

# ***The tech breakthroughs megatrend:*** how to prepare for its impact



*How to prepare for the technological breakthroughs megatrend, and the eight technologies to start with*

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## Executive summary

### **Blockchain. AI. Augmented Reality. 3D printing.**

Taken alone, these technologies are having an enormous impact on industries. However, we can't look at them as individual, isolated phenomena. These new technologies are elements of a much bigger trend – the tech breakthroughs megatrend – that will reshape entire industries.

This megatrend, and the “Essential Eight” technologies that make it up, represents a fundamental shift in the technology ecosystems that companies use to deliver products and services. AI has huge potential on its own, so imagine what happens when it's combined with advanced drone technology or the Internet of Things.

For CEOs and business leaders, the question is do you have a strategy for emerging technologies – one that considers both the individual impact of the Essential Eight, but also what will happen when they combine? Responding to this megatrend calls for an emerging technologies strategy, one that is sustainable, iterative and offers a clear roadmap for every part of a business to embrace this transformation.

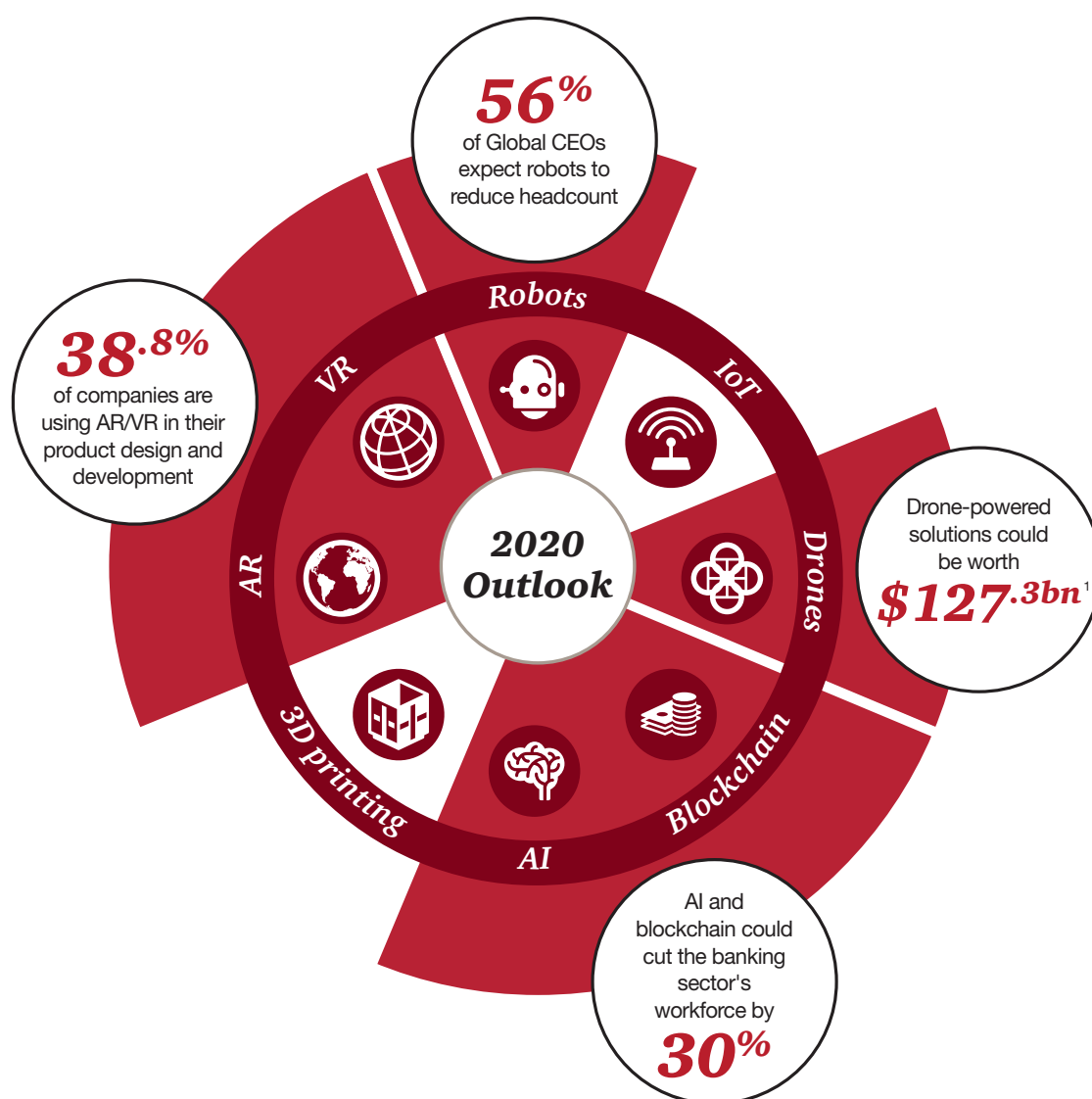
It's certainly an exciting time to be a business leader and we're only just starting to see the first possibilities that this megatrend will unlock. Now's the time then to get a strategy in place so that when these possibilities become reality, you're ready for them.

