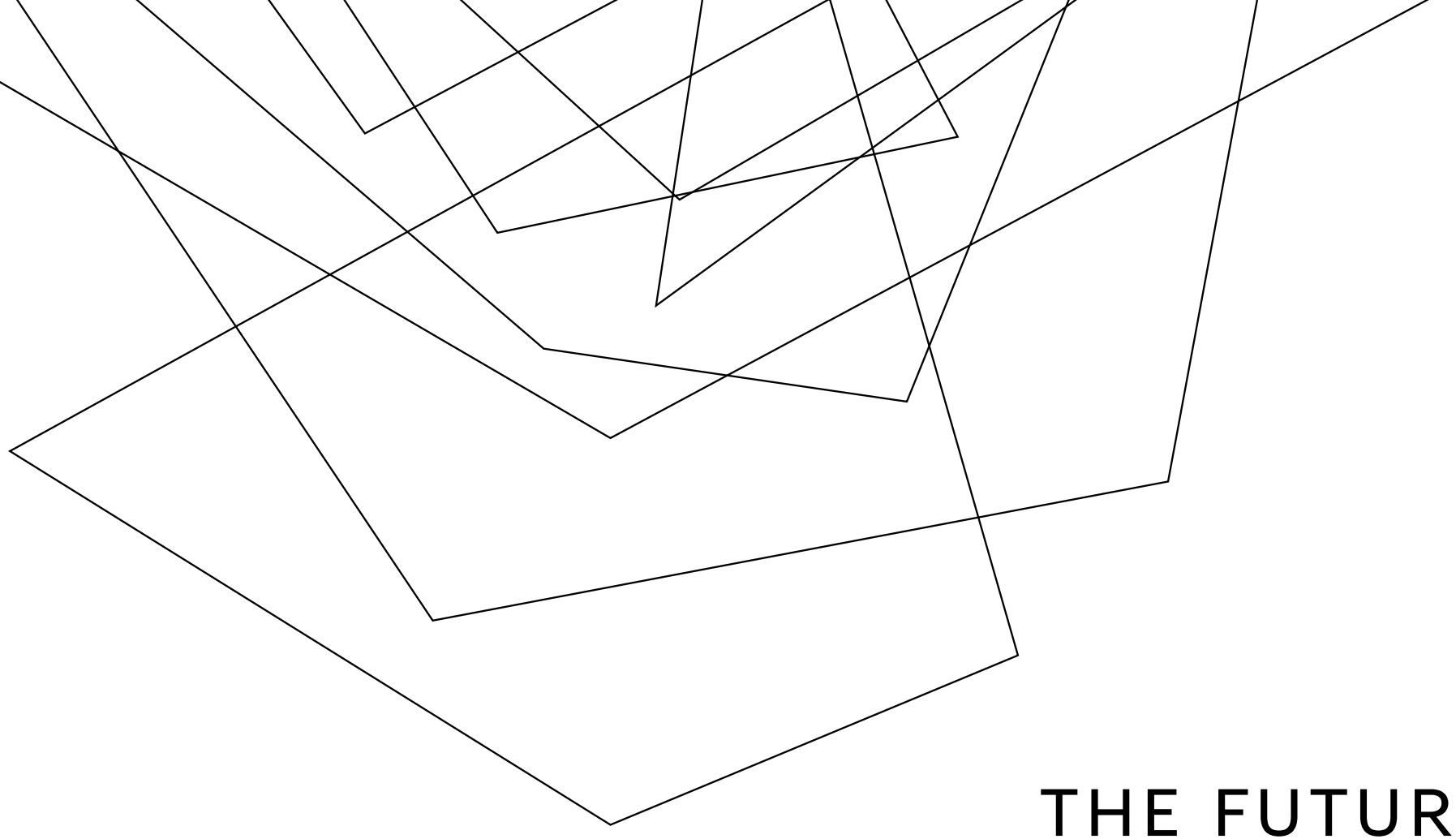
