloud is also becoming highly fragmented, with organisations accessing an average 545 different cloud services from multiple providers.

STAT

BY 2015 END-USER SPENDING ON CLOUD SERVICES COULD TOTAL MORE THAN \$180 BILLION.

CLOUD COMPUTING

Real examples:



✦ Electronics giant Philips uses Salesforce to give thousands of worldwide sales staff access to real-time customer insights.



✦ Foursquare, developer of the location-based social network, uses Dropbox to provide centralised access to files to different global offices, as well as employees on the road.



✦ The City of Los Angeles saved five million dollars by migrating its 34,000 employees to Google Apps and Gmail.



ALERT: Cloud requires robust security measures against the higher level of threat that it represents, plus as-yet-unknown threats.



FUN FACT: The concept of cloud computing dates back to the 1950s where mainframes were so costly that multiple users accessed them through 'static terminals' with no processing power of their own.

6

VIRTUAL

WORKFORCES

→ Thanks to mobile computing, there's no longer any need to have all your employees in one single physical location. Teams and individual workers can be located all over the world, offering employers access to a greater range of skills and talent, as well as lowering staffing costs.

Freelance sites such as oDesk and Freelancer.com also enable companies to hire skills on a project basis and instantly scale their workforce. It means small and medium-sized businesses (SMBs) can compete alongside larger enterprises in terms of being able to tap global talent.

STAT

MCKINSEY ESTIMATES
THAT 160 MILLION JOBS
– AROUND 11 PER CENT
OF THE WORLD'S 1.46
BILLION SERVICE JOBS
– COULD BE CARRIED
OUT REMOTELY.

VIRTUAL WORKFORCES

Real examples:



✦ Digital nomads are people who work remotely and live anywhere they want to. Often you'll find them in locations with low tax and low cost of living – such as South East Asia – working for companies in the West.



✦ Automattic Inc, which owns WordPress, allows its 160 employees to work from wherever they want in the world. Staff get together once a year to brainstorm and socialise.



✦ Boeing–Rocketdyne used a virtual team to create an optimised rocket engine, and in 10 months they designed one with fewer parts, a 14-fold decrease in manufacturing costs, and the highest-ever quality performance in the industry.



ALERT: Enterprises may need to shift their HR strategies from cost reduction to retention and engagement, as skilled workers can now offer their talents to a global market.



FUN FACT: Many studies show that employees who can choose to work from home are happier and more productive.

7 3D PRINTING

→ 3D printing is growing in popularity for both work and play as technology becomes more sophisticated and more affordable. It's being used for everything from aircraft parts to jewellery and is a great way for businesses to reduce costs through improved design, prototyping and short-run manufacturing.

While printers are getting cheaper, 3D print on demand is also soaring. There are many 3D printing studios which allow you to upload CAD files and choose different materials for your creation. If 3D isn't futuristic enough, researchers are talking about 4D printing. This is where 3D-printed materials change shape over time, such as a building adapting its structure to become more energy efficient.

STAT

THE 3D PRINTING MARKET IS EXPECTED TO GROW 23 PER CENT FROM 2013 TO 2020 AND REACH \$8.41 BILLION IN 2020.

3D PRINTING

Real examples:



✦ Boeing has produced more than 20,000 3D-printed parts for its aircraft.



✦ Biotech companies are using 3D bioprinting to create synthetic tissues for medical experimentation, and printing organs for transplantation is also in development.



✦ Eyewear companies are developing 3D-printed glasses that customers could design in their own homes, to perfectly fit their own face.



ALERT: The cost of 3D printer 'ink' may put the technology out of reach, even as the cost of printers falls, with resins already seeing huge mark-up.



FUN FACT: Chilean start-up Thinker Thing wants to print your thoughts by combining 3D printing with a brain-computer interface.

8

WEARABLE TECHNOLOGY

→ From smart glasses and wearable cameras to smart watches and personal fitness devices, wearable technology is going to be a big part of our future at work and at play. Amazon.co.uk has even opened a wearable technology store as it sees customer demand and use of wearables soaring.

Wearables are set to be huge for health, with fitness and activity trackers already representing 61 per cent of devices. In a survey of UK and US adults, a third of respondents said they would be willing to wear a health monitor that shared personal data with a healthcare agency or provider.

STAT

THE WEARABLE
ELECTRONICS MARKET IS
EXPECTED TO BE WORTH
\$8.36 BILLION BY 2018.

WEARABLE TECHNOLOGY

Real examples:



✦ Athletic clothing company Athos has created a full-body workout suit embedded with sensors to track different fitness metrics during workouts.



✦ UK scientists have developed the Endotheliometer which measures key cell layers in blood cells and gives insight into how a body is ageing.



✦ AIRO Wellness's wristband captures a range of data and even projects LED light into the bloodstream to scan nutrients.



