

## The Circular Economy

The circular economy leads to changes in the way we build and value assets.

The trend towards reusing resources to extract their maximum value rather than landfilling them leads to new products and services. New business models, performance based contracts and or industrial symbiosis will change the way we procure products and projects.



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## Limited resources

Lack of resources in the foreseeable future forces the industry to look at new ways to design and construct buildings and infrastructure.

Resources scarcity leads manufacturers to develop new products that use less water, materials and energy. In some cases, products such as concrete that use high levels of water can no longer be used in water scarce environments.



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## Natural disasters

A rise in the frequency of natural disasters results in new opportunities for contractors.

An increase in the frequency of natural disasters led contractors to develop a Design for Manufacture and Assemble (DFMA) solution which can be rapidly deployed to provide homes, plus medical and government spaces.



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## Renewable energy

A move towards cleaner, renewable forms of energy provides challenges and opportunities for construction.

Tighter environmental legislation could impact vehicle movements and plant on site, as contractors are forced to reduce the environmental impact of their site based activities.



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## Divestment

Investors remove their support for businesses which damage the environment and have high carbon emissions.

A contractor's involvement with carbon polluting projects causes investors to sell shares in the company, pushing their share price down and making it hard to access new capital.



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## Disruptive market entrants

New companies enter the Construction Market, which don't have a construction background such as Google, Amazon, Boston Dynamics etc.

In Toronto, Google Sidewalk Labs is designing a new district on the city's Eastern Waterfront. It aims to tackle the challenges of urban growth, working in partnership with the tri-government agency Waterfront Toronto and the local community.



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## Changes in asset ownership

Changes to the way assets are owned and financed leads to new clients with differing tender and project criteria.

New funding models are enabling public sector clients to partner with non-construction companies to deliver schemes e.g. O2, Emirates. These companies have different requirements than a traditional developer does in terms of project outcomes and this will require construction companies to think in new ways to win work.



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## Chinese dominance

China's 2015 "Belt and Road Action Plan" aims to establish a double trade corridor; reopening channels to Central Asia, the Middle East, Europe and East Africa and increasing competition.

The \$900 billion scheme is a domestic plan with geostrategic consequences. It will boost domestic markets along the silk road which spans 62 countries. Chinese companies will stand to gain in the transport, telecoms, heavy machinery, steel and construction markets; going from regional to global players by offering connectivity, physical and digital services.



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## National Interests

A rise in nationalism and/or increased political instability changes the way for contractors to do business in some markets.

Protectionist policies close key markets for European contractors as countries make it hard for foreign owned companies to operate within their borders.



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## Customisation and flexibility

A greater focus on end user requirements requires solutions that offer increased customisation and flexibility.

New technologies such as virtual reality are making it easier for the end user to visualise assets before they are built, better understand assets and engage at the design phase of a project. As a result end users are demanding more custom solutions that ensure their assets will deliver as expected from day one.



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## Ethical consumer

Increased consumer awareness about the impact products such as plastics have on the environment changes people's perceptions about how assets should be built.

In 2018 the BBC documentary series Blue Planet II featured an episode that showed the impact plastics were having on wildlife. Research showed that as a result of this one program 88% of viewers reported changing their behaviours. As a direct result of this, retailers are now looking at ways to remove single use plastic from their stores.



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## Sharing economy

The growth in the sharing economy e.g. car clubs etc. leads to new types of multi-use buildings and a move towards renting rather than buying assets.

Forbes magazine reported in 2019 that the sharing economy is projected to grow from \$15 billion in 2014 to \$335 billion in 2025. Businesses such as Zipcar and Lime have flourished as people seek to put an end to the costs of ownership. There is real potential for us to adopt the principles of the sharing economy within the built environment. With statistics showing that 50% of the world's office space is underutilised due to changing work patterns.



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## Affordable Housing

The need for adequate and affordable housing requires new construction methods.

Many countries around the world are facing a shortage of affordable housing. According to Eurostat, one in ten people in Europe is overburdened by housing costs i.e. spend over 40% of their income on rent/mortgage. However, construction is not keeping up with demand. Germany is estimated to need an additional 400,000 homes a year and in Sweden 710,000 homes are required over the next decade.



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## Talent wars

A mismatch between the skills employers need and what the workforce can offer.

As the construction industry becomes more reliant on data and digital we will need to attract workers with a new skill set. Currently these individuals are attracted to tech and other industries, making it difficult for us to attract and retain staff. In a worse case scenario, if we cannot get the right staff we won't be able to carry out projects.



