Workspace Reworked

Ride the wave of tech driven change

JLL | Achieve Ambitions

Self-driving cars, robotic helpers and virtual reality headsets: technologies once reserved for futuristic fiction and film are working their way into everyday life. But it's just the beginning.

Technology is advancing at an exponential pace, delivering innovations that will fundamentally transform the lives of consumers and operations of businesses. These specific innovations are just the tip of the iceberg; the iceberg in this case being a new digital ecosystem. Stitched together by clever software, this ecosystem is delivering new products and services seamlessly into our lives and, simultaneously, producing more data than the world has ever seen.

As with other periods of history that coincided with incredible technological progress – the industrial revolution and the birth of the Internet, for example—the next few years will present businesses with powerful challenges and opportunities. Technologies such as artificial intelligence, the Internet of Things and neuromorphic computing will enable companies to reinvent their business models and unlock new sources of growth. The competitive landscape across all industries will become more unpredictable as a result. Already, industry incumbents in all sectors face the threat of digital disruption from new entrants who are leveraging inexpensive technology platforms to build, market and distribute new products and services.

Size and scale no longer guarantee success. The companies that survive the changes set to take place will be those who successfully manage this uncertainty and seize the opportunities created by disruption. Leading firms are already identifying ways to use technology to transform the products and services they provide, the structure of their operations and the ways in which they compete. They are building agile organisations that focus relentlessly on using technology to remodel their businesses – outsourcing and automating work that is not core to their operations.

Critically, these firms are aligning their real estate and business strategies. From individual buildings right up to global portfolio strategy, technology and organisational changes will dramatically transform real estate requirements.

For the real estate industry, the ability to adapt to this new landscape will define its own period of digital disruption.

JLL and Unwork have joined forces to help analyse how technological and organisational drivers of change will collide to impact the businesses who occupy, and the developers who create, commercial real estate in an effort to help the industry mitigate the risks and manage the uncertainties that rapid technological advancement will bring.

2. Executive summary

This report sets out a roadmap for how technological and organisational drivers of change will disrupt workplace and real estate strategies between now and 2030. It highlights how a number of emerging technologies are reinventing the products and services firms provide, how they provide them and the industries in which they compete.

The real estate-specific outcomes in this paper are underpinned by two key drivers of change: technological progress and organisational change.

The technological drivers of change

A new digital ecosystem is powering technological change. It's an ecosystem that comprises more powerful and inexpensive computational power, billions of connected devices, faster and more widespread connectivity and huge volumes of data.

Underpinning the digital ecosystem is software, which, as Marc Andreessen said 'is eating the world'. As it does so, all companies are becoming technology companies.

Exponential advances in computational power

Exponentially faster processing speeds and new forms of computer architecture are powering technologies once thought of as impossible.

Billions of connected devices

Billions of smartphones, wearables and sensors stitched together by the Internet of Things are transforming business models and ways of working.

Ubiquitous connectivity

Faster and near ubiquitous connectivity is connecting more devices and more people to the Internet.

The data revolution

All of this combined results in an explosion of data, which gives businesses unparalleled insight into their customers, powering machine learning and artificial intelligence.

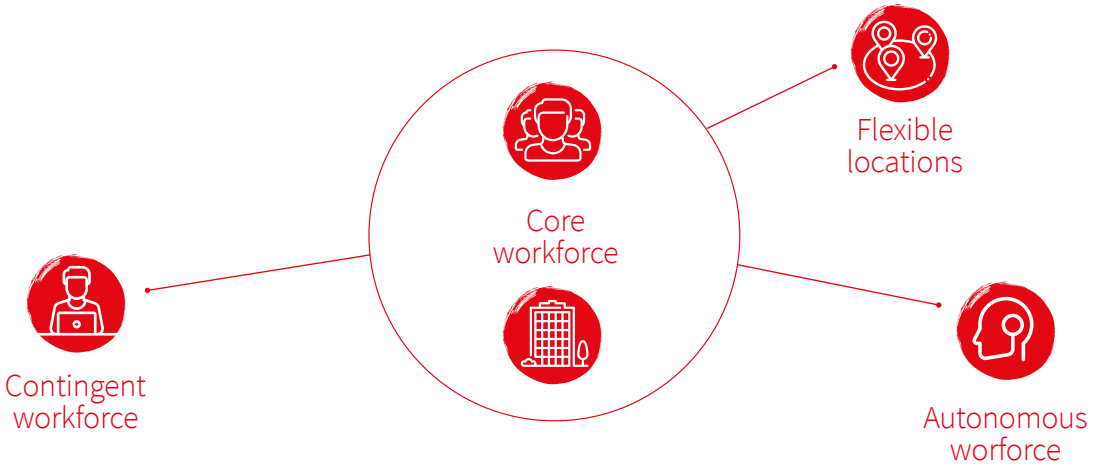
The organisation reorganised

The work that companies do and the way they do it is changing. The use of freelancers, consultants and contingent workers sourced via virtual marketplaces is becoming increasingly common. At the same time, the more process-driven elements of work are falling to artificial intelligence. The companies of the future will be leaner and more dispersed allowing their employees to focus more narrowly on value creation.

With the nature of work changing, sourcing the right talent is vital. Technology already defines the way different people work. Digital natives – the early adopters of digital – are entering the workforce and the upcoming generation of digital dependents—those 'born on the Internet'—will be the first true technology-dependent cohort. They will be key in helping businesses to navigate the changes set out in this paper. Moreover, workplaces will become crucial in attracting and retaining the best people as the competition for talent intensifies.

Technological progress is also upending the structure of industries. Industry stacks are coalescing around software platforms that provide a core market infrastructure, allowing firms of all sizes to compete. The number of smaller, capital-light companies is increasing, while owners and operators of these platforms are capturing a dominant position at the foundation of their sector 'stack'.

The new workforce



The future of real estate

To successfully navigate the changes that will take place over the next 15 years, firms must understand how their workplace and real estate can help them future proof their businesses in a more volatile competitive environment.

We highlight four key areas to consider in future real estate decisions:

1. Tech and real estate collide

Accelerating creativity and innovation
Office environments will become the centre of value creation within an organisation—locations where employees, outside experts and partners come together to work on new products, services and ideas. New types of space will emerge, and accelerator and incubator spaces will become vital components of workplace and innovation strategy.

2. Smart real estate

Defined by data
Sensors and smart systems will enter the workplace at a rapid rate. These systems will not only improve the operational efficiency of buildings, but also generate huge volumes of data on workplaces and the people who use them. This data will lead the design of physical space, empowering occupiers to align the configuration of their spaces with business outcomes.

3. Experience led

Workplace as a service
User Experience will become an increasingly crucial determinant of workplace design. High-quality service provision and amenities will reinforce talent strategies. Core portfolios will decline as large consumers of space consolidate their core spaces into fewer locations and leverage flexible and liquid spaces more.

4. Connectivity

The fourth utility
The speed and resiliency of building connectivity will become major drivers of location decisions, leading developers to take a more active role in the coordination and specification of the technical infrastructure of their developments and occupiers to consider only the best-connected space.

The roadmap to 2030

Corporates will have consolidated and streamlined their portfolios with strategic locations situated in talent hotspots, supplemented by new, diverse types of space to support innovation.

Technology will become far more embedded into workplaces: sensors will capture huge volumes of data that will track the performance of staff and recommend design interventions to improve business performance.

Core locations will also be supported by a network of flexible and liquid spaces – such as co-working spaces and serviced offices – that will be integral to real estate portfolios. Thirty percent of corporate portfolios will be flexible space.

Optimal Connectivity will become a key competitive advantage – as vital to workplaces as the provision of water, electricity and gas, and a key driver of location and real estate decisions.

2030

3. Technology driving change

"The greatest shortcoming of the human race," American physicist Albert A. Bartlett once noted, "is our inability to understand the exponential function."[1] Bartlett's observation should strike a chord with anyone who's witnessed the rapid advances in technological progress in the last few decades. While the growth of the Internet, cloud computing and smartphones – to name a few – have changed the way we live and work, they pale in comparison to the technological advances set to take place over the next 15 years.

As Erik Brynjolfsson and Andrew McAfee point out in their 2014 book, The Second Machine Age, we're at an inflection point – a point where the speed and intensity of technological change starts to accelerate.

We are entering the third wave[2] of technological progress in which technology will become an all-encompassing utility.

"While the growth of the Internet, cloud computing and smartphones have changed the way we live and work, they pale in comparison to the technological advances set to take place"

By 2030:

Technology will become a core part of the operation of all businesses.

New applications of software will disrupt business models across industries.

The emergence of the digital ecosystem of devices, connectivity and data will transform the products, services and business models of all firms.

Product lifecycles will shorten sharply, putting more pressure on firms to innovate faster than ever before.

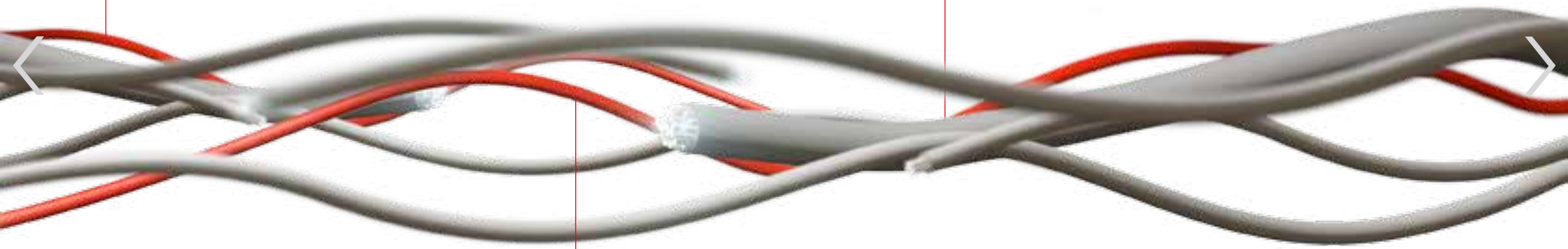
The third wave

Technological progress has occurred in two waves since the mid-1990s.