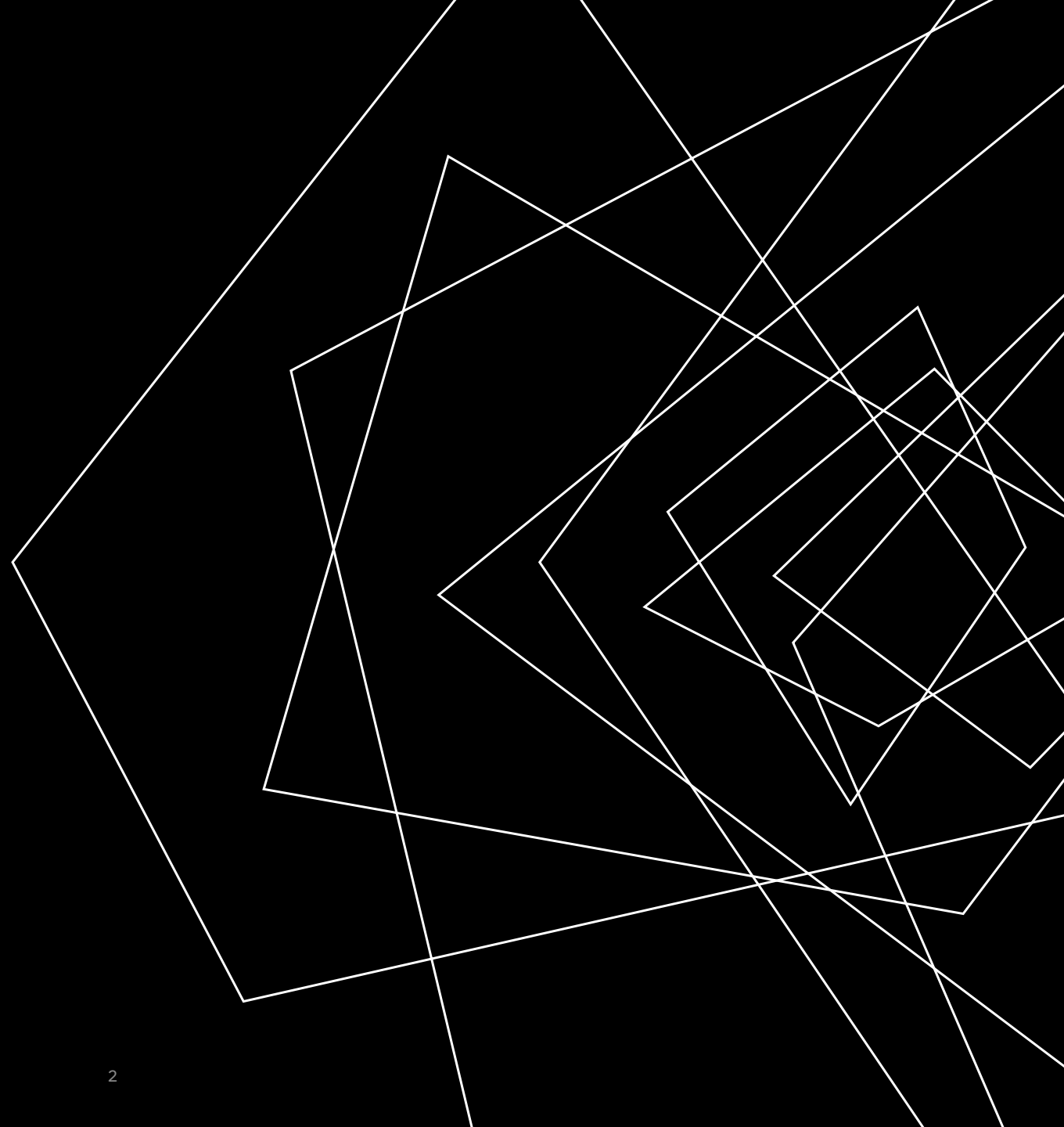


