

Empowering Sustainability and Resilience



UN-GGIM
UNITED NATIONS
COMMITTEE OF EXPERTS ON
GLOBAL GEOSPATIAL
INFORMATION MANAGEMENT



UN-GGIM
ACADEMIC NETWORK



A DIGITAL TWIN

Geospatial Solutions for Climate Changes

*a new Era empowered by
Digital Twin*



THE GLOBAL GOALS
For Sustainable Development

For Sustainable Development
THE GLOBAL GOALS



CSDILA



THE UNIVERSITY OF
MELBOURNE

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Director Smart and Sustainable Development

Director CSDILA

Board Member UN-GGIM Academic Network

A Changing World ... Global challenges, and facing the existential threat of changing climate...



Guardian
BEST MOMENTS of Tokyo 2020
An UK lead world back from brink?
Global climate crisis: inevitable, unprecedented and irreversible
Devastating report is code red warning for UN chief
Flora Harvey
Andrew Sparrow
Leader comment
The scientist is unequivocal. The verdict is clear. There is no more time for inaction.
FINANCIAL TIMES
TUESDAY 10 AUGUST 2021
INSIDE Kim's regime
Why sanctions against North Korea are failing
SILENCING staff
NDAs are damaging in the workplace
In China's debt
African nations' risks in borrowing from Beijing
World likely to be 1.5C warmer by 2040 UN



CODE RED FOR HUMANITY
EXTREME WEATHER DOWN TO GLOBAL WARMING, SAYS DOOMSDAY REPORT FROM UN
WORLD WILL HEAT UP AT LEAST 1.5C BY 2040... A DECADE EARLIER THAN WAS FORECAST
DAILY MAIL
CAMPAIGNING NEWSPAPER OF THE YEAR
FREE Brilliant puzzles pullout
David... denies... Greens... pay pac...
Next decade 'pivotal' to secure plan
PM: W... TO RED...
CODE RED
The scientist is unequivocal. The verdict is clear. There is no more time for inaction.
The Guardian



UN CLIMATE CHANGE CONFERENCE UK 2021
IN PARTNERSHIP WITH ITALY



Disasters – a worldwide problem

➤ Disaster events are increasing in frequency and severity



➤ Often as a direct result of man-made activities such as:

- unplanned urbanization and land-use
- climate change
- population growth
- over-exploitation of natural resources

Urban Populations are under stress from climate change, population growth, natural and human disasters...

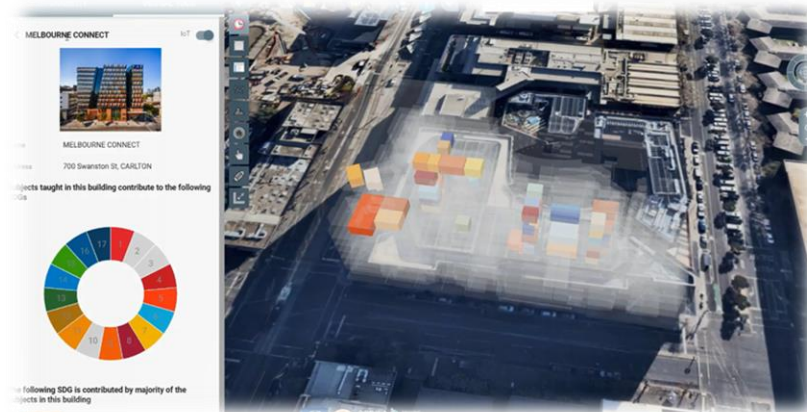
- 55% of the world's population live in cities, 50% are connected to the internet (half are not) – most of us are **now urban and digital**
- **85% of global GDP comes from world cities**
- **SDGs** are a '**blueprint** to achieve a better and more **sustainable future for all**'
- **Citizen participation** in city planning and **equitable digital access is inherently linked to the sustainability of the planet**



Image source City of Melbourne

*Emerging **digital engineering, spatial information and services** enable us to gain **insights** from data resulting in cost, efficiency, and decision-making benefits.*