1

The first wave: 1996 - 2006

The first wave (1996-2006) saw the explosive growth of the commercial Internet; the proliferation of personal devices, such as laptops and mobile phones; and standardisation and roll out of wireless networks, like Wi-Fi and 3G.



2

The second wave: 2006 - 2016

The second wave (2006-2016) expanded on these developments with more sophisticated devices, like smartphones and faster connectivity. Open source software, Web 2.0 and apps allowed users to create and share their own content and media. Cloud computing gave rise to new business models and enabled consumers and enterprises to access products and services housed in racks of servers located halfway around the world.

3

The third wave: 2016 – onward

These changes laid the foundation for the coming third wave (2016 onwards.) The third wave is being propelled by a digital ecosystem comprising exponential advances in computing power, billions of connected devices, ubiquitous connectivity and vast quantities of data. New applications of software will pervade into all industries, transforming businesses and upending long-standing approaches to the way companies work.

The digital ecosystem

We're at the frontier of a new age in which technology no longer refers solely to a set of machines or devices, like computers, smartphones, cables or the like; nor does it refer to a function within a business or industrial sector. Instead, technology is fast becoming an all-encompassing utility that's core to the operation of all businesses. This is enabling companies to realise new revenue streams through the creation of new products, services and business models that leverage the capabilities of a growing digital ecosystem of devices, connectivity and data. The expansion of the railroads in the 19th century made possible services and industries that were previously unimaginable. The growth of power grids in the 20th century gave rise to a plethora of household appliances. Now, the ubiquity of technology is poised to reinvent the products, services, business models and operations of all companies.

John Chambers, the former CEO of Cisco who spent 20 years at the helm of one of the world's largest technology firms, has said that the technological changes that will take place over the next few years will have an impact perhaps 10 times greater than the impact of the Internet to date.[3]

Exponential advances in computing power

Moore's Law suggests that the number of transistors that can be packed onto a microchip doubles every year or so. Computing power has advanced at an exponential pace since the mid-1960s; Intel estimates that the transistors it produces today are 90,000 times more efficient and 60,000 times cheaper than the first ones it produced in 1971.[4] The concurrent falling cost of computational power is leading to the development of new industries—sequencing a human genome cost US$10 million in 2007; companies like 23andMe now offer consumer testing services from just US$99.[5]

By the early 2020s, we will reach the physical limits of the number of transistors that can be packed on to a microchip. However, new forms of hardware and software design are being developed with the potential to allow Moore's Law type scaling to continue unabated. Neural networks, for instance, rely on networks of interconnected processing elements that mimic the makeup of neuron cells in the human brain. Feeding these networks vast amounts of data allows them to recognise patterns and execute certain tasks. Facial recognition algorithms, machine translation and spam filters all rely on neural networks. DeepMind, acquired by Google in 2014, recently deployed its AlphaGo neural network to beat world champion Lee Sedol at the game of Go – a feat that had eluded computer scientists for decades.[6] Elsewhere, neural networks are being used to generate property valuations that take into account the impact of hundreds of variables on asset pricing. Building management software running on neural networks will lead to 'thinking' buildings that optimise their performance though analysing millions of data points.

Quantum computing is another emerging approach to computer design that has the potential to deliver vast improvements in computational power. Relying on the subatomic principles of quantum mechanics, quantum computers hold information in 'qubits'. The transistors in a conventional computer hold information in binary values that are either one or zero; qubits can store both one and zeros at the same time. This allows quantum computers to manipulate and process vast amounts of data much faster than a conventional machine. D-Wave Systems, a Canadian company that produces commercial quantum computers, has partnered with Google and NASA to explore how quantum computing could be applied in fields like artificial intelligence and machine learning.[7]

Smartphones, wearables and the internet of things

The number of devices connected to the Internet will surge to 20 billion by 2020 as more smartphones, sensors and wearable devices come online.[8] Smartphones will become ubiquitous not just in developed countries, but in developing ones too. By 2020, 80 percent of the world's adult population will be smartphone users, up from 50 percent in 2015.[9] These devices are becoming the primary channel for engaging with consumers in industries like retail, financial services, education and healthcare. As consumers use their smartphones for an ever greater range of functions, from shopping online to summoning taxis, the speed at which companies that develop products and services for these devices can scale is accelerating like never before. WhatsApp was founded in June 2009 and took just 12 months to acquire 50 million users. The Space edition of the game Angry Birds was released in 2012 and reached 50 million downloads in just one month.[10]

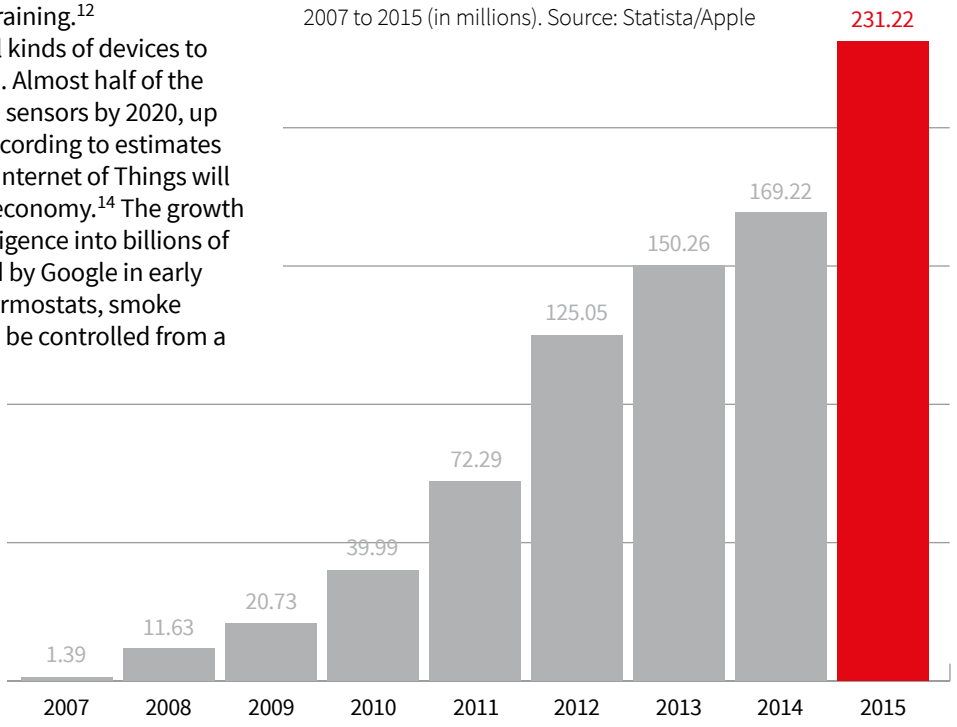
Beyond smartphones, virtual reality (VR) is set to become the next big computing platform. By 2025, VR and augmented reality (AR) will be an US$80 billion market, according to estimates from Goldman Sachs—roughly the size of the desktop PC market in 2015.[11] Oculus VR is an American startup acquired by Facebook. Sony and HTC are launching virtual reality headsets in 2016. While these headsets are all designed to play video games, virtual reality will have transformative use cases in a range of industries. The University of Southern California's Institute for Creative Technologies has developed 'VR exposure theory' to treat people with post-traumatic stress disorder. NextVR broadcasts streams of sports games to virtual reality users and has a five-year partnership with Fox Sports. Property firms are using virtual reality to offer tours of residential and commercial sites to prospective tenants. In the workplace, virtual reality will be used to create immersive, virtual environments for collaboration and training.[12]

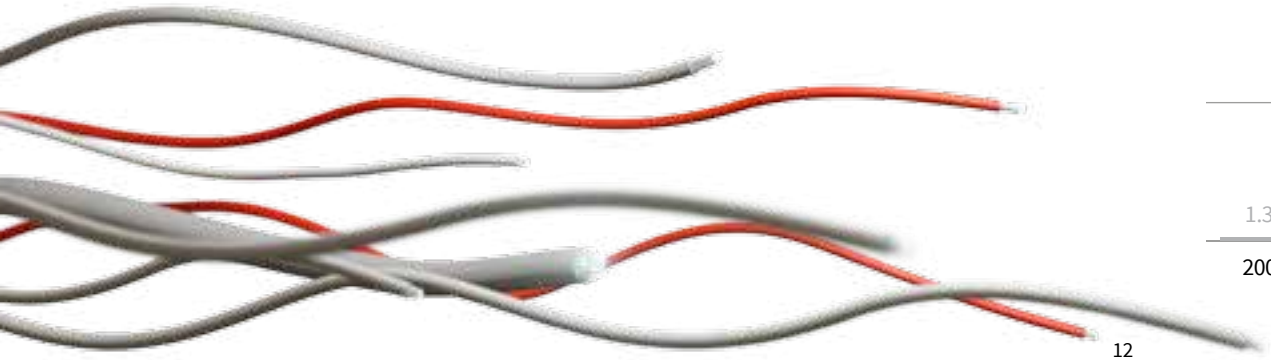
Inexpensive sensors will connect all kinds of devices to the expanding Internet of Things (IoT). Almost half of the world's Internet traffic will come from sensors by 2020, up from 11 percent in 2005.[13] By 2025, according to estimates by the McKinsey Global Institute, the Internet of Things will be worth US$11 trillion to the global economy.[14] The growth of IoT will see the embedding of intelligence into billions of everyday objects: Nest Labs, acquired by Google in early 2014, offers customers connected thermostats, smoke alarms and security cameras that can be controlled from a

"The growth of IoT will see the embedding of intelligence into billions of everyday objects"

Fast growth in device adoption

Unit sales of the Apple iPhone worldwide from 2007 to 2015 (in millions). Source: Statista/Apple





smartphone. Chinese Internet firm Baidu has unveiled a pair of smart chopsticks that notify their users when food has been contaminated with harmful substances.

