



Collaboration, Innovation and Resilience: Championing a Digital Generation

Brisbane, Australia 6-10 April

Bringing Cities to Life: Integrating 3D GIS and BIM for Smarter Urban Development

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Why?

- **Shaping the future of cities** requires a bold, thoughtful, and collaborative approach.
- We leverage technology, especially 3D GIS and BIM integration, to support **smarter, data-driven urban planning**.
- We align our work with the **SDGs**.
- **Digital innovation** is key to building inclusive, liveable, and future-ready cities.



Agenda

- 1. Introduction**
- 2. Case Study 1 – The Adelaide City Plan**
- 3. Case Study 2 – Tram Corridor Development & La Trobe St Tram Stop Upgrades**
- 4. Case Study 3 – Precinct model for the Melbourne Innovation District.**
- 5. Conclusion and Recommendations**
- 6. SDGs Contribution**

The Challenge



Fragmented Data Sources

Traditional urban projects relies on fragmented data and static methodologies.



Visualisation Difficulties

Challenges in seeing how new structures interact with existing environments.

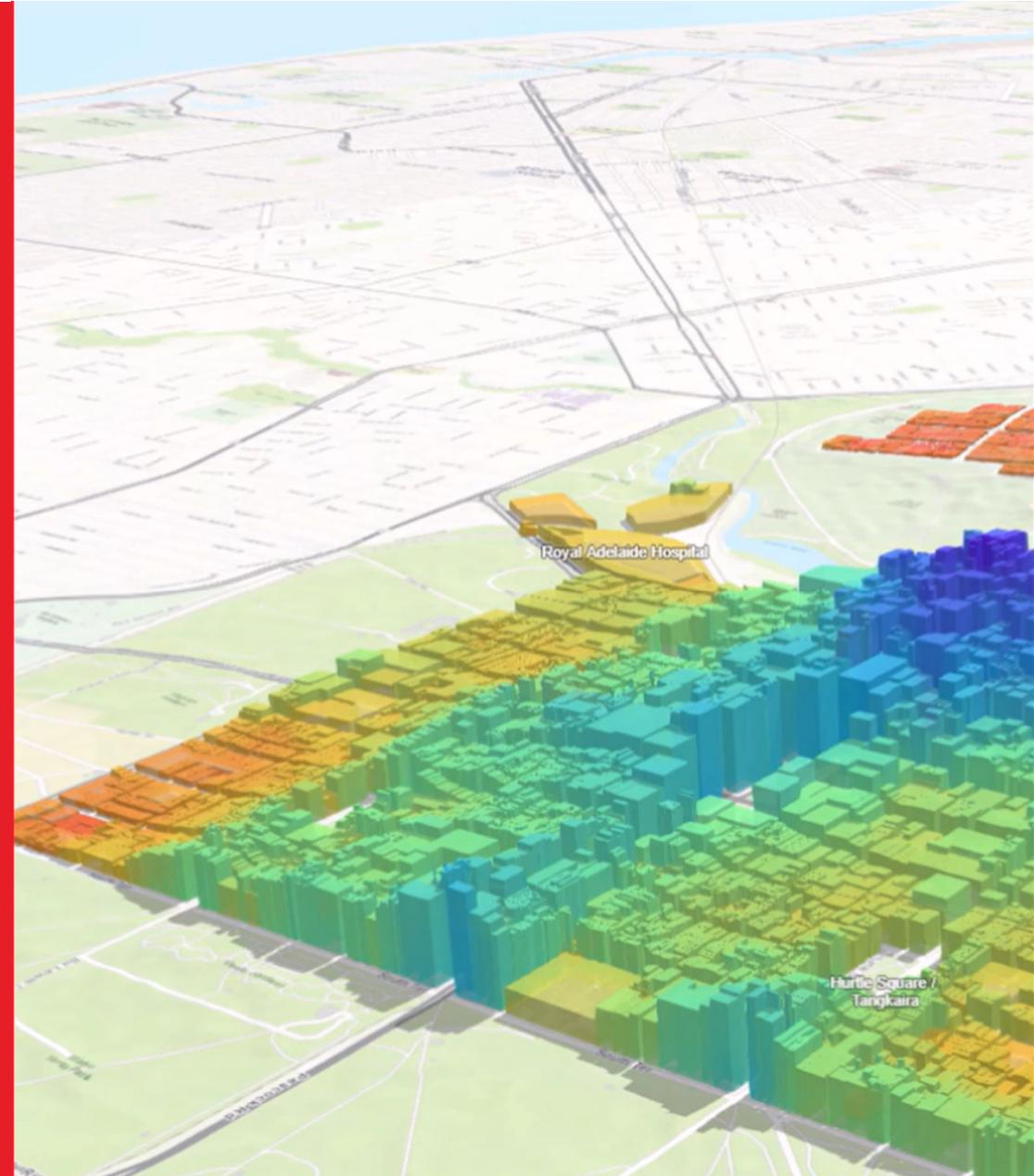


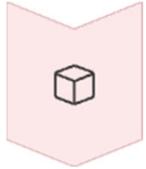