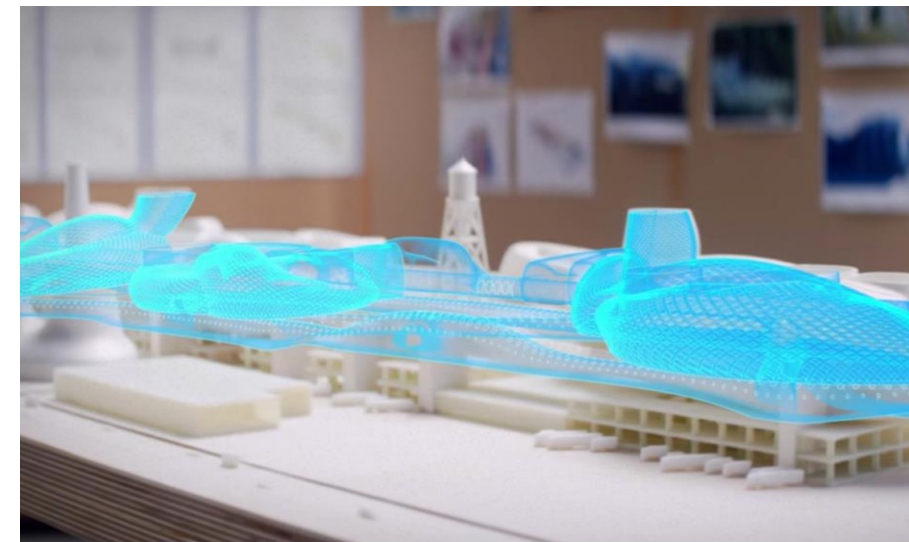
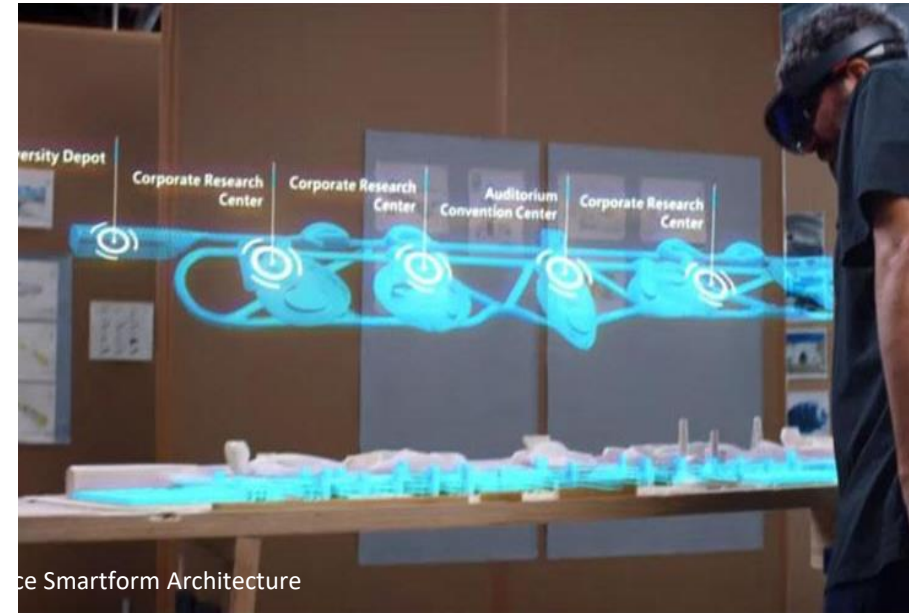
- Context: Challenges for cities, urban and rural populations
- Digitalisation and Modernisation of **Land, Environment, and Assets**
- Opportunities: **Digital Twins, Sustainability, Resilience**