Applications of IoT technologies in enterprise fields will be far more transformational than their consumer counterparts. General Electric, for instance, is using hundreds of sensors to make its gas turbines run more effectively – a one percent efficiency saving derived from the data these sensors generate could deliver billions of dollars in savings.[15] Smart sensors are being installed into offices to regulate energy consumption and track the utilisation of space. Elsewhere, Philips has developed CityTouch, an intelligent lighting management system that allows city governments to monitor and manage street lights in real time.[16]

Ubiquitous connectivity

The networks that smartphones, sensors and other devices connect to are becoming more widespread. Sixty-nine percent of the global population are now covered by 3G mobile broadband, up from 45 percent in 2011.[17] Google, Verizon and Samsung are all testing cellular network technologies that run 4G networks over the Wi-Fi spectrum.[18] 5G networks, which are expected to be rolled out by 2020, will initially offer speeds of 10 gigabytes per second—the same speed as today's typical wired data connections. Elsewhere, Nokia has partnered with startup Artemis Research to test 'pCell', an experimented cellular system that promises speeds 1,000 times faster than those currently available.[19] These emerging cellular standards could vastly improve the coverage of today's networks and enable wireless building connectivity by the mid-2020s.

The data revolution

The rapidly expanding Internet of Things, combined with ubiquitous connectivity, is creating an ever greater volume of data. Every day, 2.5 exabytes of new data is created—equivalent to 2.5 billion gigabytes.[20] Metcalfe's Law[21] is the principle that the value of a network is proportional to the square of the number of users or devices connected to the network – as more devices become connected to the digital ecosystem, the world's stock of data is growing exponentially. By 2020, 44 zettabytes – a zettabyte being one sextillion bytes – of data will have been produced.[22]

The exponential growth of the global stock of data is allowing companies to hone in on new insights and compete in new ways. SpaceKnow, a US company, recently launched a dedicated China Satellite Manufacturing Index that provides investors with a gauge of manufacturing activity by analysing 2.2 billion individual satellite observations taken of over 500,000 sqare kilometers and 6,000 industrial facilities across China. The real-time nature of this data makes it a better guide to decision-making than official estimates.[23]

Software eats the world

Stitching together the digital ecosystem is software. Software has been fundamental to the transformation of consumer industries over the past two decades – Amazon grew by leveraging software to digitize the practise of selling books, helping the company to grow into new areas and relentlessly transform retailing. Spotify digitized music consumption by offering customers access to a huge music catalogue for a monthly fee. Netflix did the same thing in the media business by providing customers with a library of licensed and original content through its online video streaming software. Now, however, new applications of software are emerging across every industry. This will disrupt well-established business models in fields like finance, law, energy, education, healthcare and real estate.

In 1997, then-Microsoft CTO Nathan Myhrvold published a paper entitled The Next Fifty Years of Software, in which he argued that software was pervasive and would expand into areas available for it to fill.[24]

"Software," as Netscape co-founder and venture capitalist, Marc Andreessen, has said, "is eating the world."

"Six decades into the computer revolution, four decades since the invention of the micro-processor, and two decades into the rise of the modern Internet, all of the technology required to transform industries through software finally works and can be widely delivered at a global scale," he added.[25] Advances in computing power, the surge in the number of devices connected to the Internet, increasing connectivity and vast quantities of data are allowing software to pervade into new areas, redefining how companies create value for their customers.

Every company is a technology company

The upshot of this is that all companies are now technology companies. Investment bank Goldman Sachs employs 9,000 engineers, making its technology group the largest division of the 36,000-strong firm.[26] SETcoin, Goldman's recently revealed digital currency that's based on Bitcoin's blockchain architecture, is hoping to upend trading practises by offering near-instant execution and settlement of trades. Elsewhere, Citibank and UBS are experimenting with similar software-based currencies for settling transfers and payments.

The modern car is powered by software that has over 100 million lines of code. Ford's new 2016 GT is equipped with 50 sensors that monitor functions like pedal positions and humidity, producing more than 100 gigabytes of data per hour, which is analysed by 25 microprocessors that churn through 300 megabytes of data every second.[27] Designers at Ford's Michigan facility, where the GT was developed, used virtual reality headsets to explore software-built models of the car without constructing physical prototypes.

In healthcare, California-based Sentrian uses biosensors and machine learning software to remotely monitor patients' data and report any unusual activity to healthcare professionals. Sentrian aims to equip its software with the ability to read published medical research, improving the quality of its interventions. The system is currently being trialled in the US and UK.[28]

"As more products become effectively 'software defined', product lifecycles are shortening and adoption curves accelerating"

Predix, developed by General Electric, is a software platform that combines device sensors with data analytics to optimise performance and extend the lifecycle of industrial equipment. Trumpf, a German industrial equipment manufacturer that employs 10,000 people worldwide, has developed Axoom – a software platform that helps optimise the manufacturing process.[30] Elsewhere, agricultural equipment maker John Deere has started collecting data on the performance of its equipment and providing this to farmers through an online platform to empower them to make better decisions.[31]

As more products become effectively 'software defined,' product lifecycles are shortening and adoption curves accelerating. Product lifecycle used to be defined by physical obsolesce. Now, it's the length of time between software updates: when Tesla realised its cars had problems with uphill starts, it resolved the issue by updating the cars' operating system. With product life cycles shortening, there is more pressure on firms to rapidly identify and realise new sources of growth.

4. The organisation reorganised

The technological drivers of change are transforming industries and reshaping the structure of organisations.

Technological progress also provides an opportunity for companies to rethink the work that they do and the way they do it. The accelerating pace of change puts a premium on flexibility and the speed at which companies can move to realise new sources of growth. Here, the way companies structure their workforces can give them a competitive edge. Firms that utilise talent platforms to develop a liquid workforce of freelancers and contingent workers, for instance, can access skills they don't have within their own company and organise teams faster and more dynamically.[32] Highly process-driven roles are likely to be automated by intelligent machines over the next decade – allowing companies to achieve more with a smaller headcount.

The companies of the future will be leaner, with remaining employees more narrowly focused on value creation and other activities delegated to specialist providers or intelligent machines. Competing for talent, however, will continue to be a major challenge due to slowing growth in the global labour pool across the next 15 years. Therefore, developing talent strategies to attract and retain the right kinds of employee is essential. There are two generations of talent that firms particularly need to get to grips with to successfully navigate the changes taking place: digital natives and digital dependents. These groups have the digital skills and understanding of technology that companies need to transform their businesses.

By 2030

Industries will evolve into vertically-integrated stacks where power and profits are concentrated into the hands of fewer companies whose software platforms provide the base of their industry's stack.

The rise of contingent workers – specialist freelancers or outside providers – and automation will make firms leaner, more dispersed and narrowly focused on their core competencies.

There will be a boom in the asset and capital-light businesses – such as microbusinesses, startups and SMES – that utilise other layers in the stack to build and distribute their own products and services.

The competition for talent – especially digital talent – will grow more intense. Firms will develop strategies to appeal to digital natives and dependents, which will impact their workplace and real estate strategies.

2030

Stacks: The industries of the future

Industries are being transformed as the digital ecosystem pervades into new areas. Industries such as finance, engineering, manufacturing and telecoms are being reorganised as vertically-integrated 'stacks' held together by software.[33] The notion of 'stacks' originated in software engineering to describe the interdependencies of different layers of components and subsystems to the operation of a platform. At the bottom of a stack, there are usually a small number of large firms who provide their stack's critical layers – such as operating systems or enabling infrastructure. A plethora of other companies of varying sizes exist higher up the stack, leveraging the layers beneath them to build their own products and services.

Alibaba and Amazon provide retail platforms that support the thousands of small merchants in selling their own products. General Electric (GE) is hoping that its Predix platform – data collection for industrial machines – will play a critical role in the engineering industry's stack by offering its technology up to developers creating their own apps on top of Predix. Apple and Google's rival mobile operating platforms support millions of developers' building apps that contribute to the smartphone industry's stack. Financial institutions are opening up their systems via application program interfaces (APIs) to nimble fintech startups for them to create their own products and services that are built on the banks' underlying infrastructure.

Reorganisation into stacks will shake up what many industries look like today. More industries will rely on the software of a small number of firms who will capture the majority of profits in their sector. Higher up the stack will be a mix of companies leveraging other companies' platforms to build and market new products – for example, crowdsourcing funding from Kickstarters, renting computing power from Amazon Web Services and selling their products on Alibaba. Many of these firms will be asset and capital-light microbusinesses and small enterprises.

Platform-based business models are being adopted by large corporates as they race to position their software as the critical layer of their industry's stack.

