

Introduction to Civil Engineering

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Speakers



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Presentation layout



- Introduction
- Civil engineering sub-disciplines – diversity of opportunity
- Civil engineering and global challenges
- Employment opportunities
- About the School

Civil engineering ... what is it?



Design, construction, and maintenance of the built environment:

- **Infrastructure:** roads, bridges, tunnels, dams, airport, water supply, wastewater treatment, etc.
- **Buildings; Public and private structures** (e.g., stadiums, industrial facilities, etc.)
- **Other activities** (e.g. project management, financial aspects).



One of the broadest fields of engineering



Structural



Geotechnical



Transportation



Environmental



Water Resources



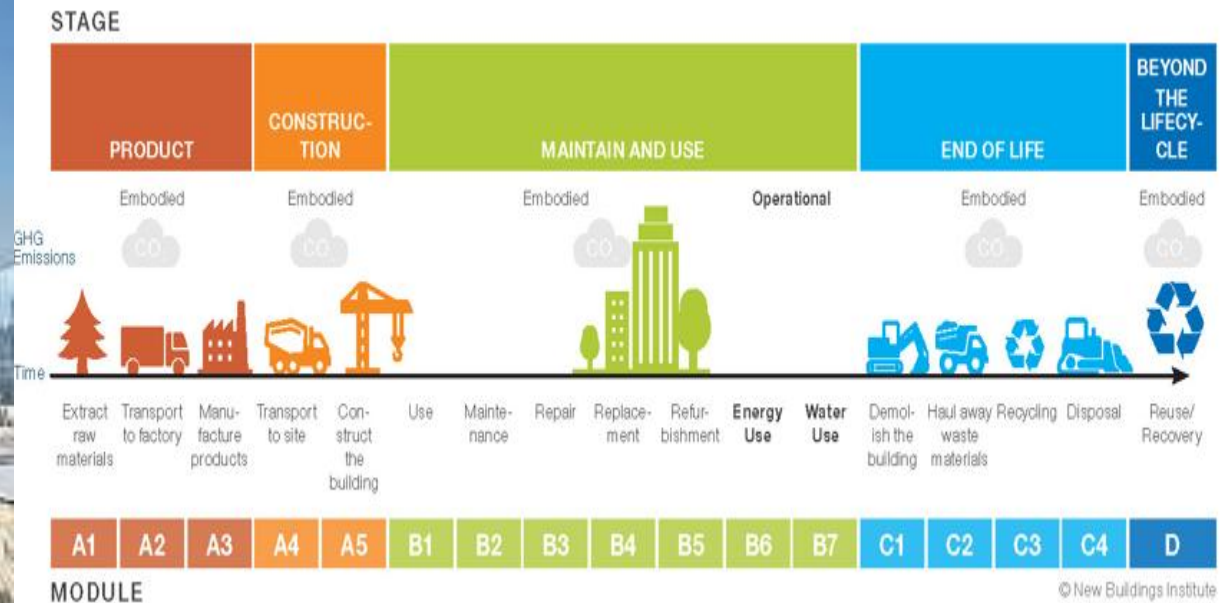
Construction & Project Management



Civil engineering sub disciplines

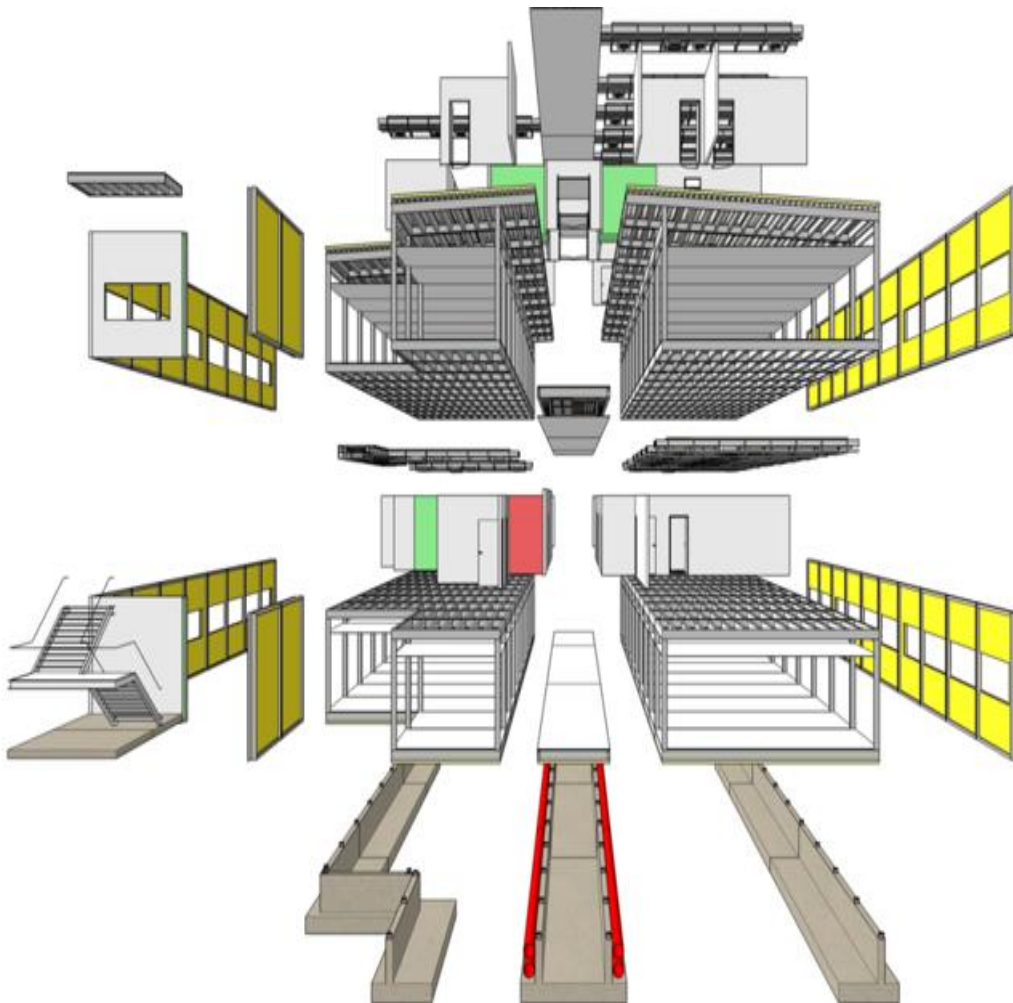


Structural Engineering



Civil engineering sub disciplines

Design for Manufacture and Assembly & Design for Deconstruction



Civil engineering sub disciplines

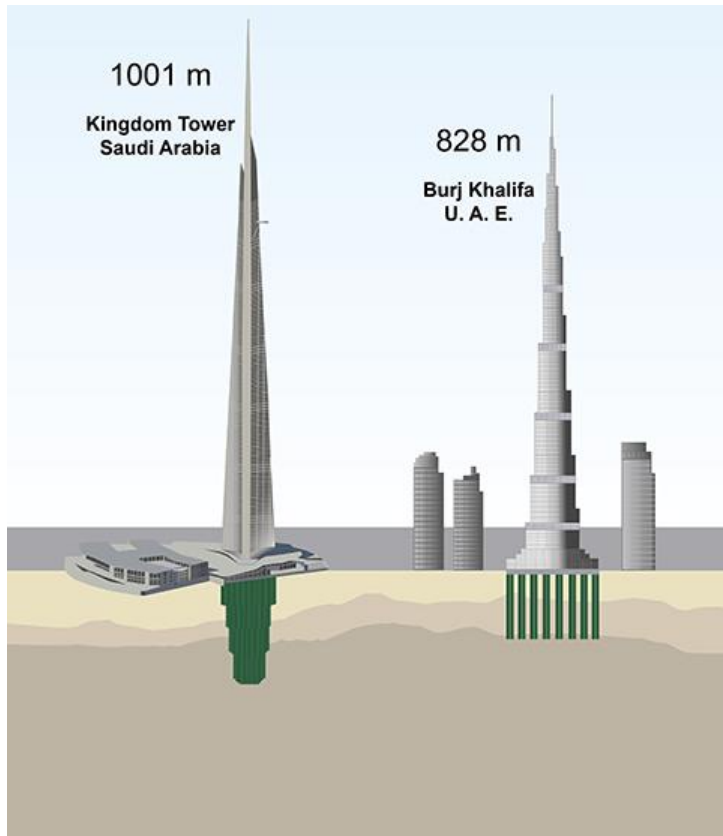
We Test to Understand



Civil engineering sub disciplines

Geotechnical Engineering

Foundations



Retaining walls



Tunnels



Civil engineering sub disciplines

Transportation Engineering

- Smart cities
- Road construction/ maintenance
- Transport planning
- Modelling transport behaviour