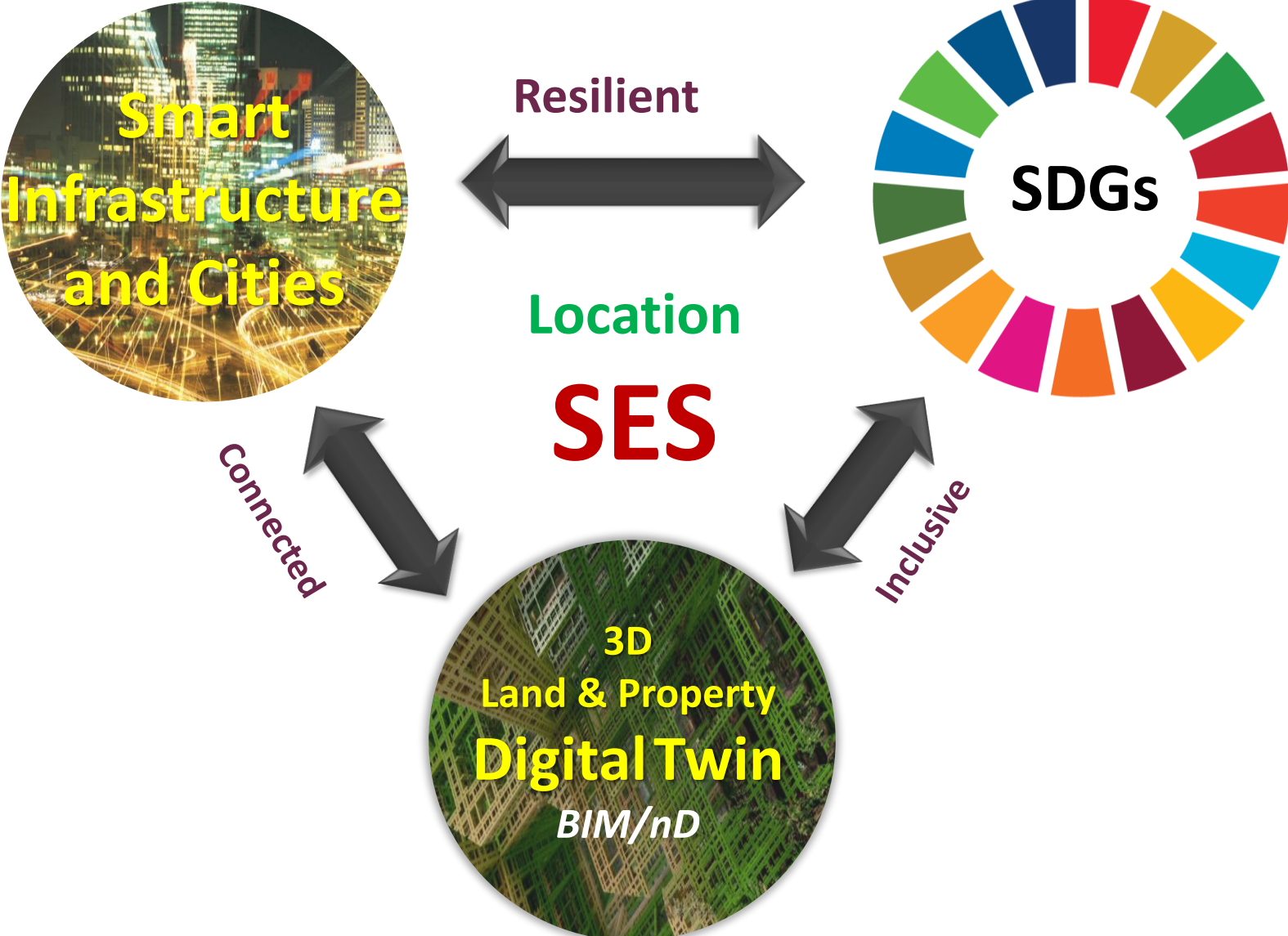
A Role for Digital Technologies

UNHABITAT World Cities Report 2022 acknowledges:

- Governments and industry increasingly **use cloud computing, big data and data analytics** while consumer-oriented businesses e-commerce
- After decarbonization **the 2nd key technological development relates to advances in the digital world**
- **Smart technologies can facilitate big data** collection, 'widespread deployment of sensors and devices, large-scale data analytics and machine learning'
- **Connected and digital technologies** find expression in the '**smart city**' a key driver of 'urban policy and increasingly, everyday reality'.



Interconnected FUTURE For ALL



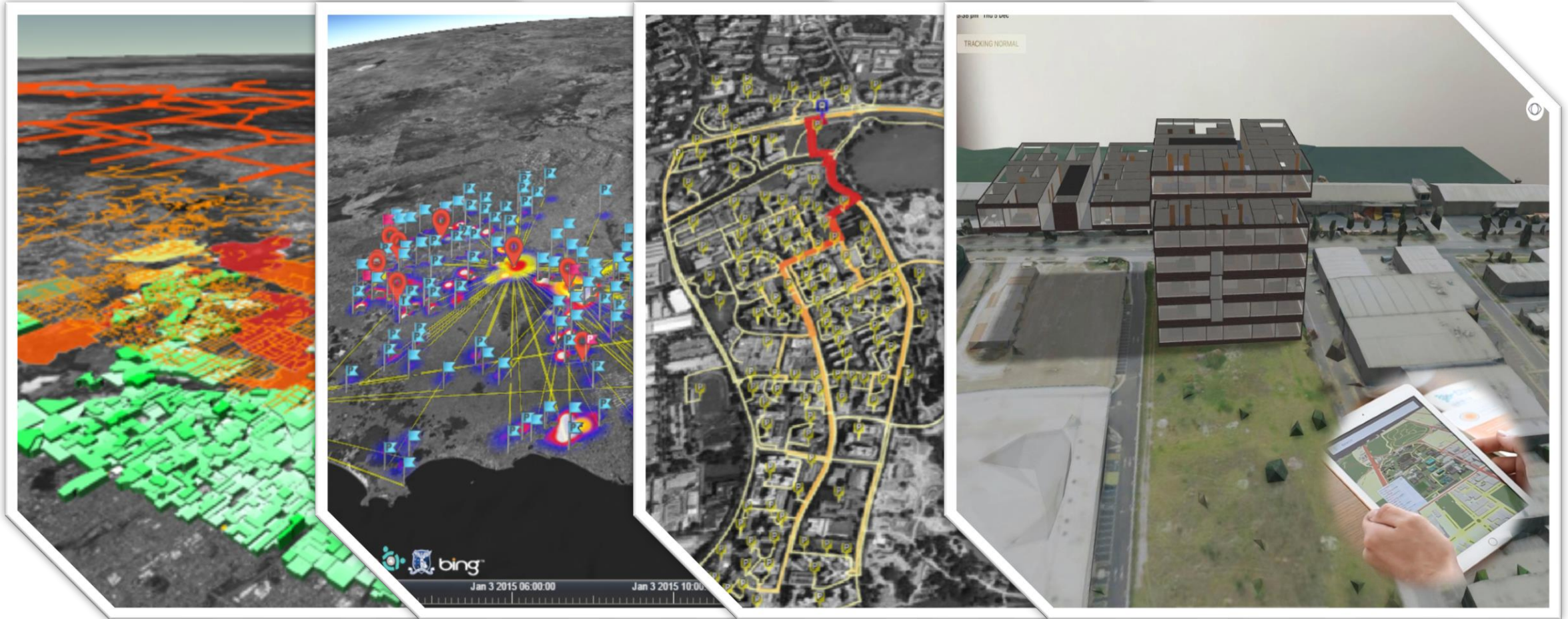
Our Perspective on Capabilities

'Beyond 2D/3D Visualisation'

Improving business **workflow** and **data processes** to support:

- *Multi source spatial data collection and integration*
- *Spatial data analytics (modeling, forecasting, simulation)*
- *Disaster management and resilience*
- *Urban environment simulation*
- *Real-time and open data integration*
- *Scenario-based planning*
- *Crowd modeling and panic management*
- *Measuring and monitoring UN SDGs' goals and indicators*