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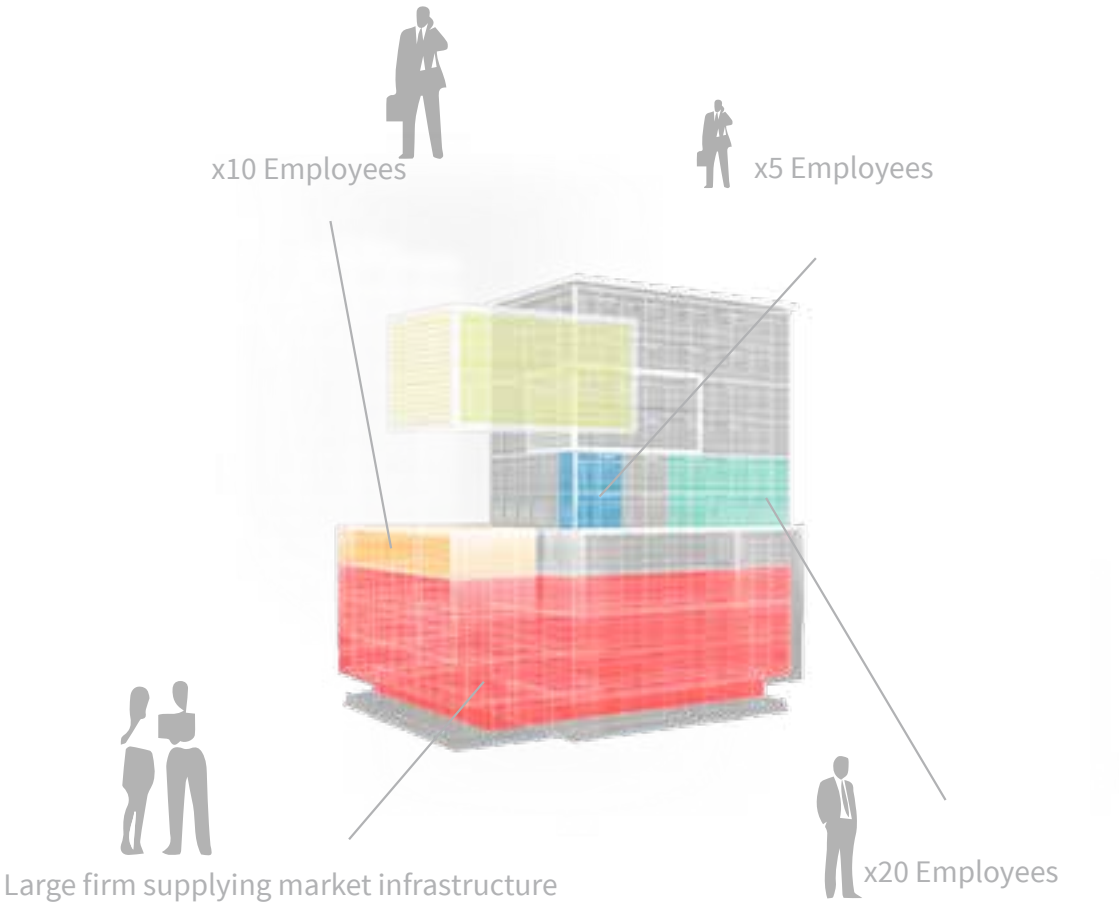


Contingent workforce

As technology and organisational drivers of change intersect, the work that companies do and the way they do it is changing. Technology is breaking down many knowledge economy jobs into separate processes that can be carried out by networks of temporary, contingent workers available on demand. These workers will be sourced via human cloud platforms that link companies with specialist firms and freelancers.

Case Study: TopCoder

TopCoder offers the services of its 300,000 freelance coders based in over 200 countries to companies in need of software engineering expertise. The platform breaks down software development projects into discrete stages, such as conceptualisation, requirement specification, architecture design and development. The commoditisation of different stages of the process enables deeper specialisation and better quality coding than would be found in most organisations, allowing TopCoder to build enterprise-grade software for the likes of UBS and ESPN.[34]

In the legal industry, firms like Axiom and InCloudCounsel provide the expertise of freelance lawyers that undertake legal work for a flat fee. Specialist firms provide legions of law schools graduates as document reviewers, who remotely review documents ahead of litigation cases at far more cost-competitive rates than junior lawyers or paralegals. In management consulting, 10EQS provides virtual teams of consultants who interact with clients through a dedicated software platform.

The growth of a more liquid workforce will allow firms to rely more heavily on networks of freelancers and specialist providers, who will be brought in for particular projects where their expertise is required. This will enable companies to access skills they don't possess in their own organisation and realise the financial benefits that come with delegating work to highly specialised outsiders. The growth of contingent workers also has the potential to inversely impact headcount and, therefore, real estate needs.

The rise of the machines: Autonomous workers

Mass automation will also reshape workforces as companies invest in artificial intelligence. Almost half of all jobs done today – according to estimates from Carl Benedikt Frey and Michael Osborne from the Oxford Martin School – could potentially be automated in the next two decades.[35]

This will lead to the creation of a new class of autonomous workers who take over the more process-driven elements of work. Intelligent software is already automating many back office roles in fields like accountancy, finance and law. E-discovery software, for instance, can analyse millions of electronic documents and tease out ones that might be relevant for a legal case, even when specific words or phrases are not present. Chicago-based Narrative Science has developed software capable of taking raw statistics and data and converting it into prose. Originally used to convert sports statistics into news stories, it's now being used by Credit Suisse to summarise stock activity for the firm's brokers – a task which was formally undertaken by a team of 20 people.[36]

Cognitive AI programmes that can respond to natural language will see human to machine collaboration become part of everyday working life. Watson, IBM's natural language processing artificial intelligence system which famously defeated two human contestants on US prime time quiz show Jeopardy!, is now being used in fields like medicine, banking and customer services. Watson can even act as a 'c-suite advisor', scanning documents, listening in on meetings and advising on which companies to invest in.[37] Ross Intelligence – an application powered by IBM Watson – can answer legal questions asked in natural language by shifting through huge databases of legal documents.[38] In a similar capacity, Kensho – a natural language processing system that Goldman Sachs has invested in – provides detailed answers to financial questions that are asked in plain English.[39] Applications like these – that can interact with humans through speech – will be called on to support or enhance the work of people.

Robotics is taking a more prominent role in the workforce due to the development of highly dexterous and intelligent machines. Boston-based Rethink Robotics has developed Baxter, an industrial robot capable of working on an assembly line. Unlike earlier industrial machines, Baxter doesn't require complex calibrations or modifications to perform new tasks. Instead, it can be trained to perform actions by guiding its mechanical arms through a series of steps. Elsewhere, Amazon Robotics has developed robots for deployment in warehouses that can carry shelves of products to human packers.[40] Outside factory floors, hotels, retailers and healthcare providers are all investing in robots that are intended to interact with people. Softbank has piloted robot shop assistants in its retail locations that can respond to spoken enquires.[41]

"Almost half of all jobs done today – according to estimates from Carl Benedikt Frey and Michael Osborne from the Oxford Martin School – could potentially be automated in the next two decades."

Towards a leaner future

The growth of outsourcing and automation will see companies group their workforces into three categories: employees; contingent workers, comprising freelancers and specialist providers sourced via talent platforms; and autonomous workers, such as algorithms and robots that automate and augment the work done by their human counterparts. Companies will become leaner and more dispersed, summoning the expertise of outsiders when required regardless of where these workers might be based.

Firms that utilise contingent and autonomous workers more will be able to increase their output without a concurrent increase in headcount. As Wall Street firms replaced human traders with automated algorithms, for instance, the number of people employed in the financial sector declined – 100,000 people worked in New York's financial sector in 2013, down from 150,000 in 2000, despite huge increases in both the volume of transactions and profitability of Wall Street firms.[42]

"As Wall Street firms replaced human traders with automated algorithms, the number of people employed in the financial sector declined – 100,000 people worked in New York's financial sector in 2013, down from 150,000 in 2000, despite huge increases in both the volume of transactions and profitability of Wall Street firms."

This trend is even more evident among firms at the hard end of technological disruption – a few months after Kodak declared bankruptcy in 2012, the photo sharing app Instagram was acquired by Facebook for US$1 billion. Kodak employed 145,000 people in its heyday; at the time of its acquisition, Instagram employed just 13.[43]

This will allow companies to focus more tightly on their core competencies. Just as the rise of offshoring and outsourcing in the 1980s allowed hardware companies to delegate manufacturing to specialist firms in the developing world and focus on the design and development of their products, the delegation of what many companies today consider to be their core competencies will free up resources to focus on the strategic imperative facing all companies today: how to leverage the power of the digital ecosystem to reinvent their products, services, business model and operations.

Digital migrants, natives, dependents

Demographic trends will also expedite the pace and impact of technological change. Falling fertility rates in developed markets will see the world's working age demographic grow between 2015 and 2030 at only half the rate it did between 2001 and 2015. The share of older workers will increase significantly: over a quarter of the global workforce will be over the age of 55 by 2030.[44] Many members of this generation are digital migrants.

Digital migrants

Migrants—those born between the mid-1960s and the early 1980s—entered the workplace when the desktop computer was the most widespread piece of office technology. They have had to re-learn how to operate in the digital world.

Digital natives

After this generation are the digital natives. Born between the early 1980s and late 1990s, this generation came of age alongside the personal computer and the Internet. At ease with digital technology and impatient to have access to best-in-class devices, natives entered the workplace with higher expectations for the technology and work environments companies should provide.

Digital dependents

Succeeding the natives, however, is a new generation of digital dependents whose behaviours and expectations have been intimately shaped by their relationship with technology. Dependents were born after the Internet was invented and have grown up surrounded by technology. They see it as fundamental to their ways of working and are infuriated when they don't have access to it. They have even higher expectations of the workplace than natives and a greater preference for freedom and flexibility in their working arrangements. Many of these dependents will build careers as contingent workers—working for many companies in a freelance capacity and not tied down to any one employer.

"Falling fertility rates in developed markets will see the world's working age demographic grow between 2015 and 2030 at only half the rate it did between 2001 and 2015."

It would be a mistake for corporates to believe that they can accommodate the demands of the larger part of their workforce by looking at the expectations of migrants and natives. As digital technology matures, new generations will come to shape the preferences and expectations of older users by introducing them to new applications, services and ways of working. The preferences of dependents will inevitably impact the expectations of older employees.

Moreover, dependents possess many of the digital skills that organisations from across all industries will increasingly rely on to maintain a competitive edge. Demand for software engineers, data analysts and other technical talent is already massively outstripping supply. This is not only driving the costs of talent up, but leading corporates to offer a range of non-financial perks to attract top talent.

In support of their talent strategies, leading firms are putting 'user experience' at the forefront of their workplace strategy. Offices with generous food and beverage provisions, kitted out with gyms, games and recreation spaces are becoming increasingly common as firms compete for top talent. Giving employees choice and flexibility over where they work is also becoming a top priority as companies fit out their offices with a greater variety of spaces to work in and give their staff the best gadgets to work from.

5. The future of real estate

5.1 Technology and real estate collide: Creativity and innovation

The confluence of technological and organisation drivers of change means that there is more competitive pressure on firms to innovate than ever before. As the operational level in which innovation strategy ultimately succeeds or fails, real estate will be a key component of any strategic decision. In this context, the role, function and design of the workplace needs to be repurposed to support the strategic aims of businesses.