THE FUTURE OF **BUILT ENVIRONMENT**

Learning Unit 5

CONTENT



“TECHNOLOGY SHOULD BE USED TO CREATE UNFORGETTABLE EXPERIENCES THAT ENHANCE OUR NATURAL AND BUILT ENVIRONMENT, TRANSFORMING THEM IN NEWLY MEANINGFUL WAYS”

David Rockwell

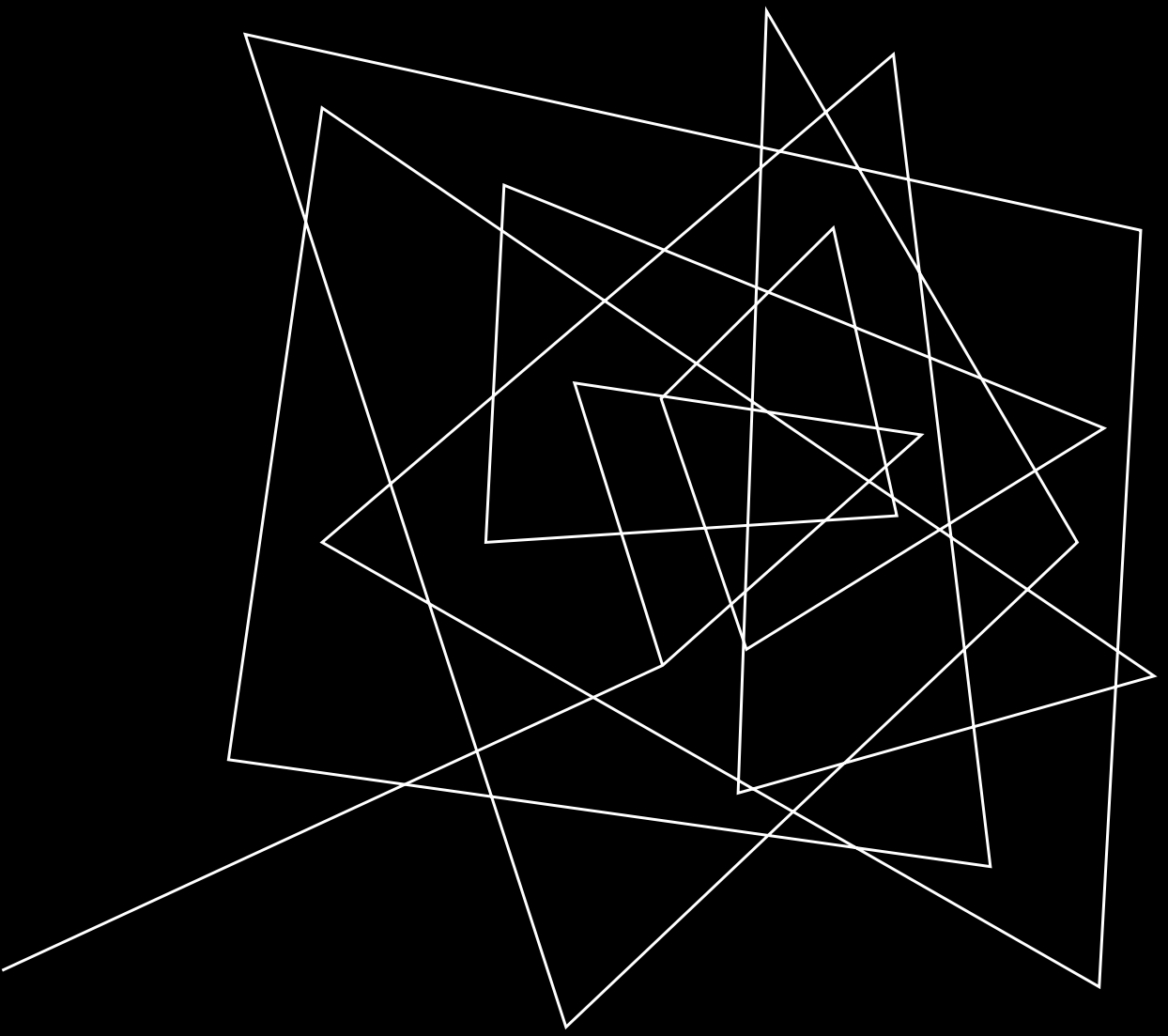
INTRODUCTION

The built environment ought to deliver economic, social and cultural benefits and provide a suitable environment for humans to reside and work in. The built environment also, however, has wide ranging negative environmental impacts, including impacts associated with air quality, water and energy consumption, transport accessibility, materials use and management of waste.