Key Capabilities



Multi-source Data
Integration

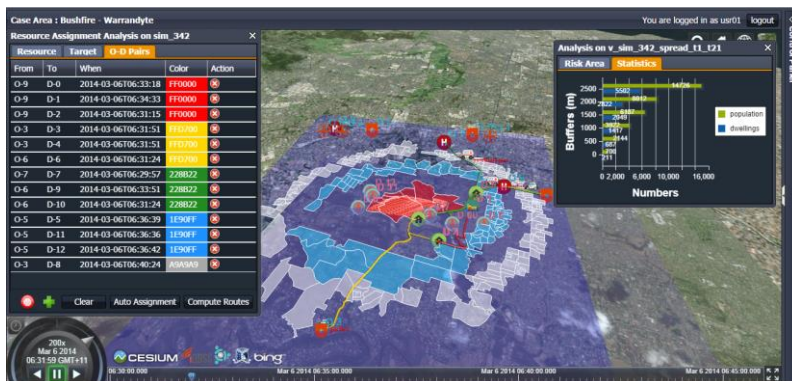
Disaster Modelling &
Simulation

Advanced Geospatial
Analytics

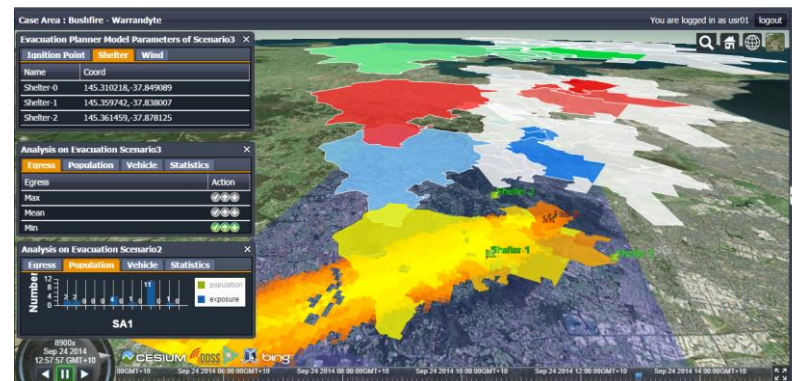
Augmented and Virtual
Reality Capabilities

Intelligent Disaster Decision Support System (IDDSS)

- Enhanced decision-making through scenario planning
- Advanced optimisation and simulation
- Real-time data collection, integration and analysis
- Modelling and visualisation capabilities
- Crowd sourcing component



bushfire impact analysis & resources allocation



regional evacuation planning



flood simulation & damage assessment

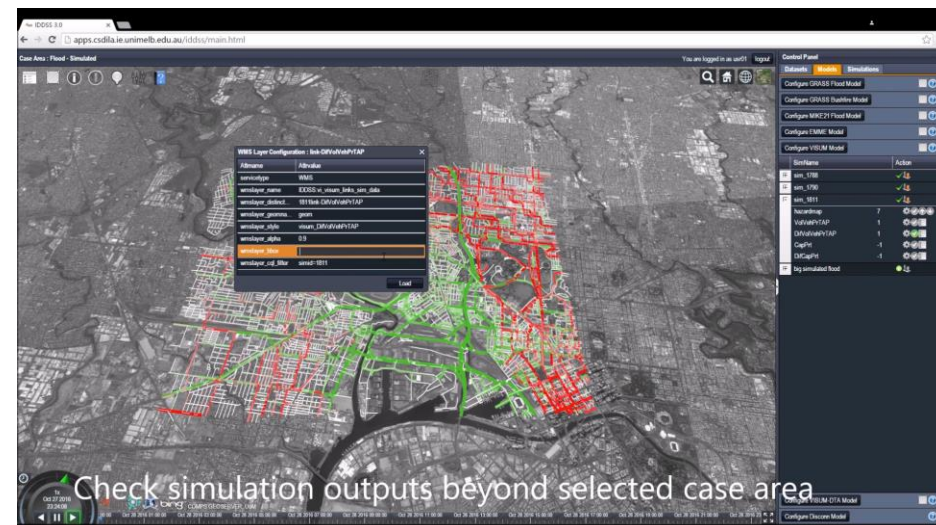
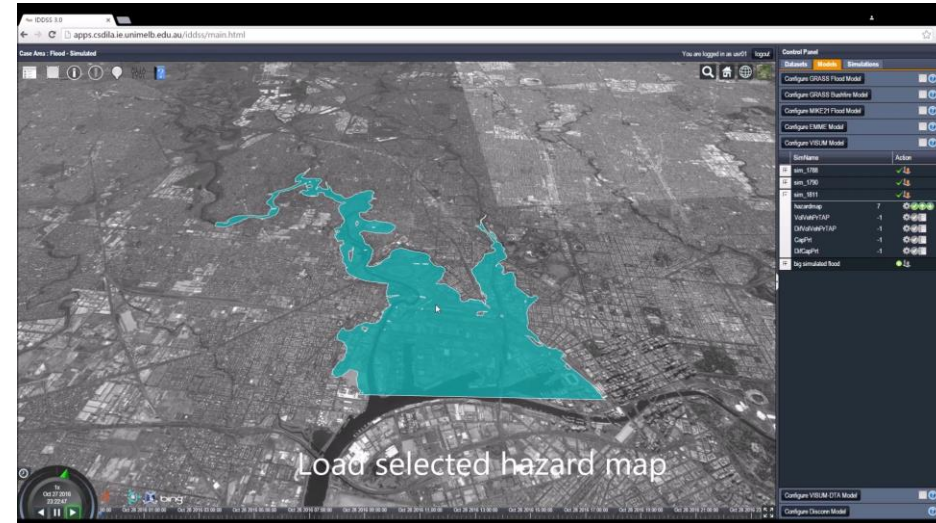
Road Network Impact Analysis