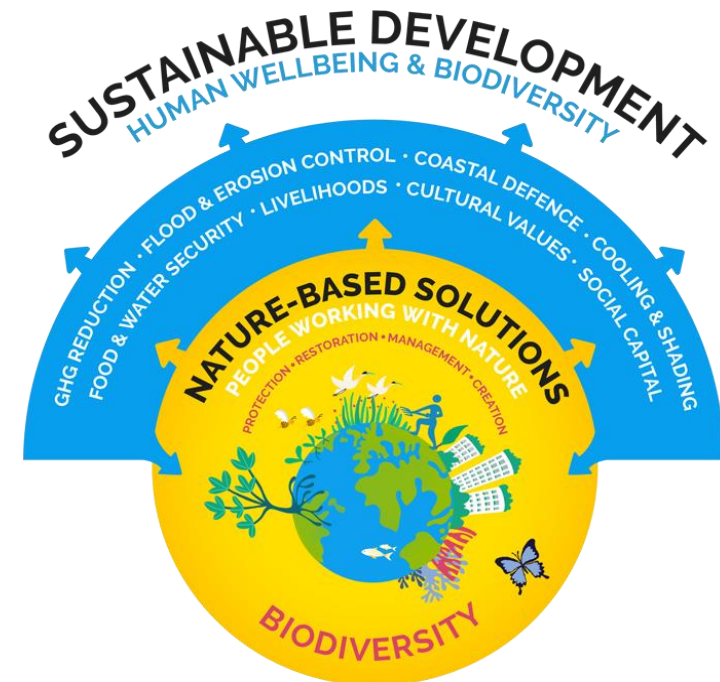
Civil engineering sub disciplines



Environmental Engineering

- Water & Wastewater Treatment
- Air quality
- Waste disposal
- Environmental remediation
- Biodiversity restoration

Environmental

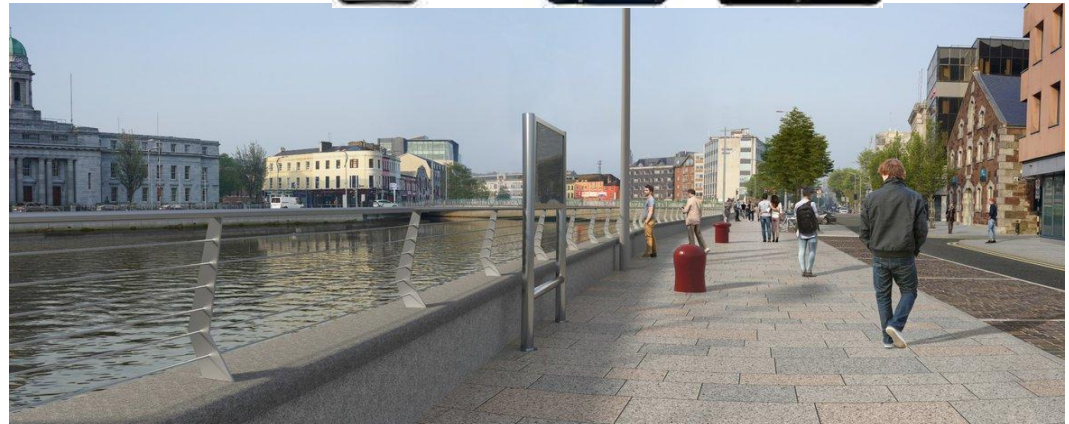


Civil engineering sub disciplines

Water Resources

- Water distribution
- Irrigation
- Flood control
- Hydropower

Water resources



Civil engineering sub disciplines

Construction and Project Management

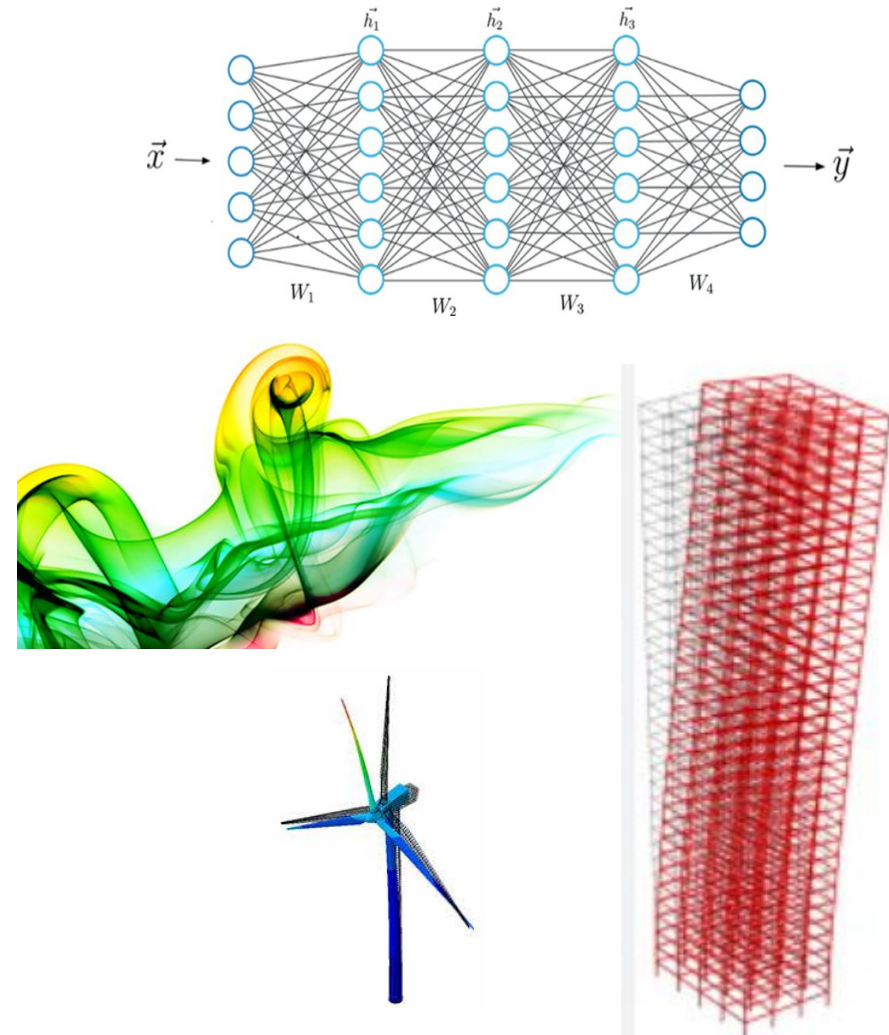
- Planning, coordinating, and supervising construction projects.
- To ensure they are completed safely, on time, and within budget.