Some issues that would not have been so relevant decades ago, have become important to address now. And Oddly enough, some issues are not as relevant now as we thought they would be in the past.

INTRODUCTION

In a sense, any building project that starts now is making some assumptions about what the world will be like in the future when the project is complete. And so, as the best speculators in the world, Built Environment players should be able to prepare for the future, so we can become more prepared and resilient.



CURRENT ISSUS IN **BUILT ENVIRONMENT**

CURRENT ISSUES

- In recent years, unprecedented changes are taking place all around us at dizzying speed. Swift technological advancement, spreading of new diseases like COVID19, wars, political changes, economic recessions, global climate change, and loss of biodiversity are just some of the issues.
- Many of these issues affect the long term sustainability of the built environment. For example, built environment has a dramatic impact on the hydrological cycle. Increased physical development and impervious surfaces mean there are less natural features to absorb rainwater, leading to greater runoff and flooding.
- The loss of open space results in less water infiltration into the ground and less evapotranspiration of water and moisture back into the air due to the loss of plants and trees. The quality of our water is diminished due to runoff, seepage, waste/toxins, and groundwater discharge all of which are the result of the built environment.

TECHNOLOGY

- Technology is playing a pivotal role in shaping the industries of today by augmenting processes, streamlining activities, and integrating innovations to propel the functioning of companies and organisations across a multitude of industries and help them achieve new heights.
- The built environment sector is continually evolving with the integration of the latest technology, and the effect of these developments is quite palpable in making the industry future ready.
- Technology can be the means whereby conflicts between the natural environment and human needs are resolved.

TECHNOLOGY

- Clearly, conflicts exist at the most basic levels. Indeed, the very reason for the existence of the built environment is the conflict between the unmodified natural environment and human environmental needs.
- Now more than ever, we're equipped with the tools and technology that have developed at an accelerating rate. This may of course have some impacts on the Built Environment not just in design and construction, but in operations as well.
- Today, technological advancements encompass every aspect of life, as material, spatial and cultural products of the human labour force, which combines material factors and energy in a lively new way of work and in forms. These all bear on the built environment.

TECHNOLOGY

DESIGN AND CONSTRUCTION

In construction, technology is constantly revolutionizing how the built environment is designed. From aiding the design and construction processes to setting new trends in the market that will meet the demand of the new era – most notable during the height of the industrial revolution when technological innovation quite literally reshaped the architectural doctrines of the time.

In the past, the construction process was fairly straightforward. All people used to have the same basic designs for their houses and buildings, in part because lack of access to different tools and techniques.

Prefabricated Building

TECHNOLOGY

DESIGN AND CONSTRUCTION

Nowadays, pre-fabrication construction has been a trend in the industry. Modular and pre-fabrication (prefab) construction is actually a method used to construct a building in a factory environment using the same materials and design laws that would be used in a traditional construction environment. The building is created in separate modules in a factory and then transported to the site for assembly.

For more video about pre-fab construction, please visit:

https://www.youtube.com/watch?v=CiB-mxxfuP4

https://www.youtube.com/watch?v=UNC7vtHbqD8

TECHNOLOGY

3D PRINTED BUILDINGS

One of the major shifts is related to 3D printing. This is an area of technology that is growing rapidly across a number of sectors as a way of reducing costs and waste.

It is clear that 3D printing construction will revolutionize the industry due to its ability to expedite the industrialization of the construction process. The objective of constructing a greater number of buildings in a shorter space of time at a lower cost is what fuels our desire to make this technology a commercial success.

3D Printed Buildings

TECHNOLOGY

3D PRINTED BUILDINGS

3D Printing in the construction industry means greatly reduced production time. That's because the machines themselves are very fast, some of them are capable of manufacturing 600 to 800-square-foot (55 to 75-square-meter) home in just 24 hours.