CAPABILITIES

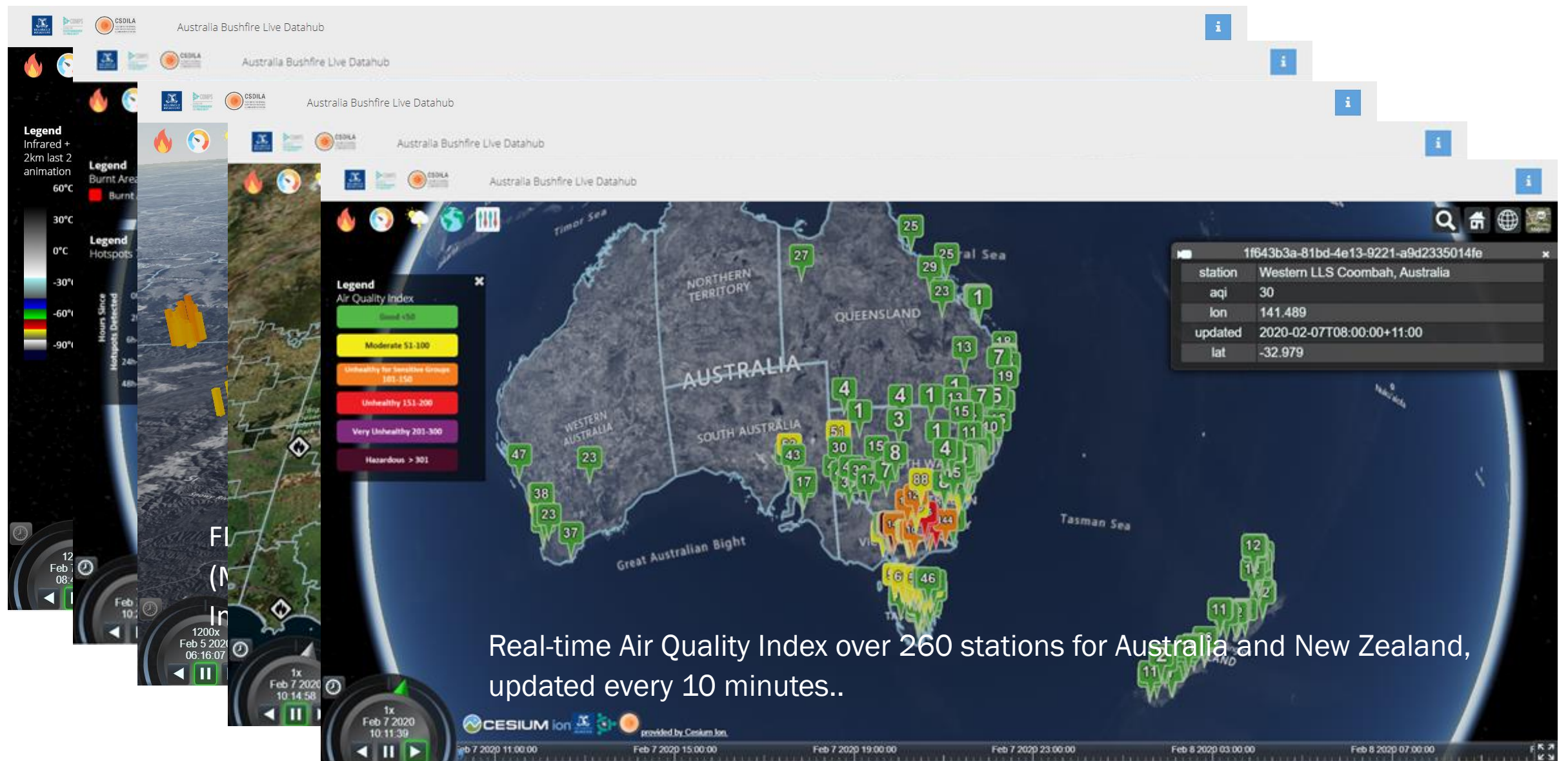
- Transport planning
- Intelligent transportation systems
- Travel demand forecasting
- Large scale optimisation

IMPACT

- Identification of vulnerable roads in a disaster event
- Integration of Melbourne's transport model into IDDSS
- Development of decision kits in disaster management operations