**Andy Symons**

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# The Essential Eight emerging technologies

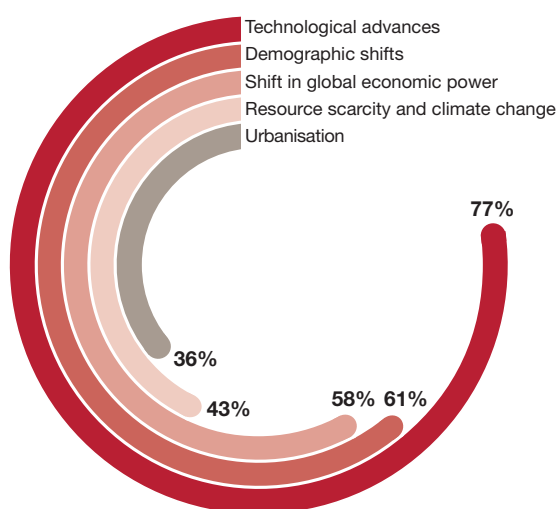


<sup>1</sup> PwC Poland, Clarity from above: PwC global report on the commercial applications of drone technology, May 2016

# What makes technological breakthroughs a megatrend?

**Figure 1: CEOs are certain about what will affect their businesses most<sup>1</sup>**

Q: Please rank the top three global trends which you believe will be most likely to transform wider stakeholder expectations of business within your sector over the next five years.



Source: PwC, 19th Annual Global CEO survey, January 2016

History is littered with companies that have waited out the *Next New Thing* in the belief that it's a technology trend that won't amount to much, or that won't affect their industries for decades. Yet disruption happens. It's safe to say that the history of humankind is a history of disruption – a stream of innovations that have tipped the balance in favor of the innovators. In that sense, technological breakthroughs are the original megatrend. What's unique in the 21st century, though, is the ubiquity of technology, together with its accessibility, reach, depth and impact.

The technological breakthroughs megatrend directly impacts every other megatrend. Every industry feels its influence now, and so does every company, of every size – everywhere. There is still a significant digital divide, but for the first time, the developed and developing worlds are using similar platforms, including the Internet, social media, and mobile technologies. Farmers in India track crop prices on their mobile phones; Kenyan and South African entrepreneurs crowdfund their new ventures.<sup>2,3</sup> There's new competition: Google and Uber are delving into driverless automobiles; Silicon Valley startups are competing with long-established defence contractors and the health insurance industry is being overrun by companies that started out as SaaS (software-as-a-service) providers.<sup>4</sup>

Business leaders worldwide acknowledge these changes, and have a clear sense of their significance. We asked CEOs what they believe will most shape stakeholders' expectations about businesses in their industries over the next five years. Our respondents were unequivocal in pointing to technological advances as the most influential by far (see Figure 1).

<sup>2</sup> Vikas Vasudeva, "Agriculture Ministry launches two mobile apps for farmers," *The Hindu*, December 24, 2015

<sup>3</sup> Gabriella Mulligan, "Africa discovers the power of crowdfunding," *BBC*, June 19, 2015

