

The background of the cover is a dark blue and black gradient with various financial data visualizations. On the right side, there is a 3D bar chart with several bars of varying heights. Below it, there are several line graphs with different colored lines (yellow, red, blue) showing trends. Some numbers are visible on the graphs, such as '00.01', '-05.22', and '-00'. There are also some green dots in a grid pattern at the bottom right. The overall aesthetic is modern and data-driven.

THE Frontier Line

Thought leadership and insights from Frontier Advisors

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Technological Disruption in Real Assets

▶ Frontier Advisors

Frontier Advisors has been at the forefront of institutional investment advice in Australia for over two decades and provides advice over more than \$320B in assets across the superannuation, charity, public sector and higher education sectors.

Frontier's purpose is to enable our clients to generate superior investment and business outcomes through knowledge sharing, customisation, client empowering technology and an alignment and focus unconstrained by product or manager conflict.

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5 Ways Sensor Technology Can Improve City Infrastructure (Industry Perspective), Cohen, 2017;
Technology disruptions affecting infrastructure (Parts 1& 2), QIC, 2016;
How infrastructure and real estate investments are being transformed in the digital world, CBRE Caledon, 2018.

Executive summary

The Property and Infrastructure sectors are particularly vulnerable to technological disruption due to their long-term and relatively static nature. Technological advancements are happening at an ever increasing rate. This will have positive as well as adverse impacts on real assets, and indeed, many of the investment opportunities within real assets are the direct or indirect result of technological changes over the past two centuries.

Based on Frontier’s research and discussions with asset owners, key disruptors for the infrastructure sector include automation, driverless vehicles, advancement of renewable technologies, electric vehicles and the proliferation of data/ Internet of Things (IOT). These present both opportunities and significant threats; for example, automation and driverless cars can add efficiencies to utility and transport assets but potentially reduce the utilisation of car park assets. Similarly, reduction in renewable technology costs will foster the growth of this sector while potentially making thermal power assets obsolete.

In the property sector automation and the Internet of Things is also at the forefront of asset owners’ considerations, as well as evolving effects of e-commerce and the sharing economy. The focus is on how technology could change the physical shape and composition of real estate and threaten the traditional use of assets, particularly in the retail and industrial sectors. This paper explores some of these themes in detail.

Technology related disruption – what is “infratech” and “proptech”?

“Infratech” and “proptech” have emerged as popular terms to describe the impact of technology on infrastructure and property sectors. “Infratech” is the deployment or integration of digital technologies with physical infrastructure to deliver efficient, connected, resilient and agile assets. In a similar vein, “proptech” refers to technological changes that foster innovation in building, operating platforms and the built environment. The combination of physical and digital infrastructure designs produce assets that respond intelligently, or inform and direct their maintenance, use and delivery.



Infrastructure

Automation and driverless vehicles

Automation, particularly in the transport sector (including self-driving cars, trucks, trains and other vehicles) is viewed as one area of technological disruption that could have a drastic and relatively near-term impact on multiple sectors. Transportation assets (like ports and airports) and even utilities can potentially benefit from more efficient automated processes, which improve throughput and reduce operational costs. Smaller forms of driverless aerial vehicles could be used as low-cost tools to inspect and monitor infrastructure spanning significant distances, such as roads and energy transmission and distribution assets.

However, other sectors are likely to be negatively impacted. Utilisation of car parking assets (including airport car parking) could be reduced by vehicles that can self-drive and park elsewhere. Rail and rolling stock providers could be replaced by driverless trucks carrying freight and public transport related infrastructure usage could decline if patrons prefer to travel in separate self-driving vehicles.

For sectors such as toll roads, the ultimate impact of automation will depend on how business models evolve around the technology. One example is the development of "Mobility-as-a-Service" (MaaS) which is essentially the integration of various forms of transportation into a single service accessible on demand. Whilst automation could reduce congestion through more efficient traffic flow on public roads and reduce the demand for tolled roads, an efficient MaaS system could increase traffic volumes.

Electric vehicles (EVs)

The ongoing adoption of electric vehicles will be positive for several infrastructure sectors, including:

- Electricity generation, transmission and distribution, due to increased electricity consumption;
- Tolled transportation assets due to increased traffic (under the assumption the EVs will only be adopted if they are cheaper to operate than existing vehicles);
- Charging infrastructure could become a new infrastructure sub-sector;
- Ports and airports may benefit from reduced oil prices and therefore air and sea transportation costs; and
- Ancillary opportunities could arise including those involved in recycling the EV batteries.

The likely losers from the rise of EVs will be the oil and gas industry as oil demand reduces, as well as oil and gas infrastructure such as pipelines, ports, oil storage facilities and rail infrastructure.