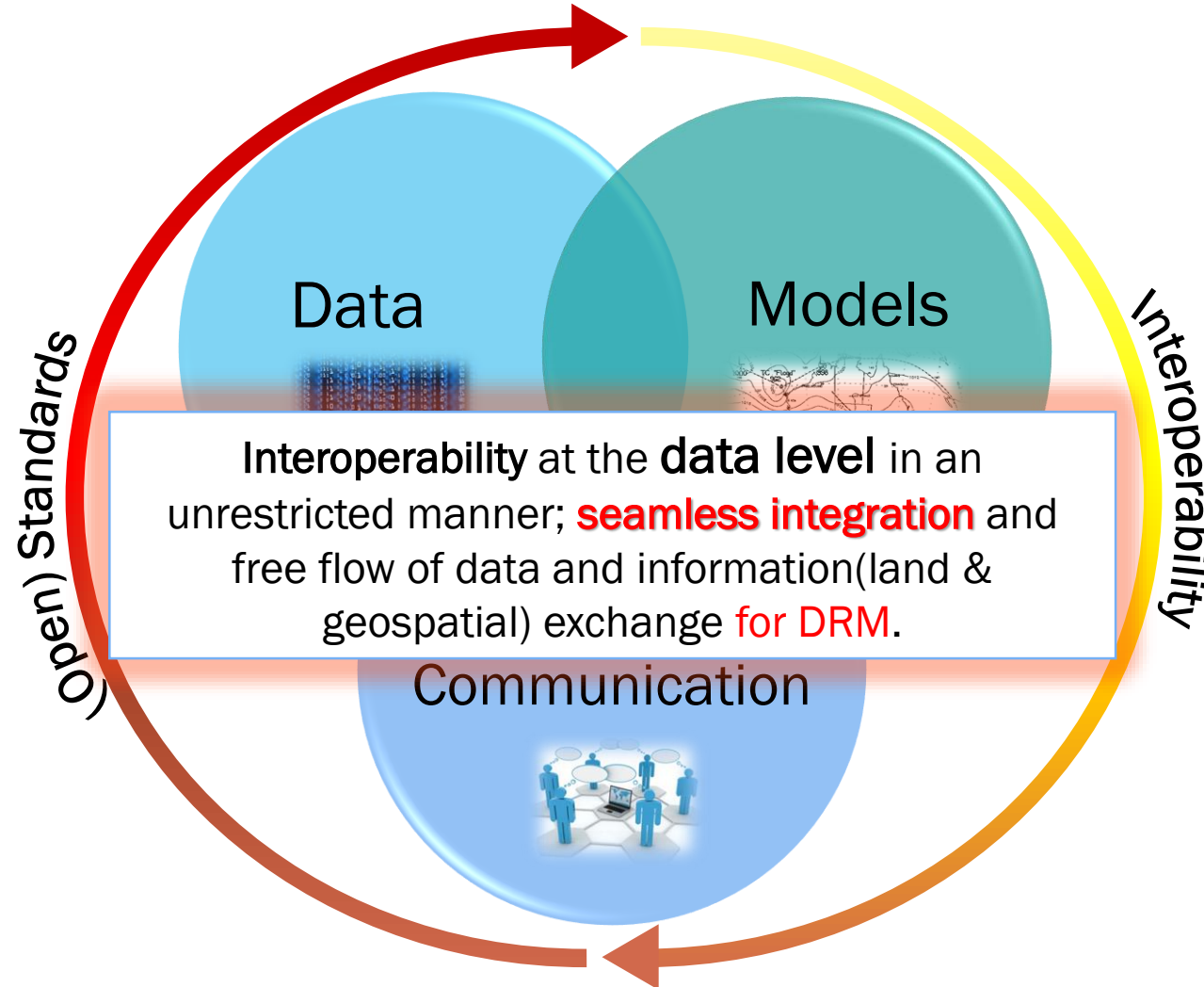


Australia Bushfire Live Datahub



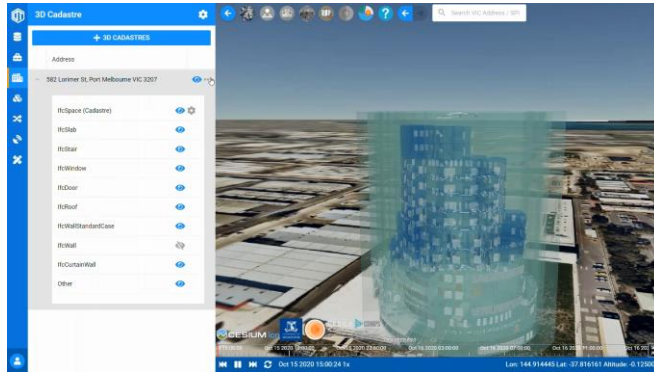
Leveraging Land and Geospatial Systems for **Improved Disaster Resilience**