<sup>4</sup> Strategy&, 2016 Technology Industry Trends, January 2016





## *The Essential Eight technologies that matter now*

1. Artificial intelligence (AI). Software algorithms that are capable of performing tasks that normally require human intelligence, such as visual perception, speech recognition, decision-making and language translation. AI is an 'umbrella' concept that is made up of numerous subfields such as machine learning, which focuses on the development of programs that can teach themselves to learn, understand, reason, plan and act (i.e. become more 'intelligent') when exposed to new data in the right quantities.
2. Augmented reality (AR). Addition of information or visuals to the physical world, via a graphics and/or audio overlay, to improve the user experience for a task or a product. This 'augmentation' of the real world is achieved via supplemental devices that render and display said information. AR is distinct from Virtual Reality (VR); the latter being designed and used to re-create reality within a confined experience.
3. Blockchain. Distributed electronic ledger that uses software algorithms to record and confirm transactions with reliability and anonymity. The record of events is shared between many parties and information once entered cannot be altered, as the downstream chain reinforces upstream transactions.
4. Drones. Air- or water-based devices and vehicles, for example Unmanned Aerial Vehicles (UAV), that fly or move without an on-board human pilot. Drones can operate autonomously (via on-board computers) on a predefined flight plan or be controlled remotely. (Note: This category is distinct from autonomous land-based vehicles.)
5. Internet of Things (IoT). Network of objects – devices, vehicles, etc. – embedded with sensors, software, network connectivity, and computer capability, that can collect and exchange data over the Internet. IoT enables devices to be connected and remotely monitored or controlled. The term IoT has come to represent any device that is now 'connected' and accessible via a network connection. The Industrial IoT (IIoT) is a subset of IoT and refers to its use in manufacturing and industrial sectors.
6. Robots. Electro-mechanical machines or virtual agents that automate, augment or assist human activities, autonomously or according to set instructions – often a computer program. (Note: Drones are also robots, but we list them as a separate technology.)
7. Virtual reality (VR). Computer-generated simulation of a three-dimensional image or a complete environment, within a defined and contained space (unlike AR), that viewers can interact with in realistic ways. VR is intended to be an immersive experience and typically requires equipment, most commonly a helmet/headset.
8. 3D printing. Additive manufacturing techniques used to create three-dimensional objects based on digital models by layering or 'printing' successive layers of materials. 3D printing relies on innovative 'inks' including plastic, metal, and more recently, glass and wood.

## Customer engagement and robots



Nao is a customer service robot being piloted by Mitsubishi UFJ Financial Group, Japan's biggest bank. Nao's visual and auditory 'senses', connected to advanced artificial intelligence, allow it to 'see' customers, recognising them and the tone of their voices. Nao thus has rich interactions with customers, greeting them in their native language (it understands and speaks 19 of them). It can support human staff during rush hour or special events that draw more foreigners to the bank. If Nao performs well, the bank is likely to employ more robotic staff in pursuit of better customer service.

The specific technologies most impactful to a company can – and will – vary, but when we analysed the technologies with the most cross-industry and global impact over the coming years, eight technologies emerged.

So what exactly do we mean by 'impact'? We believe that these technologies will shake things up across all five aspects of your business model, as seen in the following snapshots:<sup>5</sup>

- **Strategy:** If strategy is about defining 'what business to pursue', then these technologies are opening up a slew of new opportunities. In some cases, these new offerings require a comprehensive rethink of innovation and portfolio strategies. In others, they may necessitate fresh go-to-market and even merger and acquisition strategies.
- **Customer Engagement:** The Essential Eight technologies are already reshaping how companies interact with their customers, from sales and marketing to billing and after-sales support. Artificial intelligence, applied as machine learning, for instance, can help process volumes of customer-behaviour data to identify patterns that enterprises can use to improve customer engagement (see sidebar on 'Nao' the robot).<sup>6</sup>
- **Operations:** Artificial intelligence, robots, drones, and 3D printing can all improve operational efficiency and provide significant competitive advantage. At the same time, 3D printing will shrink supply chains, cut product development times, and broaden offerings for customers who expect products tailored to their preferences and needs.<sup>7</sup>

5 PwC, AI In Insurance: Hype or Reality, March 2016  
PwC, Technology Forecast: The road ahead for augmented reality, 2016  
strategy+business, "A Strategists' Guide to Blockchain," January 11, 2016  
PwC, The Industrial Internet of Things, 2016

6 PwC The data blog, "Artificial Intelligence and robotics: The end of the world (as we know it)?," April 15, 2015

7 PwC, 3D printing: Potential to shrink the supply chain, 2014

8 PwC, CEO Agenda: Pulse on Robotics, 2016

9 Portia Crowe, "CITI: The 'Uber moment' for banks is coming – and more than a million people could lose their jobs," Business Insider, March 30, 2016



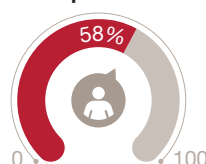
- **People and talent:** These technologies are creating brand-new job categories, but a worrying consequence may be slower job growth. Our CEO Pulse survey found 56% of global CEOs expect robots to reduce head count over the next five years (see Figure 2).<sup>8</sup> A recent Citibank report found the banking industry could lose up to 30% of its workforce over the next 10 years through technology like AI and blockchain.<sup>9</sup>

Concurrently, new technologies beget new companies and new job categories. So employers will have to determine how to integrate machines into their talent pools and, at the same time, determine how to hire, retain and develop the talent they need.

- **Compliance:** This is an often overlooked aspect of the business model. We believe the shortlisted technologies will see many companies scrambling to adapt to – and trying to influence – the resulting regulatory landscapes. Regulators themselves are likely to be in a catch-up mode for a while. How do we protect the data collected by billions of IoT devices? How is blockchain regulated? How do we plan for liability and insurance considerations as drones and service robots proliferate? Questions like these are no longer hypothetical.