It saves a lot of production costs on material waste too. That's because a 3D printer, such as robotic arms, uses exactly the amount of material they need. Producing buildings layer by layer and with lattice structures inside allows for a huge cost reduction. Not only that, but they are also capable of using recycled materials.

For more video about 3D printed building construction, please visit:

https://www.youtube.com/watch?v=XHSYEH133HA

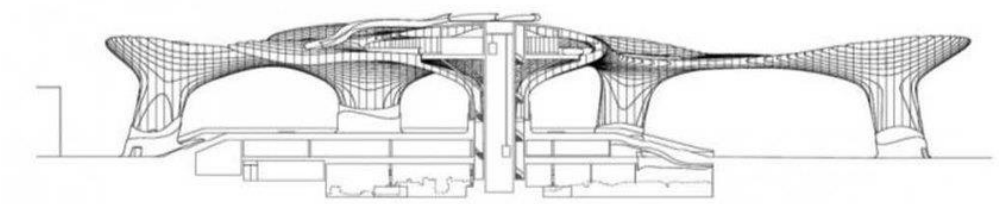
https://www.youtube.com/watch?v=eIVl3gmswhM

TECHNOLOGY

BIOMIMICRY

Another trend we anticipate comes from echoing efficiency of biological systems. This is Biomimicry, which is referring to designs inspired by the natural world.

Designers in the building industry are continually looking for new and innovative ways to create beautiful, livable spaces that are environmentally responsible and resilient. Increasingly, those on the leading edge are looking to nature as a source of inspiration.



TECHNOLOGY

BIOMIMICRY

Here are some examples of how applying biomimicry in the context of the built environment can help designers, projects, and communities as they work to create naturally sustainable, inherently resilient spaces.

Nourishing Curiosity

Emulating and Enhancing Ecosystem Services

TECHNOLOGY

BIOMIMICRY

Some examples of biomimicry in architecture:

Eastgate Centre, Zimbabwe

Super Tree Groove, Singapore

TECHNOLOGY

INTELLIGENT BUILDINGS

Partly enabled by IoT - the Internet of Things - there will also be the rise of intelligent buildings. Intelligent buildings (also known as smart buildings) use IoT sensors and building automation to control everything from lighting and energy usage to user-centric functions, such as wayfinding and conference room scheduling.

A few years ago, heating and air-conditioning controls had basic temperature settings. Now, building management systems can adjust lighting and ventilation in meeting rooms and operate a range of facilities.

Capital Tower, Singapore

TECHNOLOGY

INTELLIGENT BUILDINGS

Smart technology can not only change the way that we use the built environment, but also how its occupants interact with it. Technology enables buildings to respond to external conditions such as temperature or time and adjust accordingly.

Data visualization can serve to make invisible impacts visible and therefore have a positive impact on the behavior of those who use a building.

Burj Khalifa, Dubai

TECHNOLOGY

VIRTUAL AND AUGMENTED REALITY

The rise of representation technology such as virtual reality (VR) and immersive technologies will improve the design experience and avoid the need for mock-ups or show rooms.

Clients and designers will visualize a building and walk around it (figuratively speaking) before it is built. Developers will use VR to review and interrogate design options before investing in the next stage of design and construction.

TECHNOLOGY

VIRTUAL AND AUGMENTED REALITY

VR is proving to be an effective planning and rendering tool. By providing an immersive, virtual environment, architects can get a better sense for a space before it physically exists, enabling them to make more informed and accurate design decisions.

Unlike VR, augmented reality, or AR includes virtual elements that interact with what already exists in physical world.

Imagine a design and construction discussion where all consultants can interact with the parts of a construction using a specialized display while everyone able to see the changes in real time.

TECHNOLOGY

DRON-BASED SURVEYING

High accuracy of capturing aerial topography condition is essential to escalate the overall progress of designing and constructing stages.