One of the most interdisciplinary fields

Integrates a wide range of knowledge and advanced technologies:

- Mathematics
- Physics
- Chemistry
- Biology
- Computer and Data Science:
 - Remote sensing
 - Data analytics
 - Modelling
 - Artificial intelligent
(e.g., machine learning)



Civil engineering - technology



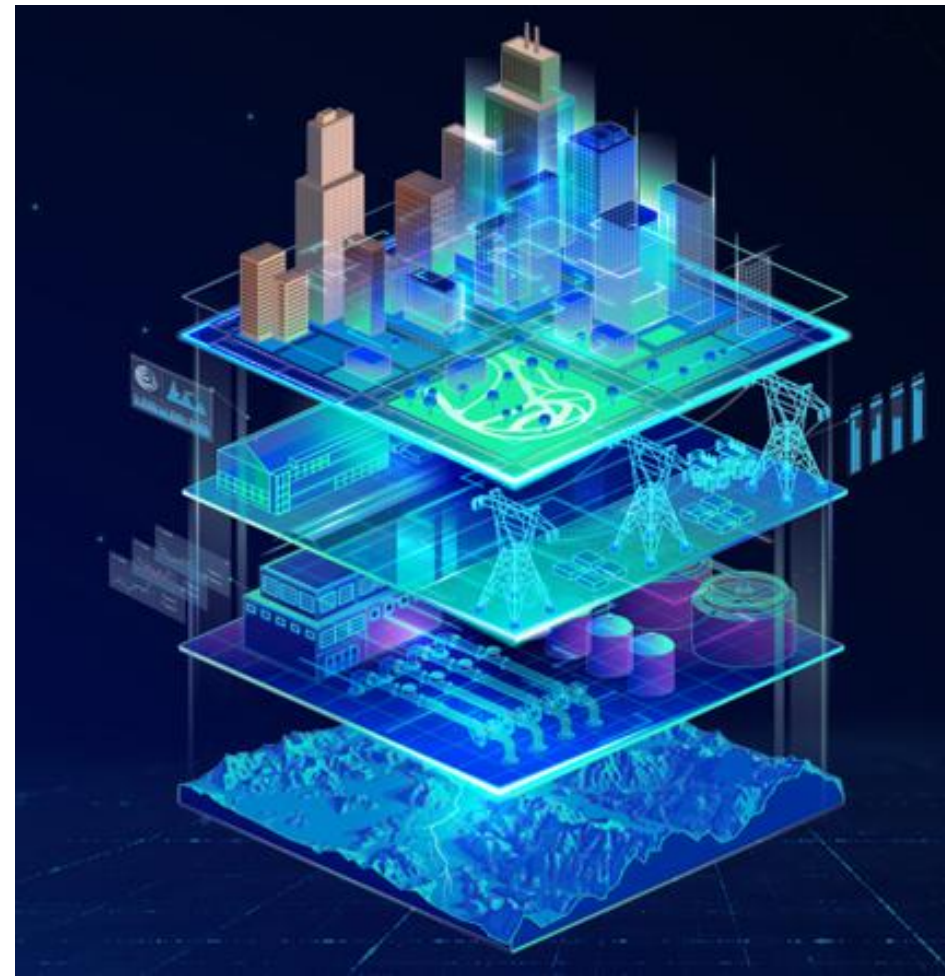
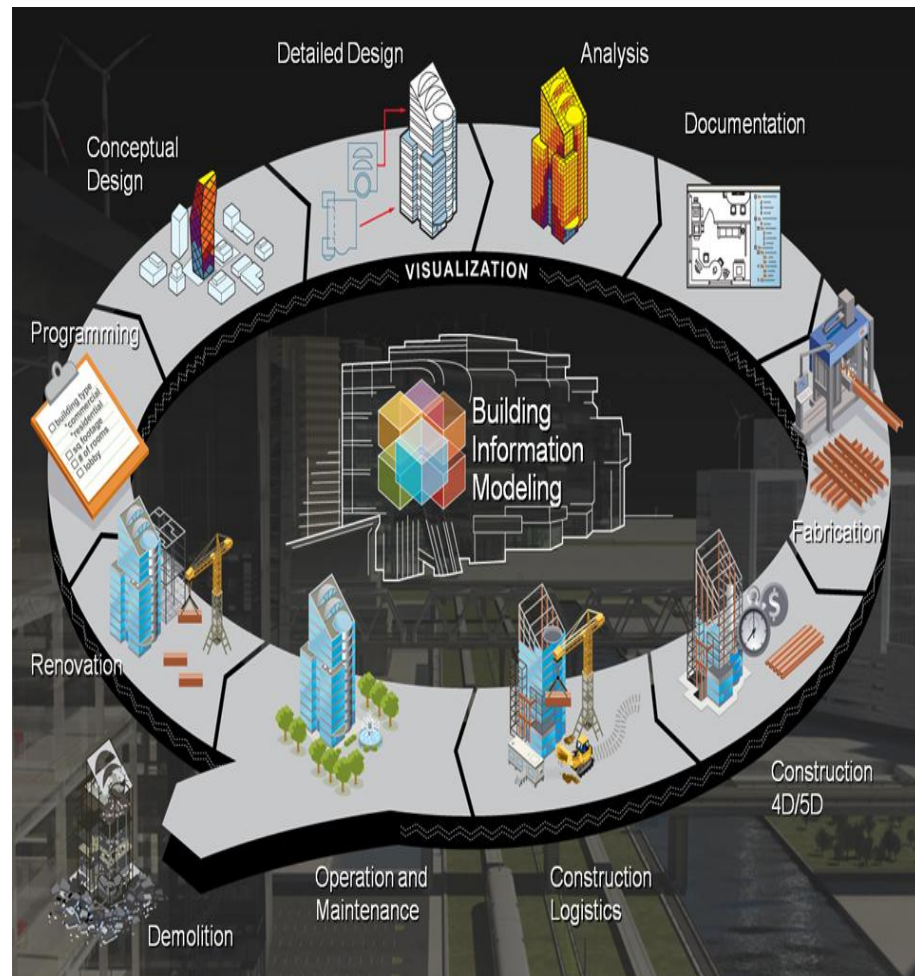
Boland's Mills