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## New levels of collaboration

New types of collaborative partnerships are formed, which bring together individuals and businesses from differing backgrounds including competitors.

Events such as Makers Faires gives the local community, businesses and academia the chance to come together and develop new ways to solve local issues.



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## Space building

The new space race encourages the industry to develop new techniques to build communities on Mars and the Moon.

The space race has returned as China, Russia and the USA seek to become the pre-eminent space power. In 2018 the White House announced plans to create a Space Force and signed a bill providing funds to achieve a manned mission to Mars and people on the moon by 2024. If people could be back on the moon by 2024, how soon could it be before we are building communities in space and what would it take for Europe's contractors to be ready to meet this need?



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## Technology lock-in

Money already invested in technologies prevents customers adopting new solutions.

Customers who have invested in expensive technologies are unwilling to purchase products or systems that replace or don't work with what they already have. This slows the adoption of technology within the industry and curbs innovation because product makers get stuck making things that work with existing products rather than having the freedom to make bolder changes and choices.



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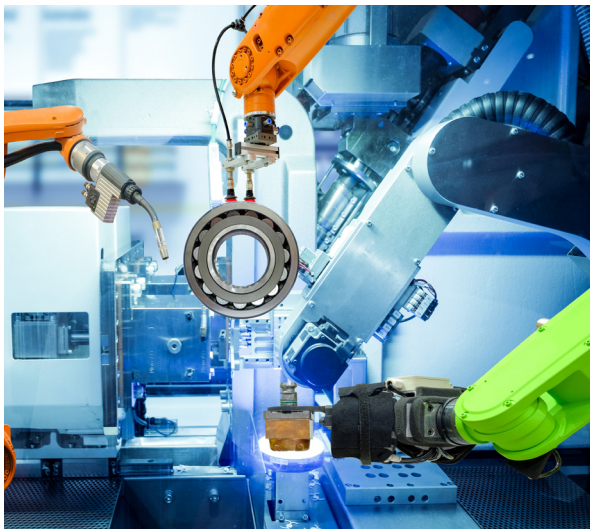
## Data and Intelligent systems

A growing reliance on data and technologies to deliver services.

The widespread use of data and technologies for the design, construction and operation of buildings and infrastructure is increasing our reliance on these tools to deliver projects. This makes our businesses vulnerable to factors such as the loss of WiFi/ 5G technology, failure technology or loss of data, which could seriously impact our ability to operate and deliver to time and budget.



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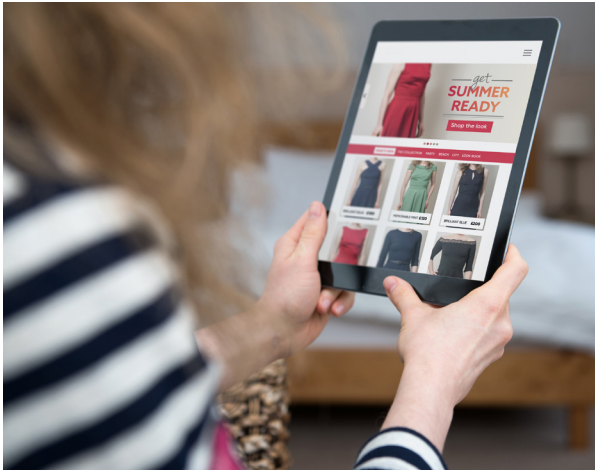
## Automation and autonomy

The rapid adoption of autonomous and automated technologies such as robots, impacts how we deliver projects and the resources we need i.e. human, energy etc.

The introduction of an autonomous workforce would improve health and safety and efficiency on site. However there are fears that the introduction of robots could have an adverse effect on the existing workforce who may lose their jobs as a result.



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## Platform business

The construction industry adopts platforms as a way to do business.

Platform businesses such as Airbnb, Etsy and Amazon have transformed the way we buy and sell services and products. New entrants to the construction sector such as Katerra are demonstrating how a platform approach could work in construction, but could this work for more traditional contractors and if so, how?



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## Threat of cyber attacks

The impact a cyber attack could have on the construction industry and its operations.

For four days in May 2017, the UK's NHS was attacked by the Wannacry virus, costing £92m and forcing the cancellation of thousands of appointments and operations. What impact would an attack have on the construction industry and our ability to deliver schemes?



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## Artificial Intelligence

Artificial intelligence changes the way we design, build and operate assets.

AI can be used at the concept stage to create a series of design options based on client requirements and data from previous or similar schemes. This generative design process helps the design team to narrow down options and speeds up the concept phase.



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