Disaster Management Main Aspects

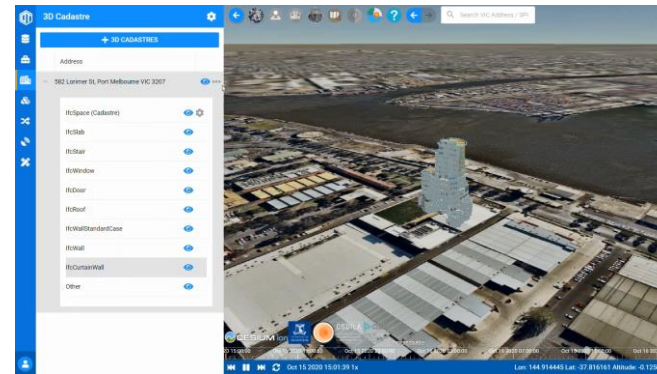


Application of 3D Cadastre

Styling

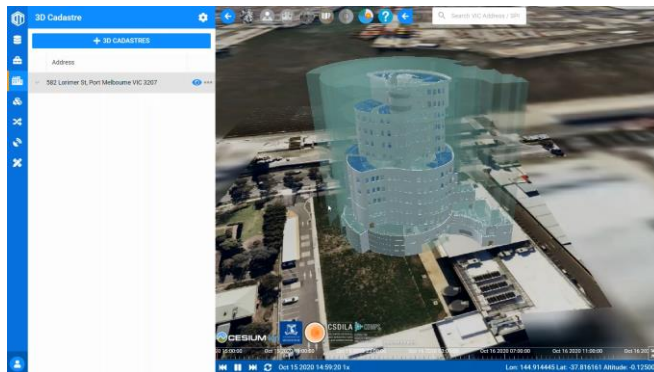


Clipping View & Slide View

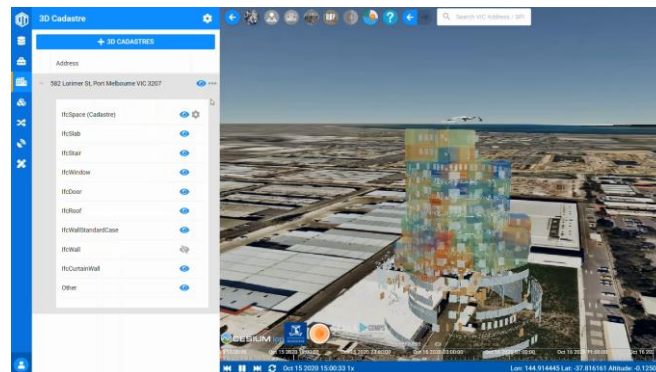


BIM Data Application for Asset Management, 3D Query, Search, Visualisation (above and underground), and compliance Assessment,

Query & Search

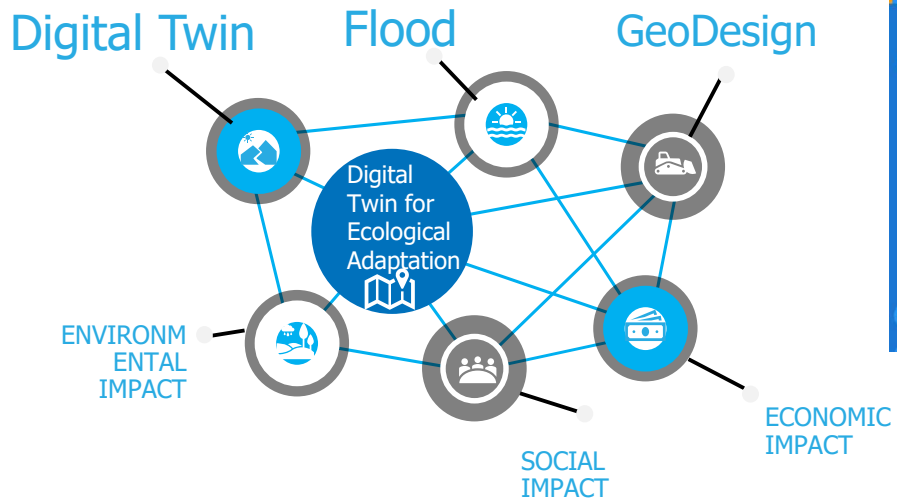


Exploded View & Rotation View



Urban Ecological Adaptation – Water Sensitive Urban Design

- A collaboration between transport planners, landscape designers, geospatial scientists, and urban planners



The screenshot shows a web-based interface for 'Ecological Adaption'. On the left is a sidebar with a table of 'PROPOSED STREETS' and a 'STOP DRAWING' button. The main area displays a 3D city model with buildings in various colors (yellow, green, blue, purple) and a street network overlaid. The interface includes a search bar at the top right and a bottom status bar with coordinates and scale.

PROPOSED STREETS	STREET CLASSES	WIDTH (M)	CAPACITY (L/M)
Law Street	Blue La...	10	100
Achorage Stre...	Blue La...	10	100
Mandarin Stre...	Blue La...	10	100
New Street	Blue La...	10	100