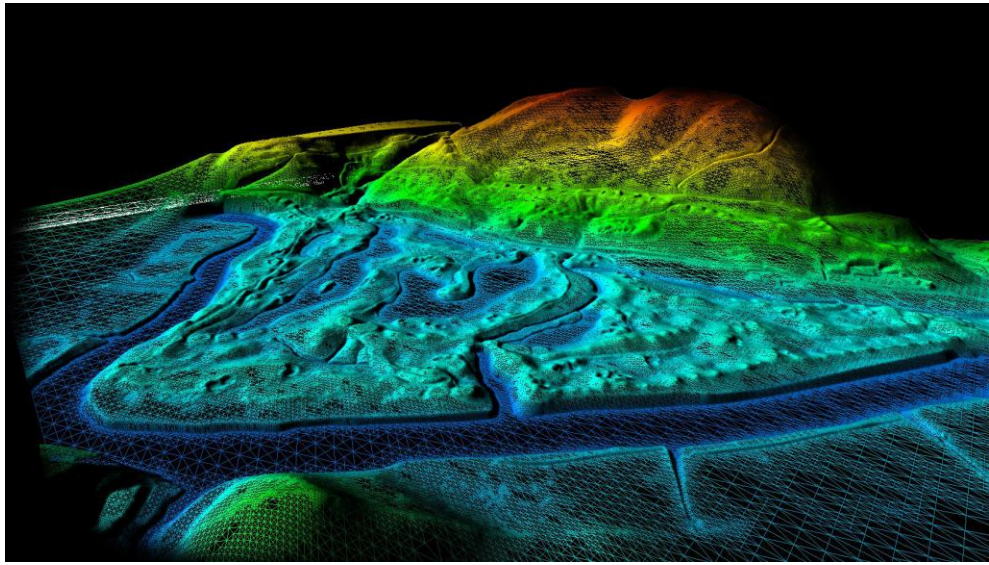
The presence of drones in construction means significant changes within the industry. Drones have already begun changing the way the construction industry operates, and those changes will have continued and lasting effects.

Drone surveying can provide satisfactory outcomes by reducing field work time, cost and at the same time provide accurate data in any unreachable areas.

TECHNOLOGY

DRON-BASED SURVEYING

The sharp, detailed images produced by drones enable site managers to track work progress and make accurate decisions based on up-to-date data and comprehensive reconstructed site maps instead of relying on plans or incomplete data that may not reflect reality.



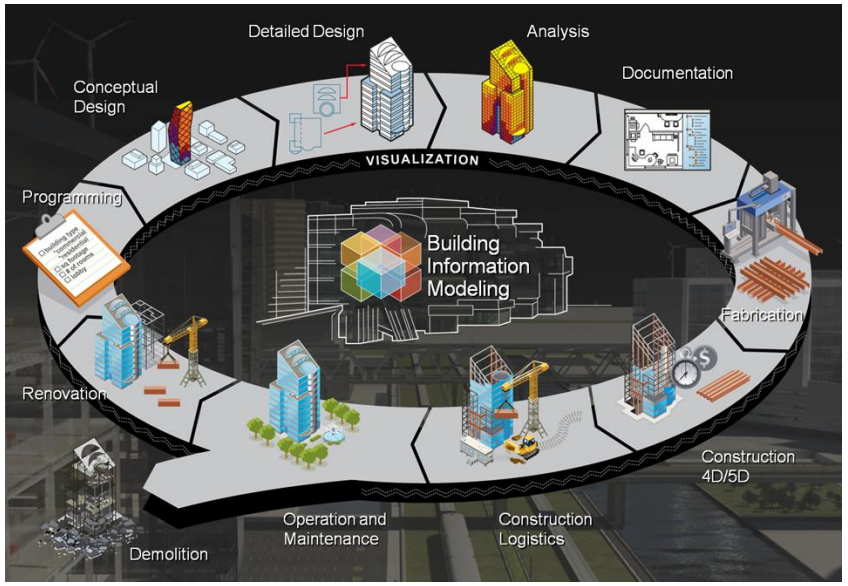
In addition to having detailed aerial photographs, the same data collected by a drone in a single flight provides a complete map of the site with GPS points, in 2D and 3D. The data obtained by the drone survey include distances, volumetric measurements, coordinates for each area and so forth.