Infrastructure

Renewables

Renewables uptake is being driven not only by the global focus on reducing carbon emissions but also by the improving economics of renewable technologies. Cost of wind and solar generation as well as battery storage has fallen over 90% in the last decade and evolution of the technology is expected to continue. Beneficiaries from the increased penetration of renewable energy are likely to include:

- Grid based energy storage, due to its ability to manage the intermittency of renewables;
- Gas-fired peaking plants, also due to their grid balancing function and related gas distribution infrastructure, such as pipelines and storage, to service increased gas generation;
- Transmission and distribution assets which will benefit from unregulated connections to their networks, plus the additional capital expenditure required to adapt the network to increased renewables penetration.

Sectors that may be negatively impacted include:

- Traditional electricity generation, should the increasingly inexpensive renewables generation drive down electricity prices;
- Infrastructure required to supply the fuel for traditional electricity generation, such as coal terminals and rail assets;
- Generation assets with merchant price exposure (including existing renewables assets) due to reducing electricity prices;
- District heating should electric sources of heating become cheaper.

Internet of Things

The industrial internet of things (IIoT) is the use of smart sensors and actuators to enhance manufacturing and industrial processes. IIoT is a network of intelligent devices connected to form systems that monitor, collect, exchange and analyse data to optimise operations and monitor processes. Related themes that emerge from IIoT that need to be considered include cloud computing, artificial intelligence, blockchain-based systems and cybersecurity.

For infrastructure operators, IoT presents opportunities to improve efficiencies and decision making in real-time. For example, smart meters can help water and wastewater utilities manage pipeline pressure and reduce leakages. Additionally, fewer overflows and leakages also extends the lifetime of equipment throughout wastewater networks. Power-quality monitoring devices using advanced sensor technology can analyse and interpret raw measurement data to improve systemwide power-quality delivery. This can ensure that urban transport infrastructure systems requiring a consistent supply of high-voltage power, such as electrified light rail, suffer less damage from overheating and component failures during their useful lifespan.

Additionally, the continuing development of IT and data usage increases the need for data centres and other telecommunications infrastructure, presenting more investment opportunities into this subsector.

However, whilst IoT will bring opportunities for infrastructure, there are a number of challenges. For example, cybersecurity measures will mean additional costs for companies to ensure crucial data is protected, cyber breaches are detected and procedures are in place to recover data. Regulatory compliance considerations will need to be addressed to balance privacy rights and data usage and ownership.



Property

Emerging technologies and innovations are expected to impact the way we live, commute, work, shop, park and produce goods and services. The “sharing economy” model is revolutionising multiple industries. The consequences for commercial real estate, particularly the retail and office sectors, are likely to reshape the look, feel and composition of cities. In the longer term, we expect mixed-use precincts in large metropolises to become the norm just as they are in Asia.

JLL postulates that we are currently living through the “Fourth Industrial Revolution – a period characterised by the rise of productivity, income and quality of life – yielded from advancements in technology.” On the other hand, adverse social consequences are to be expected, but are difficult to forecast.

E-commerce

While e-commerce is providing the largest boost to the logistics sector in recent history, the sector could equally become susceptible to significant job losses in the future from automation and robotics. In Australia, Woolworths is opening a highly automated facility in 2019 at a cost of circa \$350 million. Coles is reportedly investing up to \$800 million in newly re-configured automated distribution centres. Routine, repetitive and predictive roles are at the highest risk (e.g. claim and loan assessors, auditors) whereas knowledge-based, “human touch” roles are least at risk (Chart 1).

Changing business models are also resulting in shifting structural specifications and locations for warehouse assets. For example, a large online retailer, such as Amazon, will generally want both large regional warehouses with high floor loadings as well as “last mile” distribution centres closer to population centres. This has implications for inner-city logistics facilities, Scarcity of land in these locations, will push up the value of existing assets and encourage the development of more efficient facilities, such as multi-level buildings.