ALERT: Businesses should consider wearables as they evolve their mobile device and BYOD policies, as these devices will be slipping in and could represent security issues. Privacy will be another big concern.



FUN FACT: One in three people use wearable tech to "enhance their love lives", according to a study by the Centre for Creative and Social Technology commissioned by Rackspace.

9

GREEN

TECHNOLOGY

→ Continued pressure for businesses to cut their carbon footprints and energy costs is driving growth in green technology. Old hardware guzzles power to the point where it's simply cheaper to replace it. Energy prices and carbon penalties are only going to increase in the future, while governments may dangle tax breaks and other incentives for investing in energy-efficient technology.

Electronic waste is also an issue, running into tens of millions of tonnes per year, and is often illegally dumped, causing serious pollution. If the price of rare earth metals continues to increase, recycling will become more economically viable.

STAT

THE WORLDWIDE MARKET FOR GREEN TECHNOLOGY IS PREDICTED TO BE WORTH \$6 TRILLION BY 2025.

GREEN TECHNOLOGY

Real examples:



✦ Scientists are working on a way to harvest energy from the earth's infrared emissions into outer space, resolving the issue of storing solar energy harvested during the day to use power at night.



✦ Micro windmills, tiny enough to fit on a grain of rice, could charge mobile phone batteries by just waving your arm, or mounted together on flat panels could harvest energy for lighting, security or wireless communication.



✦ Cold fusion is gradually approaching commercialisation, with estimates that a desktop-sized reactor could generate unlimited energy.



ALERT: Green technology may cost jobs: Spain found that for every new green energy job created, two others were lost.



FUN FACT: If it could be properly harnessed, there's enough sunlight falling on the earth in one hour to meet the world's energy demands for a whole year.

10

SECURITY BIOMETRICS

→ Voice recognition featured in *2001: A Space Odyssey* as far back as 1968 and James Bond used fake fingerprints to assume another identity in 1971's *Diamonds Are Forever*. But today's biometrics are getting more sophisticated and more ubiquitous.

From biometric passports to devices such as smartphones with fingerprint scanners, we'll soon be presenting our biometric data on a daily basis.

STAT

THE GLOBAL BIOMETRICS
INDUSTRY IS PREDICTED
TO GROW TO \$16.47
BILLION BY 2017.

SECURITY BIOMETRICS

Real examples:



✦ The Nymi is a wearable device that identifies a user by their unique cardiac fingerprint, allowing them to wirelessly take control of a computer, phone or car.



✦ The German Federal Police use a facial recognition system at Frankfurt Airport, which allows voluntary subscribers (EU or Swiss citizens) to pass fully automated border controls.



✦ Barclays Bank has started using voice recognition to verify the identity of telephone customers, within 30 seconds of normal conversation.



ALERT: Getting locked out of biometrics could become an issue. Devices may store multiple fingerprints, but there needs to be some kind of override in case your entire hand is bandaged or you have laryngitis.



FUN FACT: Blood vessels, breath and body odour are three more areas being researched for their biometric potential.

BUILDING THE BUSINESS OF TOMORROW

With all of this change on the horizon – and opportunities or risks at every turn – how can businesses respond in a meaningful way?

Here are five key things you can focus on today, to prepare your business for the world of tomorrow:

1. Focus on your mobility strategy: it's an inevitability, not a choice. Consider whether BYOD will work for your company, or CYOD, where employees choose from a limited range of devices.
2. Continually review and improve your security: the cyber war is here to stay.
3. Prepare robust and adaptable security and privacy policies: there will be increasing legal and compliance requirements for these.
4. Ensure you educate staff about new technologies: knowledge and ability will vary considerably and productivity will be maximised if everyone is up to speed.
5. Look for ways to be flexible and experiment with new ideas: the future will require you to adapt and change, so embrace new technologies and ways of working.

"FOCUS ON YOUR
MOBILITY STRATEGY:
IT'S AN INEVITABILITY,
NOT A CHOICE."



IT TOOK HUMANKIND ONLY 60 YEARS TO GO FROM INVENTING THE FIRST POWERED AIRCRAFT TO LANDING ON THE MOON. ALL OF THIS HAPPENED WITHOUT SILICON CHIPS, THE INTERNET OR ANY OF THE TECHNOLOGIES WE RELY ON TODAY.

The pace of change is far more rapid today than it was last century. What will the internet be capable of by 2030, when it reaches its 60s? Is your business even ready for 2015?

By staying up to date with key developments in technology and addressing the action areas identified above, you'll have the best chance of keeping up with the next wave of changes, wherever it may take us.

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Our customers use innovation to bring progress to the world, and we design and build our products with this in mind. We take inspiration from the drive and imagination of the people who make things happen. Our technology helps those who do, do better.

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