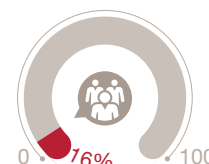
**Figure 2. More robots, new roles, fewer jobs?**

**Bots replace humans**



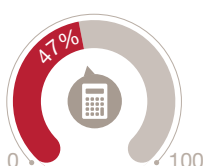
CEOs who intend to reduce headcounts over the next five years as a result of robotics

**More humans hired**



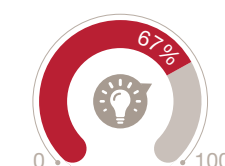
CEOs who intend to increase headcounts over the next five years as a result of robotics

**Jobs lost to bots**



Jobs in the US that could be replaced by robotics and other computerisation by 2034

**New roles created**



CEOs who agree that robotics will create new and exciting opportunities for their employees by automating repetitive tasks

Source: PwC, CEO Agenda: Pulse on Robotics, 2016



# Your job now: Responding to the tech breakthrough

So what should CEOs and their leadership teams do with such brief glimpses of the business impact of these influential technologies? For starters, it is best not to treat the technologies as a kind of checklist to delegate to the CIO or the CTO. Instead, CEOs must take very seriously their own obligations to turn these technologies to strategic advantage – and to protect their organisations against others using the technologies for advantage. If that sounds something like an arms race, that's because it is: technology must be viewed as a competitive weapon, one that merits regular discussion and decision-making in the C-suite.

The technological breakthroughs megatrend is manifesting itself as a proliferation of technologies – the Essential Eight, and hundreds more. The tracking, evaluation, and action plan development for these emerging technologies, while a complex and involved undertaking, should now be an integral component of the overall corporate strategy. To do so, there are three questions that the C-suite must find effective answers to:

## 1.

### ***Do we have a sustainable innovation strategy and process?***

Our research shows<sup>10</sup> that the most successful companies shape their future by creating the change they want to see. However, they do not chase the next exciting emerging technology as soon as it emerges. It is therefore vital to build an innovation strategy, capability, and culture that allows you and your leadership team to engage in profitable pursuit of emerging technologies aligned to your 'Way to Play' (i.e. how you create value for your customers in the market).<sup>11</sup>

For a sustainable and repeatable innovation strategy and process, here are some things you will need to solve for:

**Funding:** How will we fund the emerging-technology-driven innovation?

**Portfolio fit:** How will the emerging-technology pursuit fit within the overall product and services portfolio?

**Accountability:** Who is the senior executive on whose desk the buck finally stops?

**Metrics and monitoring:** What does success look like? How do you make it 'safe to fail'?<sup>12</sup>

<sup>10</sup> Paul Leinwand and Cesare Mainardi, *Strategy That Works: How Winning Companies Close the Strategy-to-Execution Gap*, January 2016

<sup>11</sup> Strategy&, *Capabilities-Driven Strategy Toolkit*

<sup>12</sup> strategy+business, "10 Principles of Strategic Leadership", May 18, 2016





# breakthroughs megatrend

## 2.

***Have we quantified the impact of new technologies? If not, how can we do that—and how soon?***

Championed by the CEO, the corporate strategy team should quantify the effect of these emerging technologies on all aspects of the company's business model.

The overarching task is to identify the technologies that provide the greatest opportunities for growth. This is a complex task. The timeline and number of technologies to emphasise will vary depending on multiple factors, such as the company's size and its capabilities, culture, shareholders, and industry. The lead technologists in the company (e.g. the CTO and the CIO) should be an integral part of this identification process from the get-go.

Once the technologies with highest impact have been shortlisted (not an overnight exercise), it's time to involve business executives who can help prototype them. This has to be iterative, changing as fresh opportunities come along. All along, CEOs should keep their hands on the steering wheel.

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*Tracking, evaluating, and developing the action plan for emerging technologies should be an integral component of the overall corporate strategy.*

## 3.

***Do we have an emerging technologies road map? If so, are we keeping it up to date?***

With confidence about the company's strategic vision and a sustainable innovation process in place, it's time to draw up the road maps that will guide the application of new technologies across the enterprise and the customer base. These emerging-technology road maps cannot stand on their own; they must be aligned to your innovation strategy and integrated into your overall product and services portfolio.

A defining characteristic of the digital age is the rapid pace of change and disruption. The upshot? No technology plan is 'one and done'; it must be continuously revisited, refreshed and reworked. This demands pragmatism in pruning parts of the product and services portfolio that are not delivering – and doubling down on those with the most promise. It's a delicate balancing act; there's a real risk of creating more churn and uncertainty than the organisation can handle. This is why choosing the right executive leader and hands-on involvement from the CEO are both critical.

Answers to these fundamental questions will give you the meta-actions – moves that enable the executive team as a whole to properly and effectively harness the best new technologies.

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