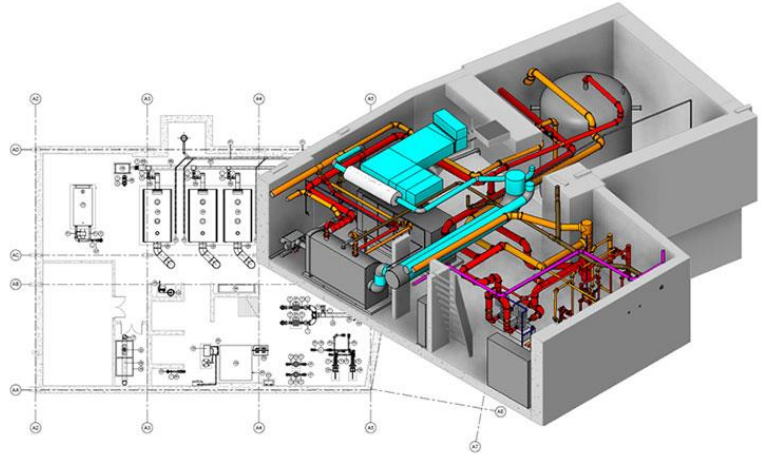
TECHNOLOGY

BUILDING INFORMATION MODELLING – (BIM)

Technology advancement and transformation in the construction industry is progressively developing and being gradually adopted by the parties involved especially for Building Information Modeling (BIM).

BIM is a collaborative system to allow all the stakeholders to share and integrate all the information throughout the project phases by using a single 3D model. This allows the model to remain consistent and coordinated throughout the entire process so that structural engineers, architects, engineers, designers, project managers, and contractors can work in a more collaborative environment





TECHNOLOGY

BUILDING INFORMATION MODELLING – (BIM)

BIM is really a whole new paradigm in designing, constructing, operating, and maintenance throughout the construction project life cycle. All of the information gathered from conception to completion and even maintenance isn't just stored, it's actionable.

The main purpose of BIM is to enhance the coordination of information, communication among the stakeholders and at the same time establishing more proactive approach towards the successfulness of project delivery by integrating the technology with the latest working practices.

Are we ready for the adoption of BIM in the construction project in light of all the benefits we could acquire?

TECHNOLOGY

INTELLIGENT TRANSPORTATION SYSTEM

An intelligent transportation system (ITS) is a technology, application or platform, that improves the quality of transportation or achieves other outcomes based on applications that monitor, manage or enhance transportation systems.

The application of ITS is widely accepted and used in many countries today. The use is not just limited to traffic congestion control and information, but also for road safety and efficient infrastructure usage.

City of Glasgow, Scotland

TECHNOLOGY

INTELLIGENT TRANSPORTATION SYSTEM

Many ITS technologies can help to optimize trips (route guidance), diminish unnecessary miles traveled, increase other mode use, reduce time spent in congestion, reduce dependence on foreign oil, and improve air quality.

A Traffic Management Centre (TMC) is the vital unit of ITS. It is mainly a technical system administered by the transportation authority. Here all data is collected and analyzed for further operations and control management of the traffic in real time or information about local transportation vehicles.

Seoul, Korea

SOCIAL AND PUBLIC HEALTH

Apart from technology, the future of Built Environment is also about looking at major shifts in issues that are becoming more relevant, especially in social and public health.

As the middle classes increase to up to three billion people over the next few decades – the pressure on manufacturers to supply the goods and services they want will put untold strains on the planet's non-renewable resources.

Alongside that, of course, is the immediate, enormous challenge of reducing carbon emissions to control the looming disaster of global warming. All those involved in the built environment are considering how smart designs and the use of the Internet of Things can improve human lives and health.

SUSTAINABILITY AND RESILIENCY

In the future, the desire for more **sustainable** design and construction processes will increase. This will lead to a focus on the circular economy. We will see property developers, constructors and manufacturers increasingly improve resource efficiency and reduce wastage.

Off-site, or modular, construction techniques and a drive to ‘design for manufacture’ will help reduce waste further and improve productivity. Materials will be better selected for fitness for purpose and designs will consider disassembly and re-use when changes need to be made.