Civil engineering - technology

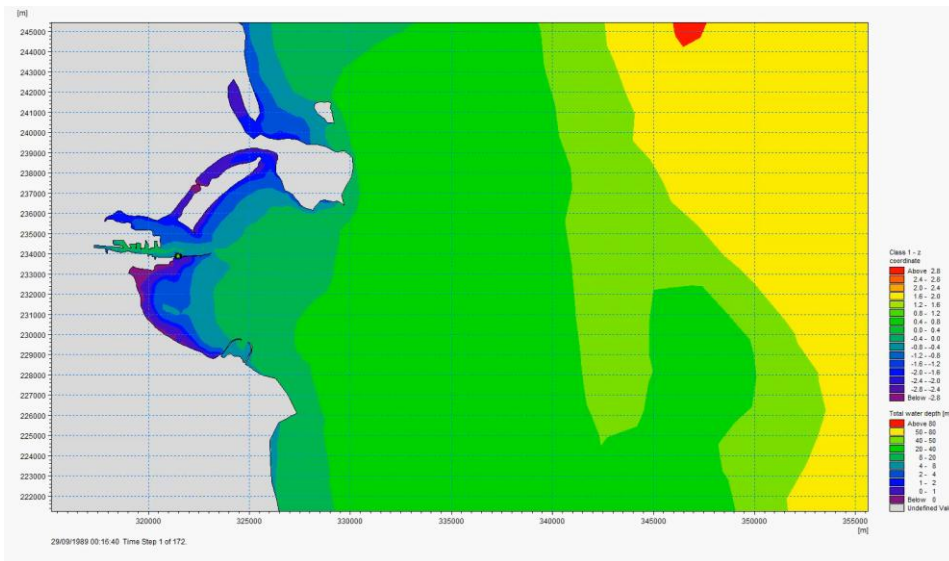


Civil engineering - technology

Building Information Modelling (Digital Twins)