Stakeholder Collaboration

Limited ability for different parties to access and share information easily.

Case Study 1

Adelaide City Plan





Objective: Understanding current conditions to plan towards a more accessible, transparent, sustainable, holistic, and inclusive city.



Approach:

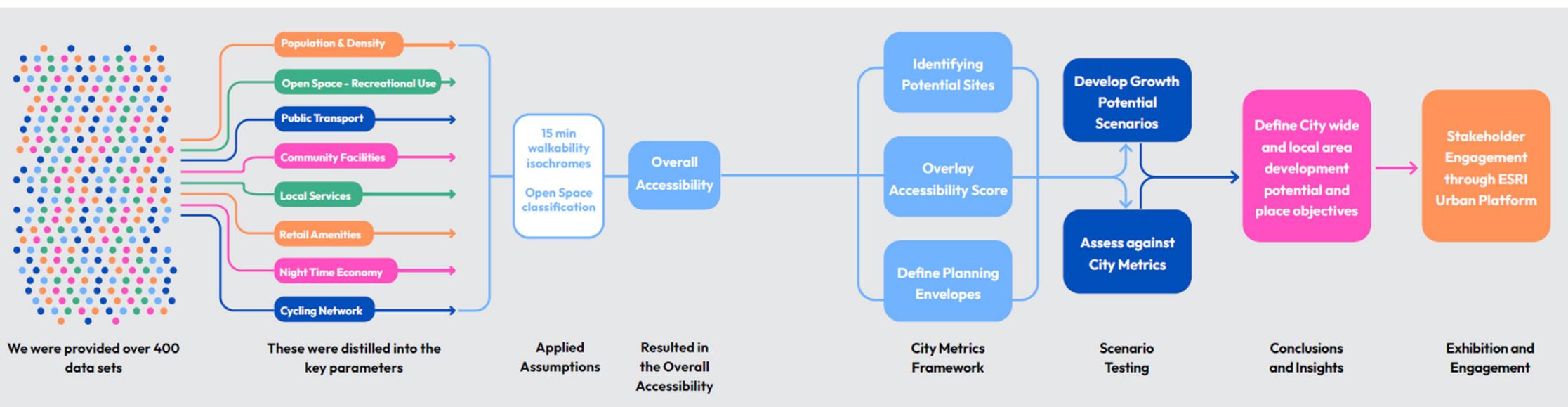
Used 3D GIS for spatial analysis and scenario modelling.

Assessed accessibility and development potential.



Outcome: Data-driven strategies for infrastructure planning and urban sustainability.

Methodology



Indicators

Projects Plans Indicators

35 results

01.1 Population Density per sq km Featured
This indicator showcases the population density within the city, providing insights into the concentration of residents per square...

Indicator - Custom

01.2 Walking Pathways Featured
This indicator provides an overview of the walking pathways within the city. By visualizing these pathways in a 3D representation, it...

Indicator - Custom

02.1 Open Spaces - Recreational Use Featured
This indicator categorizes open spaces based on their recreational use into four classifications: High, Low, Limited, and Closed. High...