Data and the Internet of Things

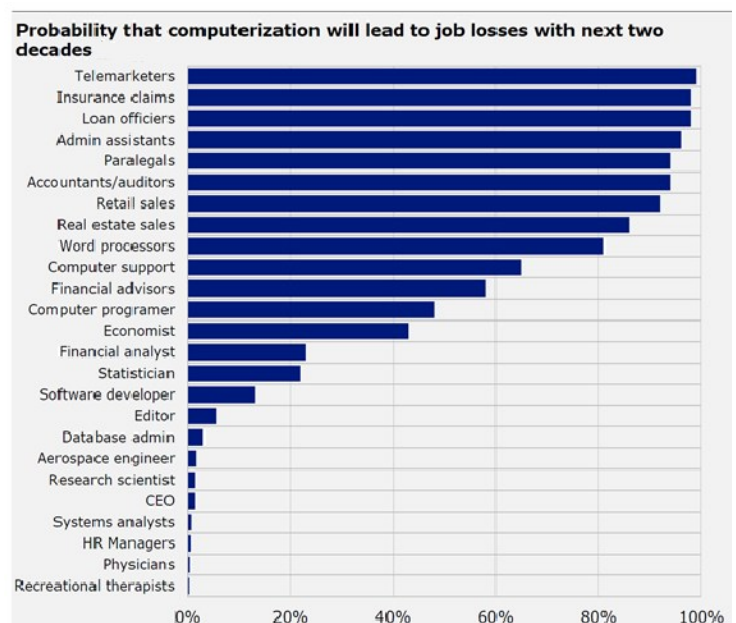
Many real estate managers refer to data as the new “gold”. Some are investing in technology start-ups that allow them to both collect and harvest data in real time to re-mix tenancies, spaces and whole precincts in response to changing user demand. Customer segmentation, personalisation and experience are enabled and enhanced through auto-tagging, visual imagery and virtual reality.

In retail assets, customers’ movements and choices are tracked instantaneously throughout shopping centres, which can be used to understand customer behaviour and optimise the retail mix. Delivery of tailored marketing to customers via phone apps is now commonplace. A similar strategy is employed by managers in the residential sector, offering a seamless array of leasing, maintenance services, personal services (e.g. dry-cleaning) and onsite communal cooking and entertainment events.

Predictive maintenance and demand forecasting are enabling radical improvements in building management systems. An Australian manager is leading the way in conjunction with Microsoft by creating a ‘digital twin’ of existing and development assets within their portfolios.

In asset management, most managers collect and analyse tenant data (such as lease terms) which drives smarter management and decision-making processes. The operation of assets can also be made more efficient by using sensor data (such as heating, lighting and water usage). Smarter, environmentally friendly buildings usually translate to lower costs for both tenant and landlord.

Chart 1: Jobs at high risk



Source: Invesco, Frontier Advisors, APRA Annual Superannuation Bulletin Statistics – 2018