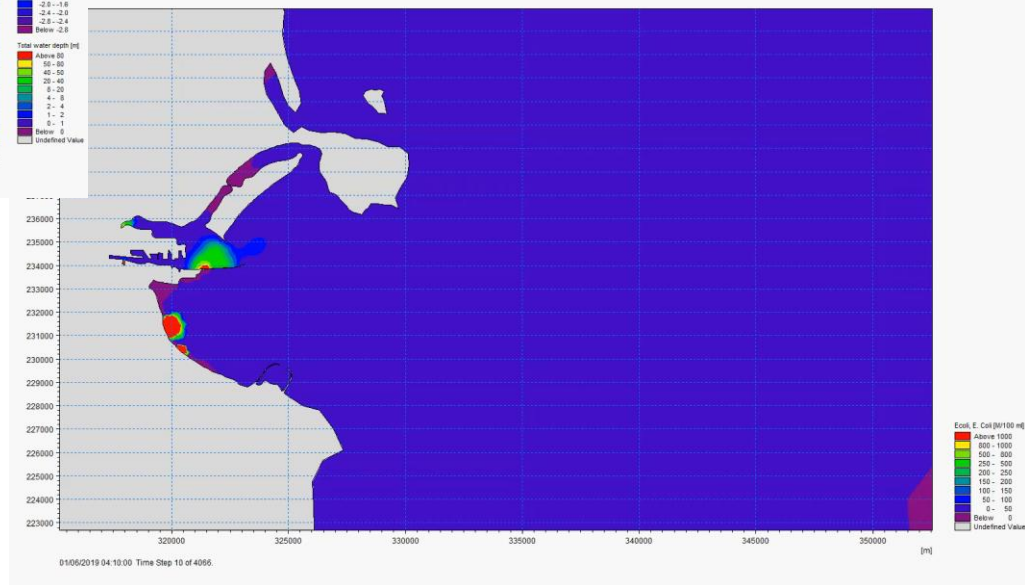


Pollution modelling Dublin Bay

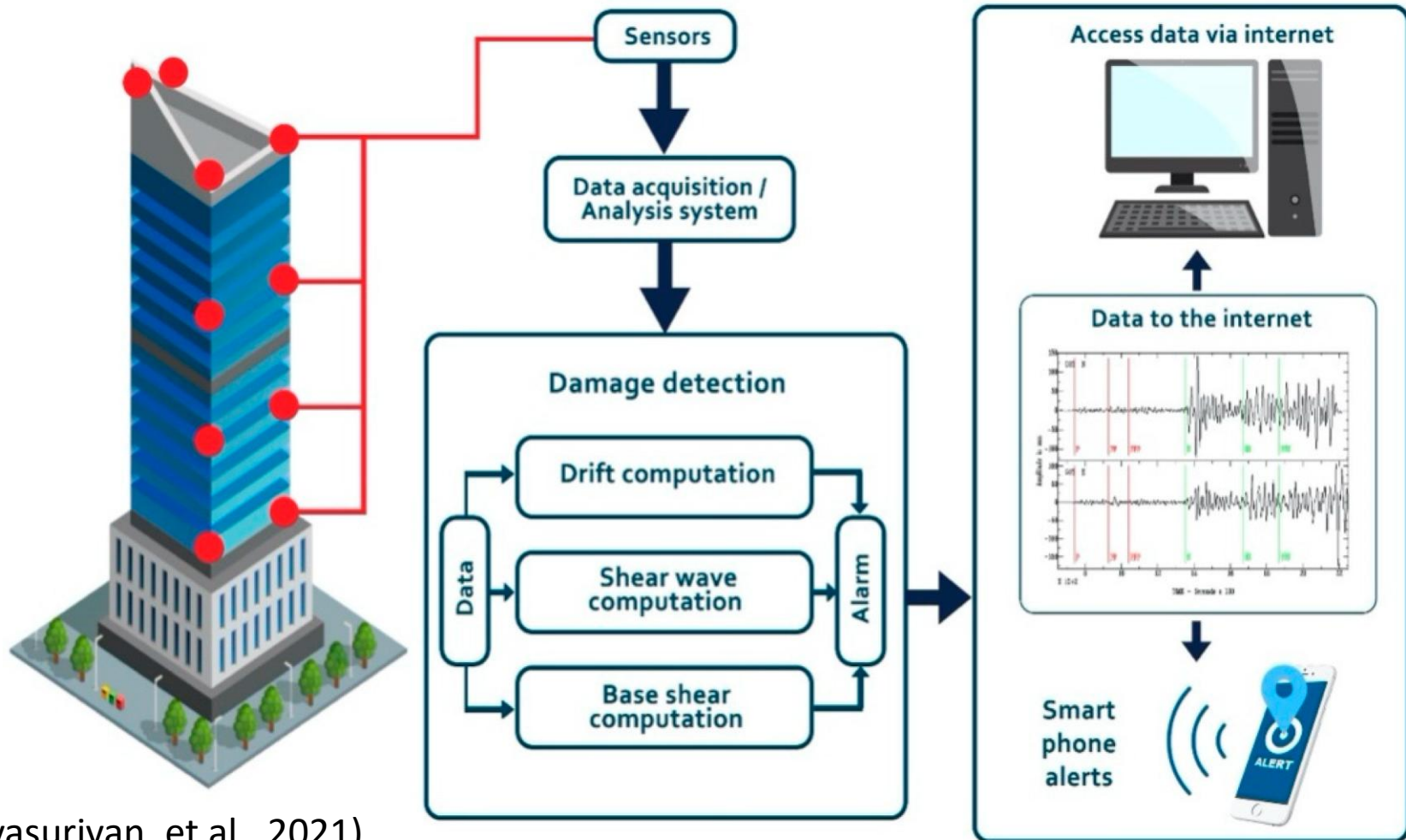


Water quality prediction

Climate change assessment



Structural Health Monitoring



(Sivasuriyan, et al., 2021)