Indicator - Custom

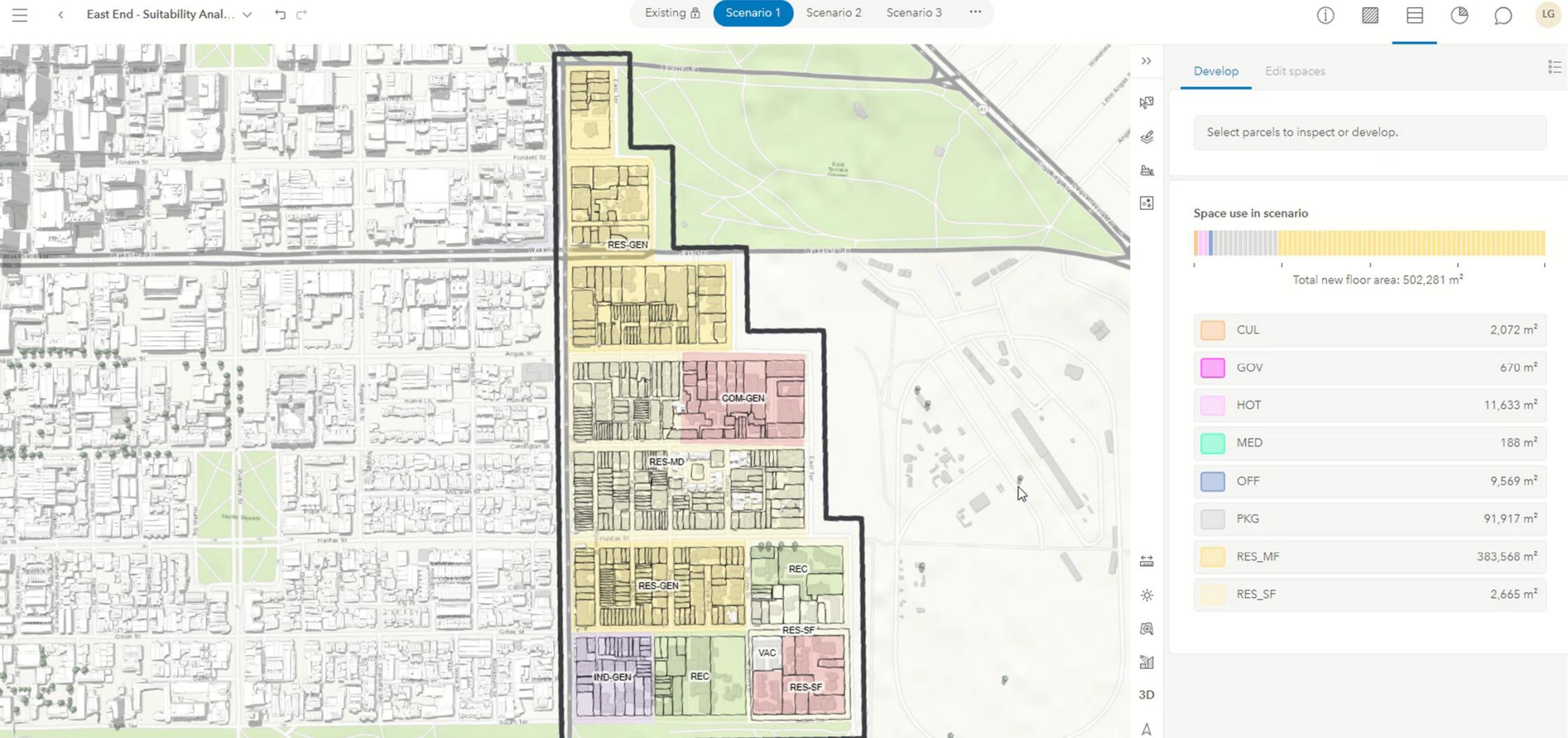
02.2 Open Spaces - Recreational Use Accessibility (3D) Featured
The Open Spaces - Recreational Use Accessibility indicator provides insights into the accessibility of recreational open spaces within th...

Indicator - Custom

03.1 Public Transport Featured
Efficient public transportation plays a crucial role in enhancing urban mobility and connectivity. By visualizing the positions of these...