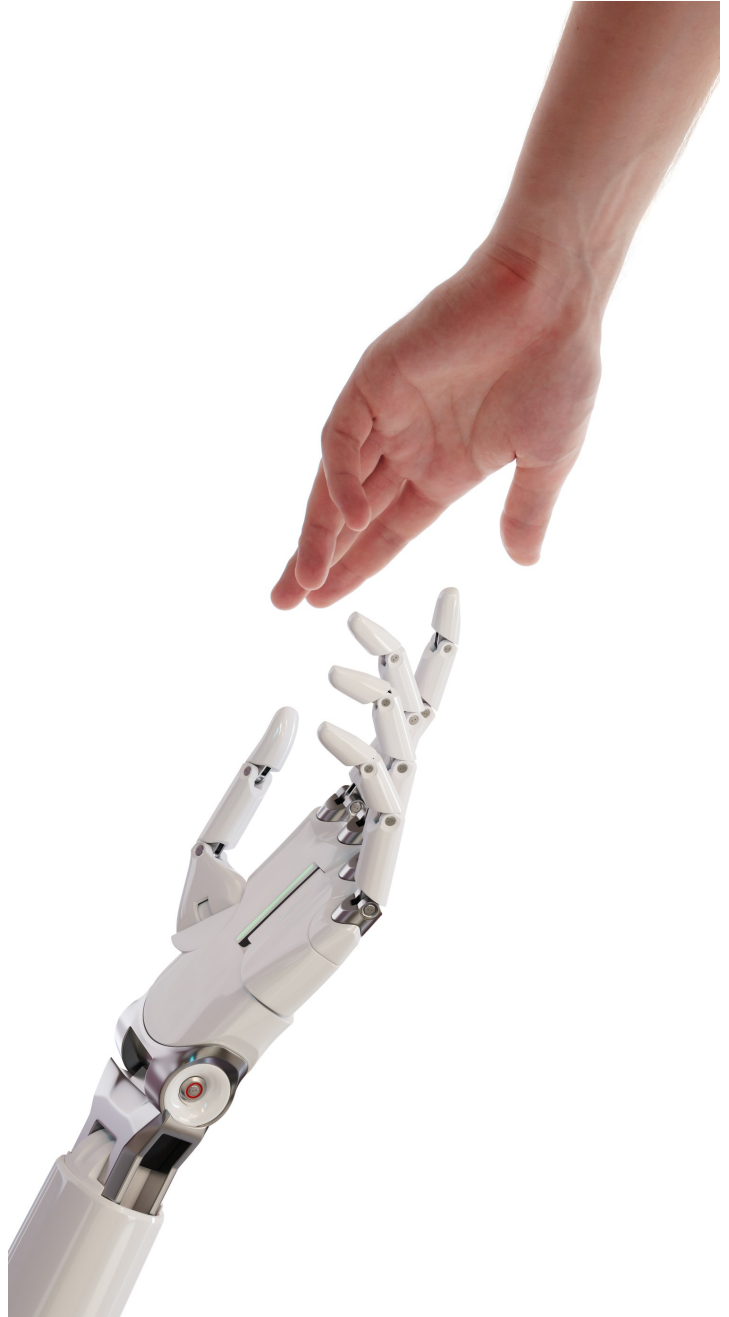
Property

Automation

Artificial Intelligence (AI) and machine learning are expected to lead to greater automated efficiencies (cost, time, energy) in the way real estate is used, managed and re-configured. Conversely, the introduction of robots and robotic processes are expected to materially impact employment and consequently, demand for space. Industry participants concede that the introduction of driverless trucks for the logistics sector is inevitable, although this development is several years away and highly dependent on regulatory support. The incremental range a driverless truck will have, relative to a human driver who requires breaks and rest time, is believed to significantly improve delivery times and reduce costs. Equally, driverless technology may reshape the geographic desirability of infill locations, as the need for physical proximity to population centres could be overcome by rolling fulfillment centres.

Drone technology was trialled for commercial delivery by Amazon in 2016. More recently, Amazon is reported to be developing unmanned traffic management systems for drones. Following the shutdown of Gatwick Airport in the UK prior to Christmas 2018, the European Parliament and European Commission fast-tracked a harmonised set of rules for drone use in Europe's crowded urban areas (Project SAFIR). Drones are expected to replace several other hard-to-access human functions such as surveying and window cleaning.

Driverless cars could decentralise office districts, reducing the requirements for parking, meaning vacant spaces would need to be repurposed. Eliminating carparks from development projects should lead to lower costs and ostensibly higher returns. Both factors could influence the value of office assets in opposing directions. Retail assets could also benefit from a reduction in parking requirements and hence the ability for parking spaces to be repurposed; however, capex for re-positioning is high and planning regulations are usually slow to respond. Some managers believe driverless cars are likely to become the norm in the next 10 to 15 years, if the regulatory environment permits.



Property

“Sharing economy”

The “sharing economy” is often raised by property managers as a technological disruptor. The business model encourages the peer-to-peer provision of goods or services, with Airbnb and Uber being prime examples. While we note that technology is ultimately an enabler of the “sharing economy” it is the business models that are disruptive, rather than the technology. In this vein, WeWork is another such model that is proving highly disruptive, becoming a dominant tenant in 22 cities globally and occupying 1.3 million square feet in less than 8 years. A host of similar operators such as LiquidSpace, Convene, Hub and similar landlord or manager-owned entities (Places by DEXUS and Flex by ISPT) vie for a share of the flexible work space.

We envisage lease structures and terms changing in time as users embrace this evolving model, creating challenges for valuers.

New business models (sharing) and technological innovation are expected to accelerate functional obsolescence in real assets well before their physical capacity terminates. En masse, this should give rise to changes in traditional real estate cycles and sectors. Managers actively engaged today will have a competitive edge as leaders and innovators.



The final word...

As digital disruption accelerates, the pace of change across industries and organisations is uncertain. Investors must become fluent in the language of disruptive innovation in order to understand its impact on traditional real assets. This requires applying a new value creation lens to the way they invest. Disruptive technologies are playing a significant role in addressing sustainability and operating cost containment, and investors should take into account organisations that are using innovative platforms to improve construction projects and overall asset operations as part of their investment criteria.

The competing uncertainty and opportunity of disruption reinforces the need for active management to defend the sectors' high barriers to entry, manage lifecycle risks and strategically leverage incumbent positions of economic importance to build value. Managers who are pro-active in using the themes to identify, monitor and structure portfolios will have an edge over those who are passive and see disruption as simply another risk to manage. This is a key area of differentiation between managers and an important element of Frontier's evaluation of managers.





About Frontier Advisors: Frontier Advisors is one of Australia's leading asset consultants. We offer a range of services and solutions to some of the nation's largest institutional investors including superannuation funds, charities, government / sovereign wealth funds and universities. Our services range from asset allocation and portfolio configuration advice, through to fund manager research and rating, investment auditing and assurance, quantitative modelling and analysis and general investment consulting advice. We have been providing investment advice to clients since 1994. Our advice is fully independent of product, manager, or broker conflicts which means our focus is firmly on tailoring optimal solutions and opportunities for our clients.

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