Civil engineering - technology



3D Construction Printing (3DCP)



Martin O'Brien, CEO of Louth and Meath Education and Training Board (LMETB), was presented with a miniature of Ireland's first 3D printed houses; July 2024 (Source: [dundalkdemocrat](https://www.dundalkdemocrat.com))



New 3D printer in UCD Civil Engineering



UCD Civil Engineering Projects with 3D printer

Global challenges and civil engineering



United Nations Sustainability Goals



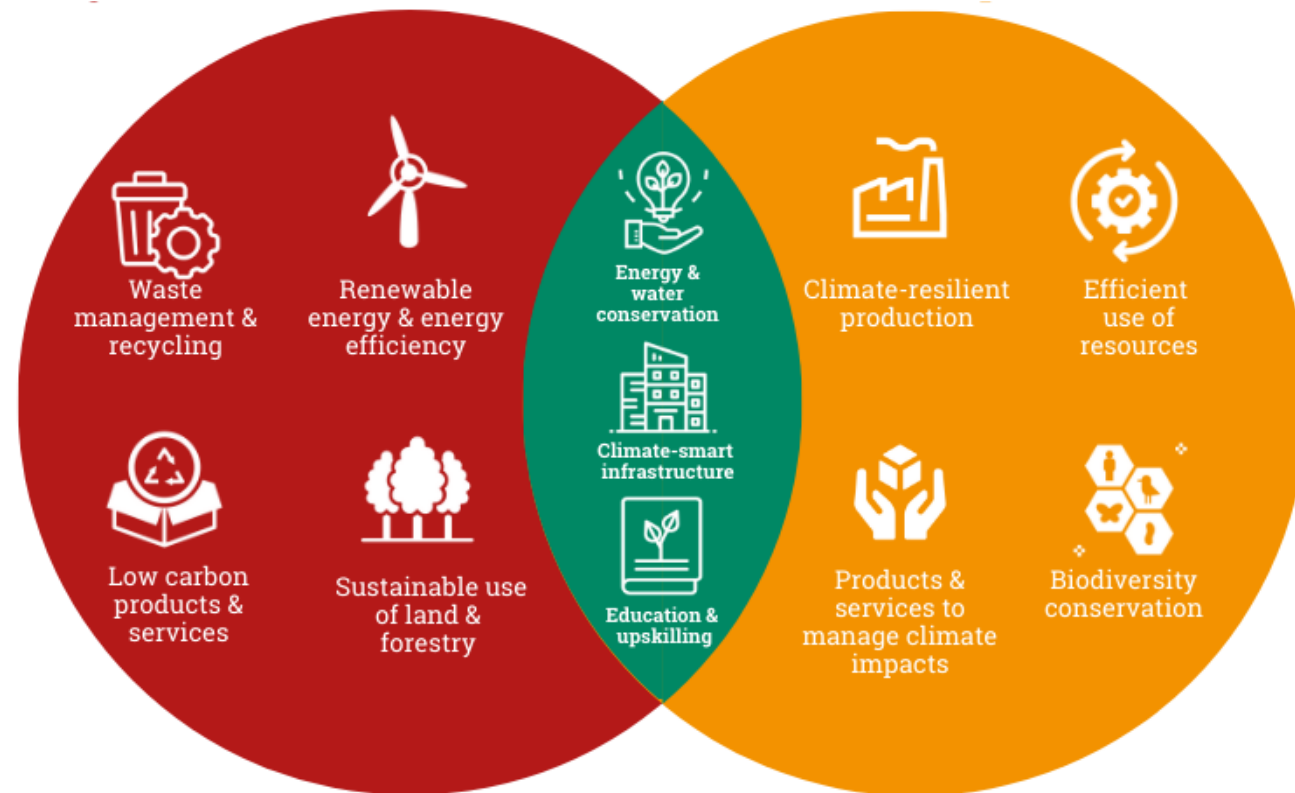
Global challenges and civil engineering

Three Pillars of Climate Response

1. Mitigation: Slowing the rate of global warming.

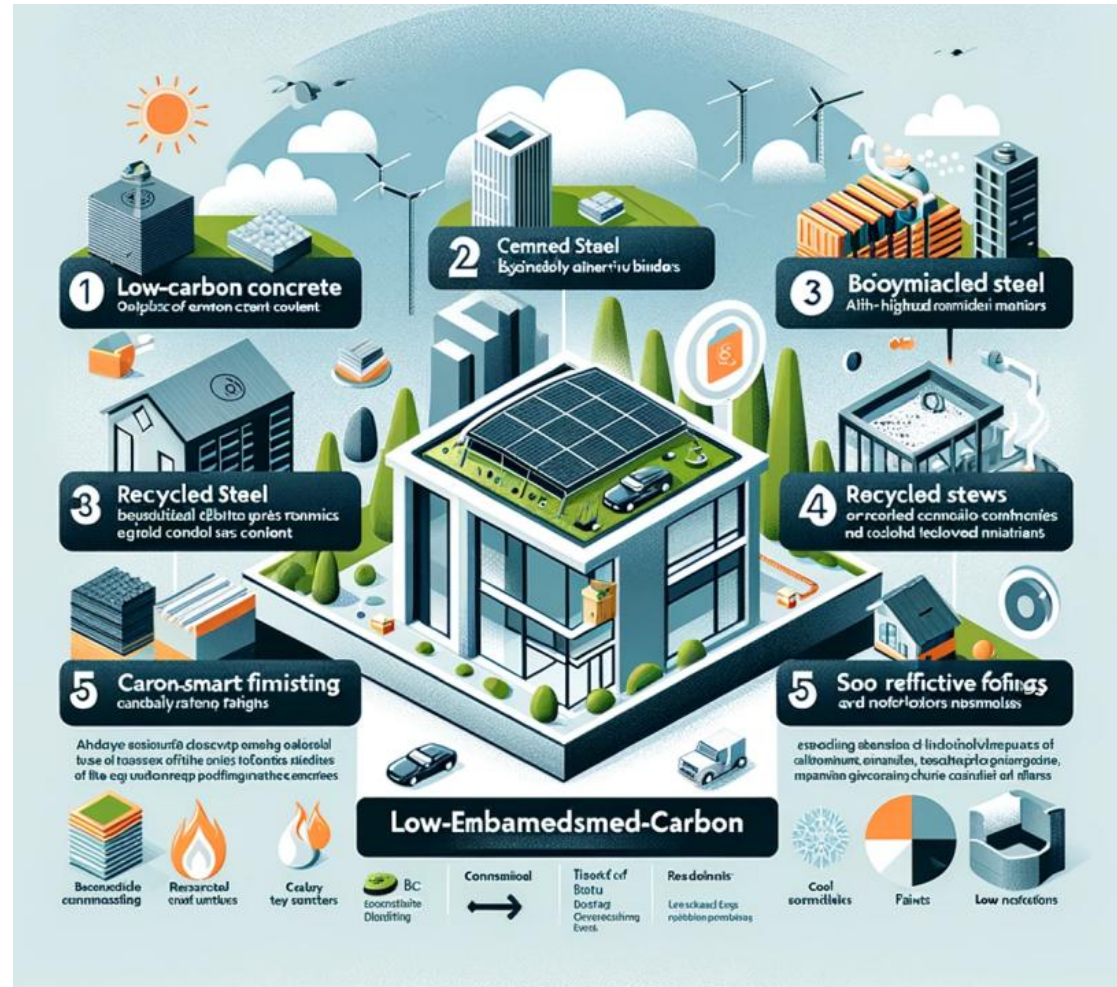
2. Adaptation: Taking steps to live with effects of Global warming.

3. Resilience: Nations need to be more resilient to the effects of Climate Change.



Climate Adaption Engineering

A composite image illustrating renewable energy sources. In the foreground, a large array of solar panels is visible, reflecting the bright sun. In the background, a large dam structure is situated next to a body of water, with a wind turbine standing prominently in the center. The scene is set against a clear blue sky with bright sunlight creating lens flares.



Global challenges and civil engineering

Adaptation: Taking steps to live with effects of Global warming.



Global challenges and civil engineering

Resilience: Nations need to be more resilient to the effects of Climate Change.



Smart, Sustainable and Resilient cities: the Power of Nature-based Solutions



Civil engineering job opportunities



Significant..... €116 billion

- **Climate action**