Indicator - Custom





Multicriteria Analysis

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Results

- ✓ Better understanding of current condition
- ✓ Improved decision-making
- ✓ Enhanced community engagement
- ✓ Improved planning process

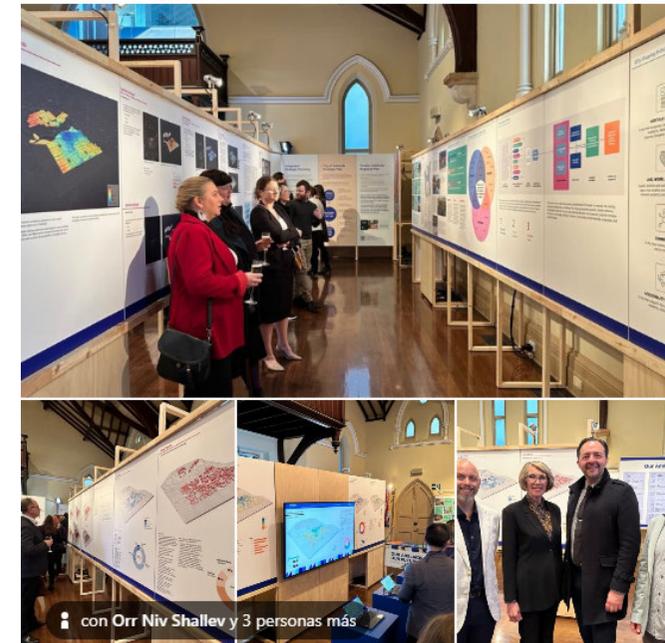
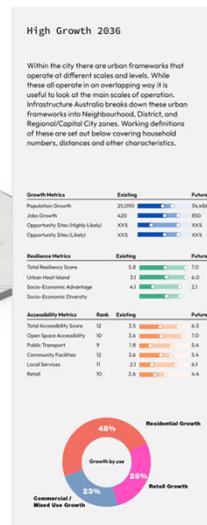
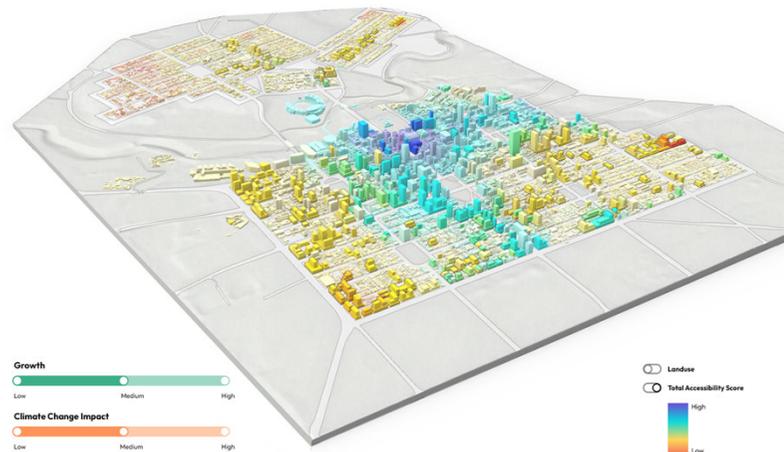
City Plan Studio is not just an exhibition; it's a hub of innovation and place where city shaping conversations start. Located within City of Adelaide Meeting Hall at Paul Kelly Lane, Adelaide, this space invites all to envision and deliberate upon the myriad of possibilities our city's future holds. Open for the next two weeks, it's a unique opportunity to contribute, reflect, and shape the Adelaide of tomorrow.

<https://lnkd.in/gwvTMtet>

#CityPlanning #Adelaide2036 #UrbanDesign #Innovation #cityplan #shaping #future #bold #vision