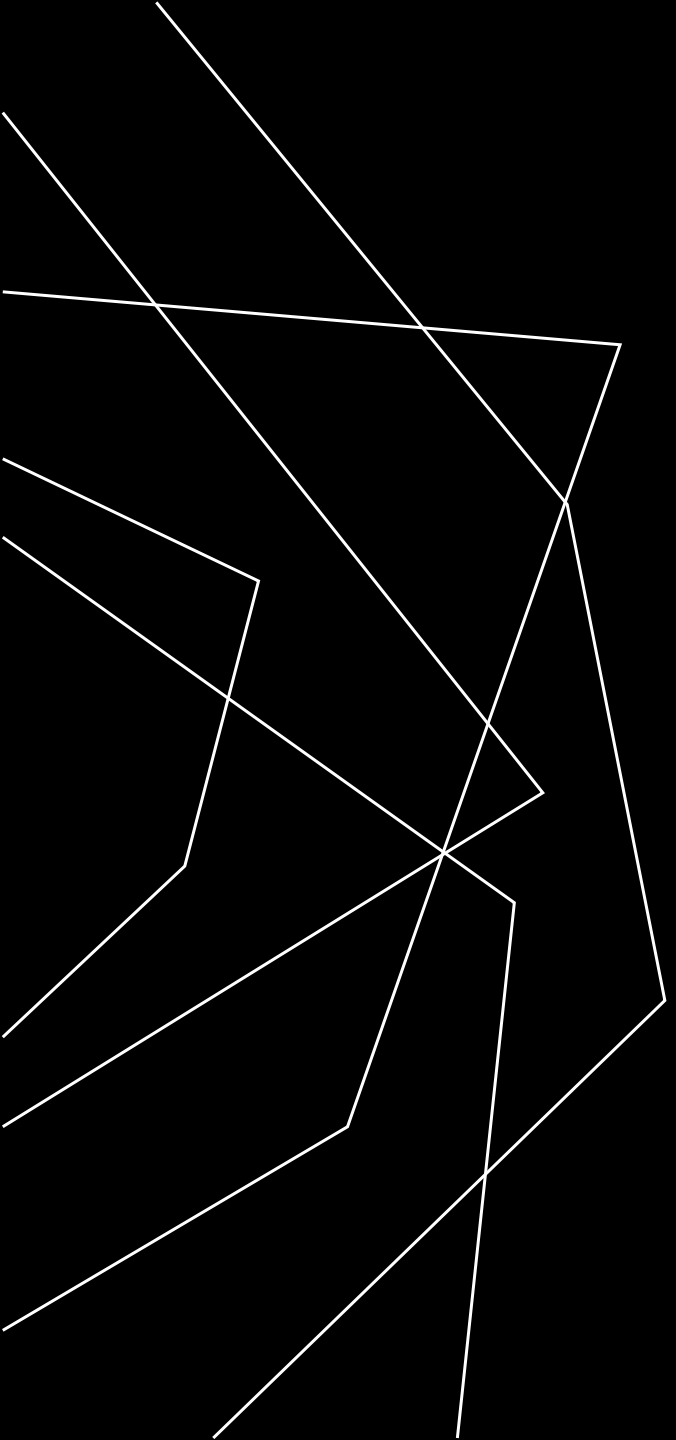
SUSTAINABILITY AND RESILIENCY

Resiliency, in the perspective of the built environment is a concept for initiating future sustainability. Can our built environment recover from disruption? It focuses on the extended evolution of the built environment and how we will react to a threats or abrupt changes in conditions that may keep on changing over time.

As organizations begin to consider sea level rise, higher frequency wildfires, and other environmental stressors that could impact their projects, we'll see more solutions appear through resilient design. Resiliency encompasses continuity of services, as we become dependent on electrical infrastructure and networks. Can our grid sustain a disruption?

SUMMARY

Apparently, the future of Built Environment is beginning to take shape. Perhaps one important question remains, whether the professions in the field of Built Environment will still be relevant, due to the challenges to be brought about by the future circumstances. A new normal that we can never see from our standing point right now, that can only be answered in the future.



THANK YOU