As firms reposition themselves to take advantage of the technological changes highlighted by this report, the purpose of office environments will change. They will become the hub of value creation where employees and outside experts come to create and collaborate, supported by technologies like virtual and augmented reality. Real estate portfolios will be consolidated, with a greater share of space located in cities to appeal to top talent. The design of office environments will be guided by user experience as the competition for talent grows more intense.

More fundamentally, new types of space will be created to strengthen innovation strategy. Accelerator, incubator and innovation space will be widely deployed in real estate portfolios to allow firms to work with startups, partners and researchers to develop new products, services and ideas.

By 2030

Offices will become locations for employees, contingent workers and partners and outside experts to work in dynamic and fluid teams.

Portfolios will be streamlined into core locations situated in strategic sites that bring together partners, clients and employees and support talent attraction.

Accelerator, incubator and innovation spaces will be a core component of real estate and innovation strategy.

Virtual and augmented reality will become mainstream in office environments to support immersive collaboration.

The design of office environments will be guided by user experience, providing office users with more flexibility and choice over their working environment and a greater range of amenity spaces.

2030

What's the office for?

As the work that companies do is transformed by technology, the function of the office will shift. Offices will become centres of value creation, creativity, innovation and collaboration within an organisation. Employees, contingent workers, partners and outsiders will come together in an office to work on new products, services and ideas. This is a significant departure from the way office environments are designed and used today. As the more process-driven elements of work are taken over by specialist firms and autonomous workers, the nature of work undertaken in the office will become more creative and collaborative. Dynamic 'Hollywood-style' models of work, in which ad hoc teams of specialists and experts form on a project-by-project basis, will become increasingly common as highly skilled contingent workers collaborate with employees on particular assignments.

Tech-enabled collaboration

Office environments will need to provide users with more specialist project space to accommodate teams of people working together for long periods of time. Here, technologies like virtual reality and augmented reality will be employed to enhance collaboration between employees based in different locations. Ford has experimented with Oculus Rift headsets to allow teams of designers based in different locations to meet virtually and experiment with new designs.[45] Emerge, part of Cisco's innovation lab, has experimented with a virtual reality telepresence system that pairs a headset in one location with a robot head in another – allowing the user to look around and experience a meeting as though they were there.[46] Microsoft has demoed how its HoloLens could be used to allow meetings to take place through 'holoportation' – augmented reality projections of a person that can move around a space as though they were there.[47] As these systems come down in price, they will become standard technology in the workplace.

Consolidated and flexible portfolios

Outsourcing and automation will mean that companies will need less space to house their employees. Large corporates will consolidate their core space into fewer locations that will act as the hub of real estate strategy. These locations will reinforce culture, instil brand and encourage interaction and collaboration. Around these hubs will be networks of alternative spaces comprised of a blend of co-working space, serviced offices, the home office, hotels, airport lounges and other flexible and liquid locations for staff to work from.

While corporates will have fewer core locations, they will invest more in them to attract talent. Core spaces will be fitted out to a high specification and situated in desirable urban environments, in the centre of cities and innovation districts – locations that allow occupiers to tap into deep networks of talent.

User experience-led design

User experience will take primacy in the design of office environments as the war for talent grows more intense. To meet the expectations of the next generation and boost the productivity of those using the office, a greater variety of spaces will be available to work in. Activity based working – an approach to creating workplaces that provide users with shared access to spaces for individual and collaborative work – will become commonplace in workplace design. High-quality services, from food and beverages to recreation spaces, gyms and space to support wellbeing, will become standard features in core locations.

New types of space

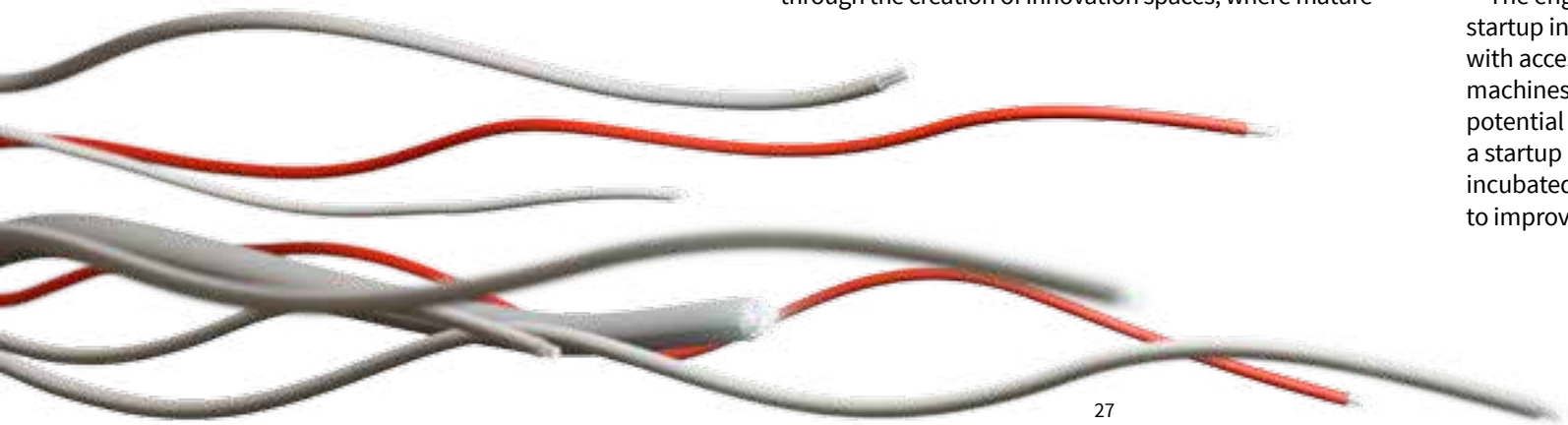
The rise of the digital ecosystem means that the development of new products, services and business models will be increasingly critical to business performance. Here, specialist work environments will play a vital role by providing space for staff, partners, researchers and startups to experiment with new ideas and create value.

Accelerator spaces – spaces for startups and high-growth companies – can act as a honey trap for large companies looking to identify new ideas or investment prospects at source. Product development can be significantly expedited through the creation of innovation spaces, where mature companies bring their teams to work alongside partners and suppliers to jointly work on new products and services. Spaces where companies can work with partners in adjacent industries will be key as technology blurs the lines between different sectors.

"While corporates will have fewer core locations, they will invest more in them to attract talent."

On the campus of the University of Louisville in Kentucky, General Electric has opened FirstBuild, where a team of product engineers crowdsource ideas and develop new connected products using additive and low-volume manufacturing techniques. In 2015 it crowdsourced concepts for an affordable counter-top ice machine, which it rapidly prototyped before launching on crowdfunding site Indiegogo.[48]

The engineering giant has also launched a number of startup incubators, GE Garages, where it provides startups with access to 3D printers, computerised numerical control machines and laser cutters, as well as expert advice and potential partnerships.[49] Meanwhile, rival Bosch has opened a startup accelerator in Ludwigsburg, Germany, where it has incubated a handful of firms, including one that uses sensors to improve agricultural yields.[50]



Case studies

In finance, Barclays has created Rise, a brand of co-working and accelerator spaces with locations in London, Manchester and New York. The accelerator programme, run in association with Techstars, is aimed at fintech firms who can leverage Barclays' network and systems to scale their businesses. DoPay, a company created by the London programme, developed a cloud-based payment platform for the unbanked and worked with Barclays to process hundreds of thousands of payments for the Egyptian government using Barclays' connections and bank charter.[51]

Elsewhere, insurance company Allianz has launched its own startup accelerator in Munich, co-sponsored by Google, which focuses on applications of big data to drive the development of new finance and insurance business models.[52]
AT&T has opened four Foundry Innovation Centres, where it works alongside partners to develop new consumer and enterprise applications. At the AT&T Drive Studio in Detroit, the telecoms company works with automotive firms Audi, GM and Tesla, as well as systems integrator Accenture to develop new 'connected car' solutions.[53]

Companies are also launching their own co-working brands as a way of tapping into startups and small enterprises. SAP, for instance, has recently opened HanaHaus, a 15,000 square foot co-working and event space in Palo Alto, California. Startups can participate in the hackathons and workshops that HanaHaus hosts, and rent workspace by the hour.[54]

As large corporates become more interested in working with startups and small businesses, a number of property companies with large estates are also launching their own accelerator and co-working brands to attract corporate occupiers. Level39, Europe's largest technology accelerator, was opened by Canary Wharf Group in March 2013. The space is now home to 170 startups focused on technology applications in finance, cyber security, retail and future cities and, since opening, has expanded to fill three floors of One Canada Square.[55] Its establishment helped Canary Wharf attract a number of new tenants – including Alibaba, which relocated its HQ to One Canada Square in 2014. In Japan, Mitsui Fudosan has established its own accelerator brand, 31 Ventures, which it plans to expand to 31 locations by 2020.[56] Hong Kong property group, Swire Properties, has created Blueprint, a co-working and accelerator space for B2B technology startups.[57]

Increased dialogue and choice

The workplace requirements of businesses are set to become more disparate and diverse as some procure specialist space for product development while others look to create highly finished environments to house their core businesses.

Developers of commercial real estate need to engage in greater dialogue with occupiers to better understand their requirements. As companies' use of space start to diverge, developers should respond by offering a range of different fit out options and allow tenants to specify which is most suitable. Identifying and developing sites that closely align with occupier demands will justify higher rental premiums on developers' locations and could lead to lucrative long-term partnerships with occupiers.

Action plan for businesses

Now-2020

(i) Align Innovation Strategy and Real Estate Mix
Align workplace strategy with the strategic aims and objectives of your business.

Engage with c-suite to understand business requirements around innovation, and adjust your real estate strategy to support this.

(ii) Choose Your Innovation Model
Decide which model – accelerator, co-working or innovation space – is suitable for your business and identify whether your organisation has the capabilities to manage space or whether partnership is required.

(iii) Define Real Estate Technology Strategy
Build a strategy for emerging technologies like virtual reality, augmented reality and the Internet of Things and how your business will use them.

(iv) Adopt Talent-Driven Real Estate Strategies
Review location and workplaces against talent strategy and leverage labour analytics to understand concentrations of talent and essential locations.