Ver traducción

Growth Potential Scenarios



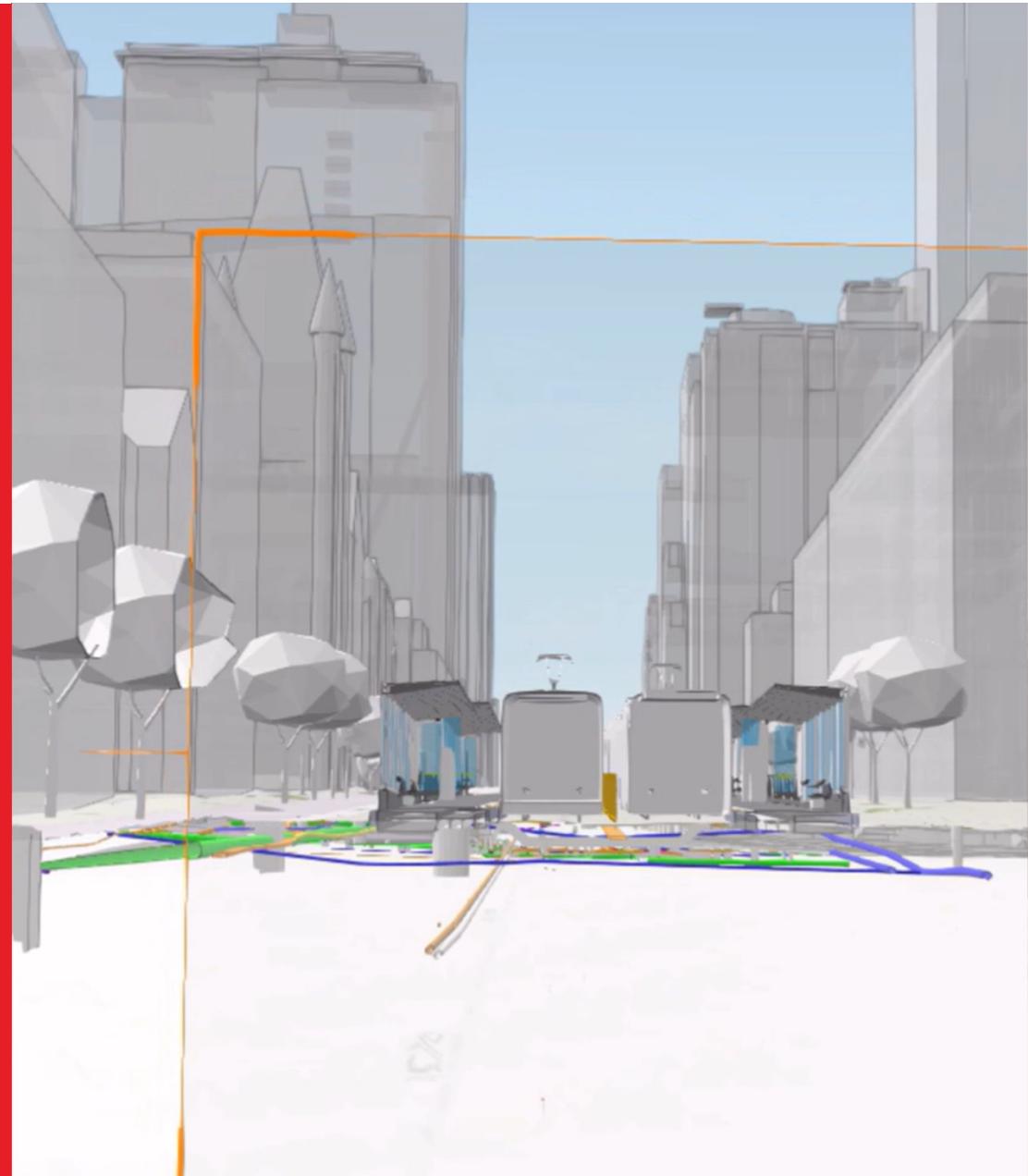


Welcome to City Plan



Case Study 2

Tram Corridor Development & La Trobe St Tram Stop Upgrades





Objective: Improve Melbourne's tram network efficiency and accessibility.

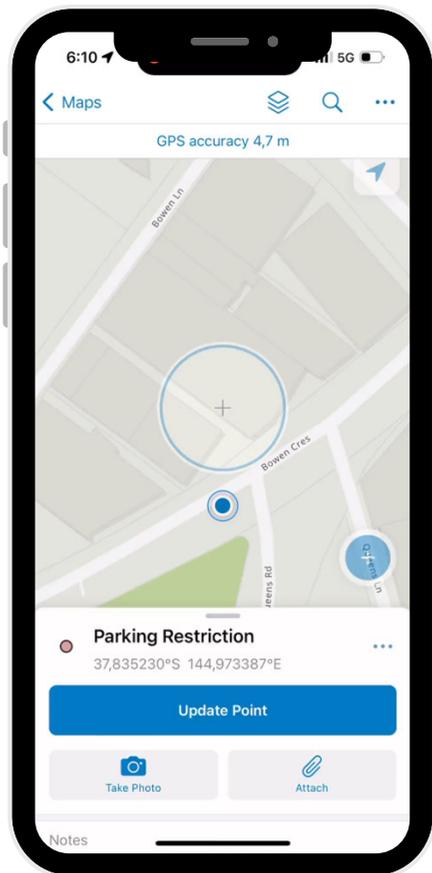


Approach: Integrated GIS with other technologies such as BIM for a more effective data collection, management, and visualisation.