Challenges and Future Research

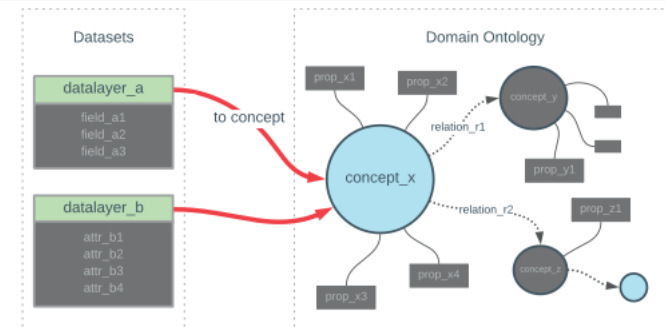
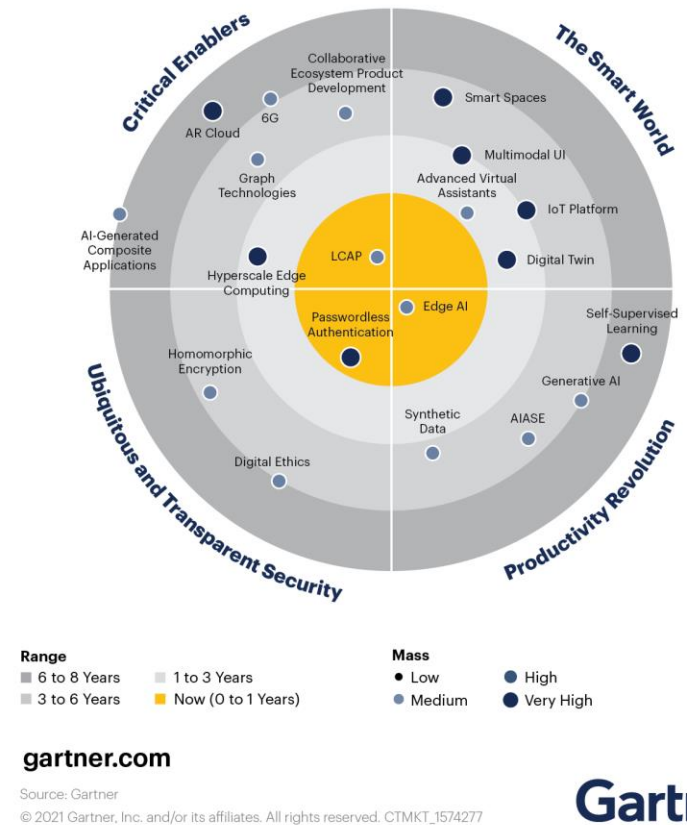
Data

- Automating the workflow of IFC to 3D Tile conversion to create a Fit-for-Purpose LoD;
- Creating an ontological approach for standardisation and harmonisation of different 2D/3D data formats;

Technology

- Developing a **Digital Thread** capability through a two-way communications with external models, simulators, applications, libraries via web APIs and CLI (Command Line Interface), complying with open data exchange standards and protocols.

Impact Radar for 2022



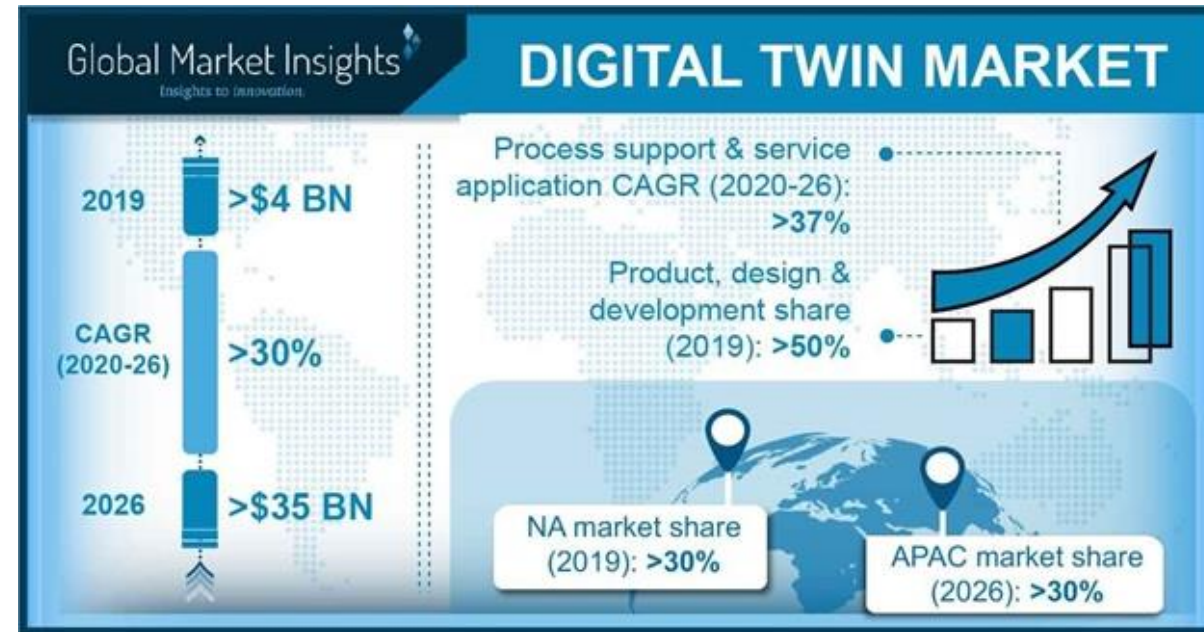
Challenges and Future Research (Con.)

Governance

- The value proposition of Digital Twin is not fully understood by different stakeholders;
- Defining the security and privacy principles

Capacity building, Advocacy, and Awareness

- The Digital Twin lifecycle should be defined and agreed upon by all stakeholders (learning from other standards; e.g. OGC);
- Upskilling and refreshing the professional community with potential use cases



<https://www.gminsights.com/industry-analysis/digital-twin-market>

THE FUTURE IS BRIGHTER

Thank You
We welcome new
partnerships and
collaborations.



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