Put user experience at the forefront of workplace design.

2020-2030

(i) Identify Tomorrow's Innovation Hotspots
Employ predictive location analytics to identify future hotspots.

Focus on developing markets with strong talent surpluses and identify cities with large talent pools.

Find second and third tier locations in emerging markets that are up-and-coming sources of top talent, such as Tianjin, Chennai and Hsinchu.

(ii) Integrate Contingent and Autonomous Workers into Space Requirements
Identify which business functions will be outsourced or automated and adjust your real estate footprint.

Increase flexible options into portfolios to allow real estate to scale as your workforce changes.

Action plan for developers

Now-2020

(i) Build an Ecosystem
Identify whether launching your own accelerator and co-working brand could pull target industries to your estate.

Fit out your estate with capital intensive spaces—like collaboration suites, maker space or amenities areas—so that occupiers don't have to. Identify ways to monetise these.

(ii) Start Strategic Dialogue with Occupiers
Roll out strategic occupier engagement programmes and commence ongoing dialogue with occupiers to identify how their space requirements are changing.

(iii) Position Larger Estates as Innovation Districts
Position larger estates as an innovation district and target a sustainable business ecosystem with specific industries or tenant types.

Understand the current and future infrastructure and fit out requirements for your target industry.

2020-2030

(ii) Diversify Your Portfolio Model
Adopt a diversified portfolio model which distinguishes between smaller build, let and sell real estate and larger estates.

Fit out smaller locations to shell and core – like research and development environments – and let tenants select desired levels of fit out from a menu of options.

(ii) Adapt to the Rise of Innovation Districts and City Centres
Be aware that clusters of similar industries and a focus on fewer, core locations will result in significantly higher rental premiums in high-demand locations and submarkets.

5.2 Smart real estate: Defined by data

Inexpensive connected sensors and IoT devices won't just shape factory floors and our homes. These devices will alter the workplace. As buildings become smarter, companies and managers of real estate will be able to closely monitor and optimise the performance of their real estate.

The data that these devices produce will take an active role in the design of workplaces – suggesting design interventions to encourage human interaction, speeding up product development and improving work environments in general.

By 2030, data will take an increasingly important role in the provision and management of work spaces:

Smart buildings will become mainstream, improving the operational efficiency and sustainability of assets.

Advanced analytics applications will capture data from sensors, wearables and smartphones to monitor the interactions and work that takes place in offices, and use this data to suggest design interventions that enhance business performance.

2030

Sensors that monitor the use of space, and the health and wellbeing of office users, in real time will be widely deployed.

Operational and tactical management of workplaces will be delegated to algorithms that track and support the performance of staff.

Smart buildings

Smart building, systems and services such as networking, lighting, heating and cooling, are integrated to allow centralised control and maintenance. In a smart building, control systems work together to reduce operating costs and improve the experience of occupants and visitors, making them better places to work. While many of the use cases for smart buildings focus on relatively mundane tasks, like controlling lighting systems and regulating building access, real gains can be made in sustainability, operation cost and the productivity of staff.

Powering smart buildings are next generation Building Management Systems (BMS). In contrast to the BMS found in most commercial buildings today, which only regulate the performance of a building's critical plant systems, next generation BMS connect to all building systems over an IP-based network. Functioning like a building's operating system, data from multiple smart devices can be transmitted back to the BMS, which can then make decisions on how to optimise building performance. In the event of an emergency, for instance, CCTV cameras could be redirected, access to effected parts of the building restricted, and the information systems used to direct occupants to safety.

Facilities management becomes much simpler in a smart building as all building systems can be controlled from a single piece of software. The performance of individual devices can then be monitored and optimised remotely. Next generation building management systems are also able to accommodate the addition of new devices and systems, like IoT sensors, as long as these devices communicate in a common protocol language, such as BACNet or LonWorks. Smart buildings that adopt open architecture design standards can adopt new capabilities as additional hardware is added to the overall BMS infrastructure.

Alongside next generation building management systems, new standards are emerging for building subsystems and sensors. Power over Ethernet (PoE), for instance, is a standard that can be used to transmit electrical power and data over Ethernet cabling. Desktop phones, CCTV cameras and other low-power devices can, today, be powered using PoE. In the near future, wall-mounted display screens, LED lighting systems and even personal computers could be powered using the technology. For building managers, PoE can monitor and control power consumption of individual devices, switching them off when not required.

"Facilities management becomes much simpler in a smart building as all building systems can be controlled from a single piece of software."

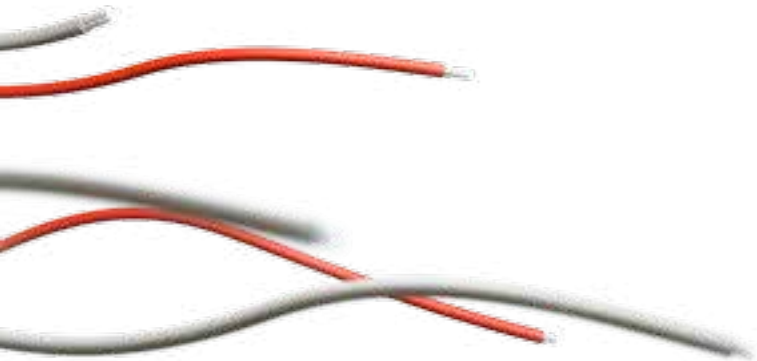
Smart buildings 1.0

Some of the world's first genuinely smart buildings are now starting to come online. The Edge, the Amsterdam HQ of Deloitte, is equipped with more than 30,000 sensors that track the movement of staff from the moment they arrive. Each of the 6,800 LED lights in the building are powered through low-voltage Ethernet cables and are equipped with a sensor monitoring temperature, movement, light, CO2 and humidity. The BMS then uses this data to adjust the lighting and heating in vacant parts of the building, helping to make The Edge one of the world's most sustainable office buildings.[58]

User experience is also better in a smart building. Majunga Tower – a smart building situated in the La Défense district of Paris – allows building users to change the lighting and temperature settings of meeting rooms via a mobile application.[59] Facial recognition technology could be deployed in a smart building to alert reception to returning guests and important individuals, sending a visitor's name and details to a receptionist's display screen as they enter the building. The faces of authorised building users could even be linked to the control of access gates or the operation of lifts.

Smart buildings can offer services like people-tracking and navigation that also help enhance the experience of users. Majunga Tower tracks building occupancy in real time using sensors embedded in staff badges. This information is used to help building users find empty meeting rooms. At the Edge, the location of every employee is tracked via their smartphone, allowing users to locate colleagues via an app. In the near future, buildings will be able to marry up location data with information from corporate databases and social media to engineer interactions between staff members. Buildings will then become physical social networks that can notify one employee working on a project that an unknown specialist is nearby. Companies will be able to engineer collaboration and position their buildings as real-time assets that can drive business success, rather than dumb cost centres.

"Companies will be able to engineer collaboration and position their buildings as real-time assets that can drive business success, rather than dumb cost centres"



Smarter workplaces

It's not just the buildings that people work in that will get smarter, however. Over the next few years, new devices will enter the workplace that will open up new ways of working, change how workplaces are designed, and forge new management paradigms. At the core of this shift will be the ever increasing flow of data from sensors and wearable devices.

Smart systems already employed by retailers to capture footfall data and increase conversion rates are now being deployed in workplaces. Similar technologies are dropping in price and finding their way into workplaces to measure occupancy. In 2015, Steelcase unveiled a version of its Gesture chair that not only monitors usage, but also the heart rate, sitting habits and stress levels of users.[60] Hitachi has recently unveiled a wearable badge which, claims the company, can measure the happiness of an employee by looking at their physical activity.[61]

Fitness trackers like Fitbit and Jawbone wristbands, increasingly common in employees' personal lives, are finding a new lease of life in offices. According to Gartner, 10,000 companies offered employees fitness trackers in 2014.[62] Ernst and Young has trialled giving their employees Jawbone wristbands that monitor how active they are inside and outside of work, capturing this data to help employees understand their health habits.

Adaptive design and real-time optimisation

Monitoring the use of space and the types of interactions that take place in a workplace, correlated with strategic business metrics like number of new product launches, bottom line, or staff turnover, will change the way offices are designed. 'Social physics', a research field pioneered by Alex Pentland at the Massachusetts Institute of Technology, uses vast datasets derived from smartphones and wearables to track how people interact and share ideas.[63] Sociometric badges, a wearable ID badge developed by Pentland, can record where an employee goes in an office, who talks to who, and the character of their interactions. This data can then be used to optimise space to improve business outcomes.

Sociometric badges were employed at Cubist Pharmaceuticals, identifying a positive correlation between cross-team interactions and higher sales. Using this data, the company invested several hundred thousand dollars in replacing their office's small coffee points with larger ones that were shared between more employees. In the quarter following the redesign, sales rose by US$200 million dollars. Elsewhere, Bank of America used sociometric badges to identify why some of their call centre employees were more productive than others. Realising that the most productive employees were those that took breaks together, the bank rescheduled employees' breaks to maximise interactions and saw a 10 percent increase in productivity.[64]

When sociometric badges and similar technologies become suitable for use at scale it will be possible to gauge the impact of workplace design changes in real time and to experiment and model how this will impact a business.