- **Urban regeneration**
- **Sustainable mobility**
- **Public transport**
- **Affordable housing**
- **Sustainable water resources and environmental resources**



- Shortage of graduate Civil Engineers

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Crisis shortage of Civil Engineering graduates in Ireland

Crisis shortage of Civil Engineering graduates in Ireland

A letter from the Engineering Heads of Department in NUIG, TCD and UCC.

The Civil, Structural and Environmental Engineering profession is responsible for developing the built infrastructure on which successful societies and economies depend. The profession in Ireland has recovered very strongly after a few difficult years immediately following the national economic downturn. The Ulster Bank Construction Purchasing Managers' Index (PMI), which tracks the sector's performance on a monthly basis, has indicated continuous aggregate growth over three

Why Civil Engineering?



- Significant job-opportunities
 - 100% employed within 9 months after graduation.
- Rewarding, well-paid career (37-40K starting salary)
- Work in multi-disciplinary settings
 - Architects
 - Mechanical
 - Electrical
 - Urban planner
 - ...
- Variety of work, on-site & office based

Civil engineering job opportunities



Consultancy



Contractors



Energy



Project Management



Gov/Regulatory



Quant Sector



About the School



The Best Civil Engineering School on the Island of Ireland!

Community

- Very proud of our community spirit
- Newstead Staff Student Forum
- Civil Engineering Society
- Coffee mornings
- Tag Ruby (Students vs Lecturers)