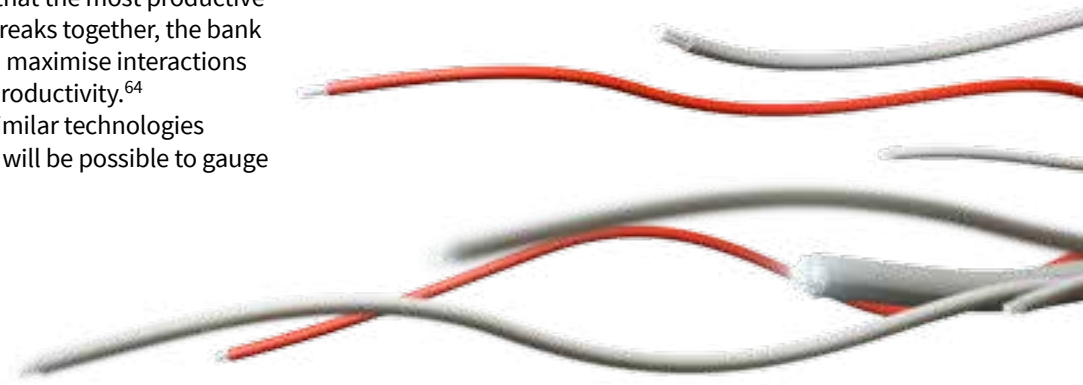
Data will drive design, cementing the link between the strategic aims of a business and day-to-day operations. Workplaces must become more modular and suitable for cost-effective redesign. Companies will achieve this by renting, rather than buying, more of their office furniture so that refits and redeployments can occur more frequently.

Workplaces managed by algorithms

Interventions that shape behaviour and improve the performance of staff will be made on the basis of data captured in real time through inexpensive sensors and monitoring software.

Take Except Labs' MindMeld application, for instance, which uses natural language processing algorithms to listen to conversations and surface relevant information.[65] This could be combined with a camera-mounted wearable device, like Google Glass, to provide heads-up information or prompts to a salesperson pitching to a client, based on the client's reaction to certain words or concepts.

However, robust data policies and change management processes will need to be put in place to ensure employees understand what data is captured and how it is used. Current perceptions of 'big brother' management impacts talent attraction among businesses who employ data capture in the workplace.



Action plan for businesses

Now–2020

(i) Define Your Data Strategy
Understand your objectives in capturing data from your workplaces and build an engagement strategy in partnership with the c-suite and human resources.

(ii) Align Your Data Strategy with Your Vision for User Experience
Identify where smart technologies can enhance the experience of building users and support talent attraction.

(iii) Develop a Smart Procurement Strategy for your Smart Technology
Review technology platforms.

Make interoperability of smart systems a key requirement of procurement.

Ensure smart systems adopt best practises in cyber security.

(iv) Implement Strategy in Best-in-Class or Strategic Locations
Use core locations as test beds for smart systems.

2020-2025

(i) Select Smart Buildings across core portfolio
Opt for smart locations over dumb ones by making base build infrastructure part of your selection criteria for new locations.

(ii) Put Data Science in the Driving Seat
Deploy and embed best-in-class technology platforms to all locations and integrate data into workplace strategy.

Develop or outsource data science expertise to transform management of your workplaces.

2025-2030

(i) Prepare for the Rise of the Machines
Ensure that operational and tactical management of workplaces is delegated to intelligent software.

Arrange automation of facilities management functions and workplace design interventions.

Action plan for developers

Now-2020

(i) Adopt Open Architecture Design Standards

Make open architecture design standards and interoperability key to smart building strategies.

Develop in-house smart technology and cyber security expertise.

(ii) Rollout Pervasive Wi-Fi

Flood locations with high bandwidth, low latency Wi-Fi networks that cover the entire building, not just work areas. These will allow services like people tracking and wayfinding.

2020-2025

(i) Embrace Adaptive Design for Developers

Use smart systems to capture data on existing locations and leverage data to inform future developments and optimise service provision.

(ii) Allow for More Intensive Zonal Use of Buildings

Increase intensive zonal use of buildings as work becomes concentrated in certain areas, like collaboration and innovation hubs.

(iii) Embed Greater Flexibility in Design

Modular fit outs of office environments will enable spaces to be re-tooled and reconfigured more easily.

Cloud-based systems will reduce the need for server rooms, which will reduce energy consumption and cabling requirements.

2025-2030

(i) Embed Smart Technology and Smart Buildings

Equip all new developments with smart systems and technology.

5.3 Experience-led: Workplace as a service

As technological and organisational drivers of change lead companies to a leaner future, where more work is done by contingent or autonomous workers, demand for real estate will change. Large consumers of space will consolidate their core spaces into fewer strategic locations that they invest in more. These spaces will drive business performance by providing high-quality environments for employees and outside specialists to develop new products, services and ideas. Core space will centre on major cities and be fitted out to a high specification to attract talent.

Around these core spaces, a network of flexible and liquid space options will exist for corporates, startups, micro-businesses and freelancers to use. Flexible locations – like co-working spaces and serviced offices – will become an integrated and essential component of real estate strategies of large companies as they attempt to scale their portfolios in response to increasing numbers of contingent and autonomous workers.

"Flexible locations – like co-working spaces and serviced offices – will become an integrated and essential component of real estate strategies of large companies"

The primacy of user experience will reshape the selection, specification, fit out and service provision of office environments.

Thirty per cent of corporate portfolios will comprise flexible space.

2030

Demand for co-working and flexible space will significantly increase as large companies come to use these spaces as a key flexible solution in scaling their real estate portfolios.

Digital marketplaces for space will allow occupiers to secure smaller chunks of space almost instantly.

By 2030, the way companies consume space will change significantly:

The primacy of user experience

The workplace is becoming the new frontier in the war for talent. Digital dependents are entering the workplace with higher expectations and challenging corporates to provide spaces that not only match their workstyles, but also offer a sense of community and belonging. Corporates, for their part, are looking to attract more of their workforces – both employees and contingent workers – into their offices to allow interactions to take place and new ideas to develop. With a smaller number of locations serving as the hubs of real estate strategy and more work taking place in flexible and liquid locations, corporate offices will need to offer the amenities and services to pull staff into locations that reinforce culture and encourage collaboration.

User experience will take primacy in the selection and specification of office space. Everything from location to configuration of work environments, and services and amenities provided will be reshaped by the focus on the users. Core office hubs will be concentrated in the centre of cities or innovation districts – dynamic areas that people want to live and work in.

They will also be kitted out with a greater variety of work settings and a range of amenities and recreation spaces, which will result in offices coming to resemble the hospitality industry – with high-quality food and beverage provision, concierge services and expansive wellness programmes becoming standard features of core locations.

Optimising user experience will require organisations to partner with specialist providers of services and amenities. Facilities management will become more about service provision and enhancing the experience of office users than the day-to-day management of office space.

Co-working

Co-working providers have experienced robust growth over the past five years as startups, SMEs and corporates have started to utilise their spaces more. DeskMag, which runs an annual survey of co-working spaces, found that the number grew by more than 36 percent in 2015 alone – bringing the total number of spaces to approximately 7,800. Two thirds of the co-working spaces surveyed said they planned to expand. By 2018, there could be as many as 40,000 co-working spaces.[66] WeWork, the poster child for the co-working movement that was valued at US$10 billion in 2015, aims to have a portfolio of 80 million square feet globally by 2020.[67]

Though the growth of co-working providers will be impacted by the business cycle, demand will continue to rise over the medium and long term. This is in part due to the way in which the rise of the digital ecosystem is reshaping organisations and – consequently – their real estate requirements. The availability of software platforms that allow companies to build and market new products allows companies to scale their operations while remaining asset and capital-light. A newly formed startup business can fund their business via Kickstarter, source technical expertise from TopCoder and rent computing power from Amazon Web Services. These sorts of companies will only require a relatively small number of employees managing the core operations of the business. A co-working space could be the only office they need.

The growth of contingent workers and freelancers will also benefit co-working providers. More than 40 percent of the American workforce could be working as freelancers by 2020.[68] Co-working spaces will be an attractive location for freelancers and contingent workers due to the networking opportunities on offer.

Startups and SMEs aside, large corporates are increasingly leveraging co-working spaces to accommodate project teams and to allow their employees to network with entrepreneurs and small enterprises. Pepsi, American

Express and Microsoft are all customers of WeWork. Silicon Valley Bank, which has signed multi-year leases with the co-working provider, is hoping its membership will help the bank identify companies to invest in. Elsewhere, the electronics company Ricoh sent their innovation team to work from the Santa Cruz location of co-work provider NextSpace to observe people's working practises and identify common pain points. The insights the team gathered led to the development of Smart Presenter, a paperless meeting solution.[69]

The core-flex balance and the rise of corporate co-working

In the longer term, co-working spaces will be a key flexible solution that large corporates use to scale their real estate portfolios. Increasing numbers of contingent and eventually autonomous workers are making the real estate requirements of large corporates more dynamic and unpredictable. Moreover, in a more volatile and challenging competitive environment, firms are less able to forecast their workplace requirements across the 5 or 10 years of a typical office lease. Corporates will look to limit their liabilities through arrangements with co-working providers that enable them to scale and reduce their real estate requirements dynamically and on an international basis.

This will cause a significant increase in the amount of flex space in the portfolios of large companies. By 2025, 30 percent of corporate portfolios will be flexible and liquid space solutions. Large consumers of space will adopt a parallel portfolio strategy where they combine reduced core space requirements with greater flex space. Corporates will enter into strategic alliances with co-working providers who can offer a network of spaces and global reach. There is likely to be a consolidation of co-working providers as they attempt to scale up their offering in response to increased demand from corporates.

"Online marketplaces for office space are emerging that allow companies to quickly secure space when required"

Space procurement goes digital

Online marketplaces for office space are emerging that allow companies to quickly secure space when required. Platforms like Desk Near Me enable users to reserve desks, meeting rooms and team spaces via a platform website on an hourly, daily or monthly basis.[70] Hubble and 42Floors match vacant space with startups and SMEs who want to rent spaces by the month.[71] JLL HiRise, launched in 2015, is an online leasing platform for small tenants occupying less than 5,000 square feet – a class of tenants who were previously underserved by the commercial real estate (CRE) market.[72]

Platforms such as these will allow tenants looking for space in the short or immediate term to quickly augment their portfolios without the complications and risks associated with signing longer-term leases. Moreover, highly specialised spaces – event spaces, incubators and engineering labs – will be available to occupiers on demand.

Increasingly diversified real estate market

In the short term, the co-working and flexible space market is likely to remain highly diverse, with a variety of players providing flexible spaces that companies can leverage in their portfolios.

To meet the evolving demands for flexible space, a number of real estate owners and developers are entering the co-working market through partnerships with established providers. British Land has a profit share arrangement with co-working provider Central Working to provide flexible space in a number of British Land buildings.[73] Elsewhere, W Hotels has partnered with Desk Near Me to provide its guests with access to workspaces.[74] Other real estate owners are likely to partner with established co-working providers or launch their own co-working brands to respond to increasing demands from occupiers for flexible spaces.

Action plan for businesses

Now-2020

(i) Select Strategic Sites
Review your portfolio and identify core locations.

Increase portfolio flexibility and offset long lease obligations with flexible arrangements.

Explore, test and implement flexible space partnerships.

(ii) Review and Professionalise Facilities Management Provision
Assess whether your facilities management provision offers excellent user experience.

Identify whether your Facilities management team has the capabilities to deliver hospitality-like service quality and, if not, outsource.

2020-2025

(i) Diversify Portfolios
Review and reduce your core space footprint and explore the possibility of a strategic partnership with a flexible space provider.

(ii) Let User Experience Lead Real Estate
Focus investment on core locations while offering employees a multiplicity of flexible locations to work from – e.g., co-working, incubator, home and hotel.

Integrate robotics into your real estate to enhance user experience.

(iii) Outsource Facilities Management Service Provision to High- Quality Providers
Outsource your facilities management service provision to specialist firms.

2025-2030

(i) Adopt Lean Organisation Models
Ensure your core portfolio is focused around strategic sites.

Channel internal investment into technology rich environments which increase collaboration and showcase brand.

(ii) Partner with Best-in-Class Co-Working Providers to Consolidate Flex Portfolios
Enter into strategic alliances with consolidated co-working providers who offer the largest network of spaces and global reach.

Increase flex space provision to around 30 percent of your real estate portfolio.

(iii) Roll out an Artificial Intelligence Strategy for Building Services
Delegate your building management to intelligent software running on neural networks.

Action plan for developers

Now-2020

(i) Embrace Digital Space Procurement
Move procurement of flexible spaces, short leases and office environments under 10,000 square feet online.

Leverage these online platforms to market spaces.

(ii) Adapt to Consumerisation of Real Estate
Adapt to dynamic pricing models that arise from demand for flexible space.

(iii) Create Parallel Portfolios for Flexible Locations
Review options for providing flexible space solutions and develop in parallel portfolios.

Identify potential partners and experiment with new business models and revenue streams.

Assess the viability of launching your own co-working brand.

2020-2025

(i) Let User Experience Lead Real Estate Developments
Assess the impact of user experience primacy on the location, form, function and built environment of new developments and develop place making as a core competency of developers.

(ii) Manage Risk Through Portfolio Diversity
Build a flexible space portfolios while balancing risk through maintaining a parallel portfolio of spaces leased on traditional terms.

2025-2030

(i) Prepare for the Disruption of City and Market Hierarchies
Expect a concentration of value in city centre locations and innovation districts.

Expect greater operational challenges to established office markets due to complexities of amenities and services provision and greater connectivity needs.

5.4 Connectivity: The fourth utility

In early 2009, when the world was still reeling from the impact of the global financial crisis, a start-up called Spread Networks was secretly building a tunnel through Pennsylvania's Allegheny Mountains. On a good day, the company's construction crew would progress about 100 feet using rock saws that glowed white as they bore through the granite and schist. Elsewhere, other teams of engineers and workmen were busy digging ditches next to roads and boring tiny tunnels beneath streams and rivers. The aim of this incredible undertaking was to lay a new fibre cable route between Chicago and New York. Unlike the existing cable network, which followed roads and rail tracks, this new cable would be a straight line stretching 825 miles and shaving perhaps three or four-thousandths of a second off the time it takes to pass information between the two cities.[75]

When Spread Networks completed the cable route, Wall Street firms piled in to lease bandwidth from the company, at a cost reportedly ten times greater than that of the existing cable network. The banks and financial institutions were anxious to carve out their slice of cable capacity before their competitors did – the small speed difference the cable offered would ensure that their automated trading algorithms would be able to make and process transactions faster than those of their rivals.[76]

The experience of big financial firms, who've collectively spent billions on building communications paths and computing facilities designed to produce tiny speed advantages, is telling for companies in other industries.

"When Spread Networks completed the cable route, Wall Street firms piled in to lease bandwidth from the company"

By 2030, the speed of connectivity of office buildings will be critical to location strategy:

Optimal connectivity will become the fourth utility, as essential to the operation of a business as water, electricity and gas.

2030

Developers who don't invest in improving the connectivity of their locations will struggle to let their spaces.

Speed, resilience and a competitive advantage

Constant connectivity, speed and the resilience of communication networks are becoming absolutely vital to all firms. As more applications and services are delivered via the cloud, occupiers are more dependent on the communications infrastructures of their office locations and their resistance to outages.

Whether buildings are 'lit up' in advance of incoming tenants, the design of cabling systems, distance to the public cloud and speed and the resilience of communication networks should be viewed as part of the competitive advantage of different locations. Network connectivity is becoming more embedded into the fabric of a building. Buildings that offer best-in-class connectivity and simple move-in procedures will command higher rental premiums. While this may require an initially greater capital expenditure, developers can recoup their investments through increased rental premiums on sites with better connectivity.

Readily available ratings data on the connectivity of potential locations should be used by occupiers to identify sites with superior connectivity. WiredScore, a firm which rates office buildings according to the speed and reliability of their Internet connections, now provides ratings for buildings in 50 cities, including New York and London.[77]

"Commercial real estate developers will then find themselves under pressure from both occupiers and planning authoirities to provide best-in-class connectivity."

Governments are increasingly treating the availability of a high-speed Internet as a critical part of their national infrastructure. Local authorities are therefore likely to incorporate connectivity requirements into planning criteria for new developments. Commercial real estate developers will then find themselves under pressure from both occupiers and planning authorities to provide best-in-class connectivity.

Developers who invest in improving the technical infrastructure of their sites will find them easier to let. When Caspi Development acquired 161 Bowery building in New York, they invested in wiring fibre connections from the outside plant to every floor in the building. Not long after the renovations were complete, tenants flocked to the newly WiredScore-certified building.[78] Developers will need to take a more active role in coordinating the design of their buildings' infrastructures – putting in place connectivity roadmaps and working with architectural, mechanical and electrical designers to ensure designs support their connectivity strategies.

Action plan for businesses

Now-2020

(i) Review your On-Site Data Centre
Leverage public cloud platforms and colocation to outsource the running of datacentres to specialist providers. This will release floor space, currently designated to server rooms, and reduce energy consumption.

2020-2030

(i) Develop Your Connectivity-Led Location Strategy
Make building connectivity part of the selection criteria for new sites and leverage available ratings data to inform location decisions.

The speed and resilience of communication networks, distance to public cloud and availability of different telecoms providers should be major concerns when comparing buildings.

Action plan for developers

Now-2020

(i) Embed Connectivity as the Fourth Utility
Make connectivity of buildings and tenant domains as much of a concern as the provision of water, gas and electricity.

Eliminate lead times to connecting tenant domains by having telecoms providers 'light up' the building in advance of incoming tenants.

Upgrade the connectivity of existing sites and have them certified as WiredScore compliant.

(ii) Set the Vision and Roadmap for New Developments
Coordinate the design of building infrastructure with architectural, mechanical and electrical designers to ensure designs provide best-in-class connectivity. This will make sites more marketable and command higher rental premiums.

2020-2030

(i) Prepare for Location Decisions Transformed by Connectivity
Make best-in-class connectivity an essential requirement for all developments.

For larger estates, invest in the connectivity of locations and seek a return on investment by leasing access to the network back to telecoms providers.

6. Action plan to 2030

The rise of the digital ecosystem and consequent restructuring of companies will result in a wholesale transformation of the way workplaces are designed and used today. Companies are already taking steps to future-proof their workplaces and businesses.

By 2020, large consumers of spaces will have begun to consolidate some of their core locations and build more flexible options into their portfolios. More of them will have established specialist accelerator and incubator spaces to work with partners, startups and outside experts. Smart building sensors and emerging technologies like virtual reality will begin to enter the workplace, but will not yet be ubiquitous. The connectivity of companies' locations will be integrated into the selection criteria for new sites as companies become more dependent on the speed and resilience of communication networks.

By 2025, technology will have had a transformational impact on organisations and their real estate portfolios. Flexible spaces will comprise up to 30 percent of the total footprint of large companies as more work is outsourced and automated. The hubs of real estate strategy will be consolidated locations in the centre of cities or innovation districts. The design of these spaces will be led by user experience—fitted out to a high specification, offering a variety of work settings and with better quality provision of amenities and services. A mix of employees and a contingent workforce will become the norm as employees collaborate with outside specialists on a project-by-project basis. Smart buildings will be mainstream, allowing companies to reconfigure their spaces based on real-time measurement of the performance of their workplaces and people.

"The companies that benefit from the disruption set to take place will be those with a clear view of the technological and organisation drivers of change"

By 2030, companies will have diverse real estate portfolios that balance core space requirements with greater amounts of flex space. Core locations will be concentrated in fewer, yet more dynamic, strategic, locations. More of them will be in developing markets with strong talent pools. Automation and outsourcing will streamline the workforces of large companies and reduce the number of full-time staff they employ. Tactical and operational management of workplaces will be largely undertaken by algorithms that optimise the design of workplaces by analysing millions of data points on how these spaces are used. These will be correlated with strategic metrics, such as the bottom line and staff turnover.

Navigating the changes set to take place will be a challenge for even the most forward-thinking of firms. Being a successful company in the future will be more demanding than it was in the past. The companies that will benefit from the disruption set to take place will be those with a clear view of the technological and organisational drivers of change, who have the vision to make bold decisions on how these forces will reshape their real estate, and who are able to respond to changes taking place today.

Contact

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Thank you

We would like to thank the following whose contributions, insight and energy helped to shape this report:
Anthony Impy - Optimity | James Layfield - Central Working | Andrew Roughan - IO | Will Rowe - Protein

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