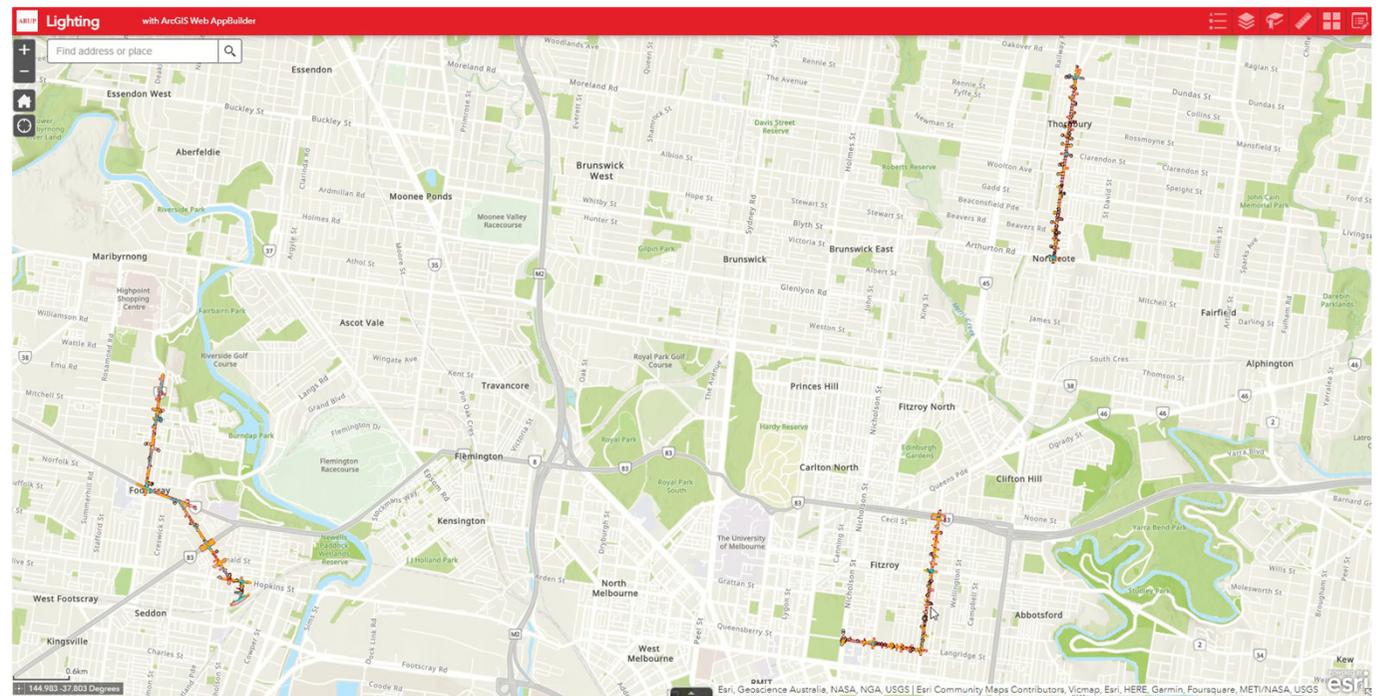


Outcome: Holistic real-time visualisation for an enhanced stakeholder engagement.

Data Collection



ArcGIS Field Maps



ArcGIS Enterprise

Data Centralisation



F | Tram Corridor Development - Existing Conditions Survey & Design

Sort By: **Alphabetical** Module Type Search

Browse Fuse modules for this project...

Civil Infrastructure

Civil map showing the utilities identified as high risk.

Open Module

Fieldmap

Tram Corridor Development - Fieldmap

Open Module

Land Planning and Environment

LPE map showing heritage, ecology and land contamination data.

Open Module

Lighting

Map of categorised lighting typologies, spacing, illumination levels and variation.

Open Module

Storymap Report

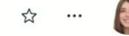
Transport

You're using a Trial version of Fuse. Contact your [Fuse developers](#) to upgrade.

Dynamic Report

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ARUP Tram Corridor Development



Tram Corridor Development

Existing Conditions Survey & Design Report

September 22, 2023 - Final submission

[Introduction](#) [Policy Context](#) [Basis](#) [Package A](#) [Package B](#) [Package C](#) [Summary](#) [Fuse Portal](#) [Appendices](#) [QA Page](#)

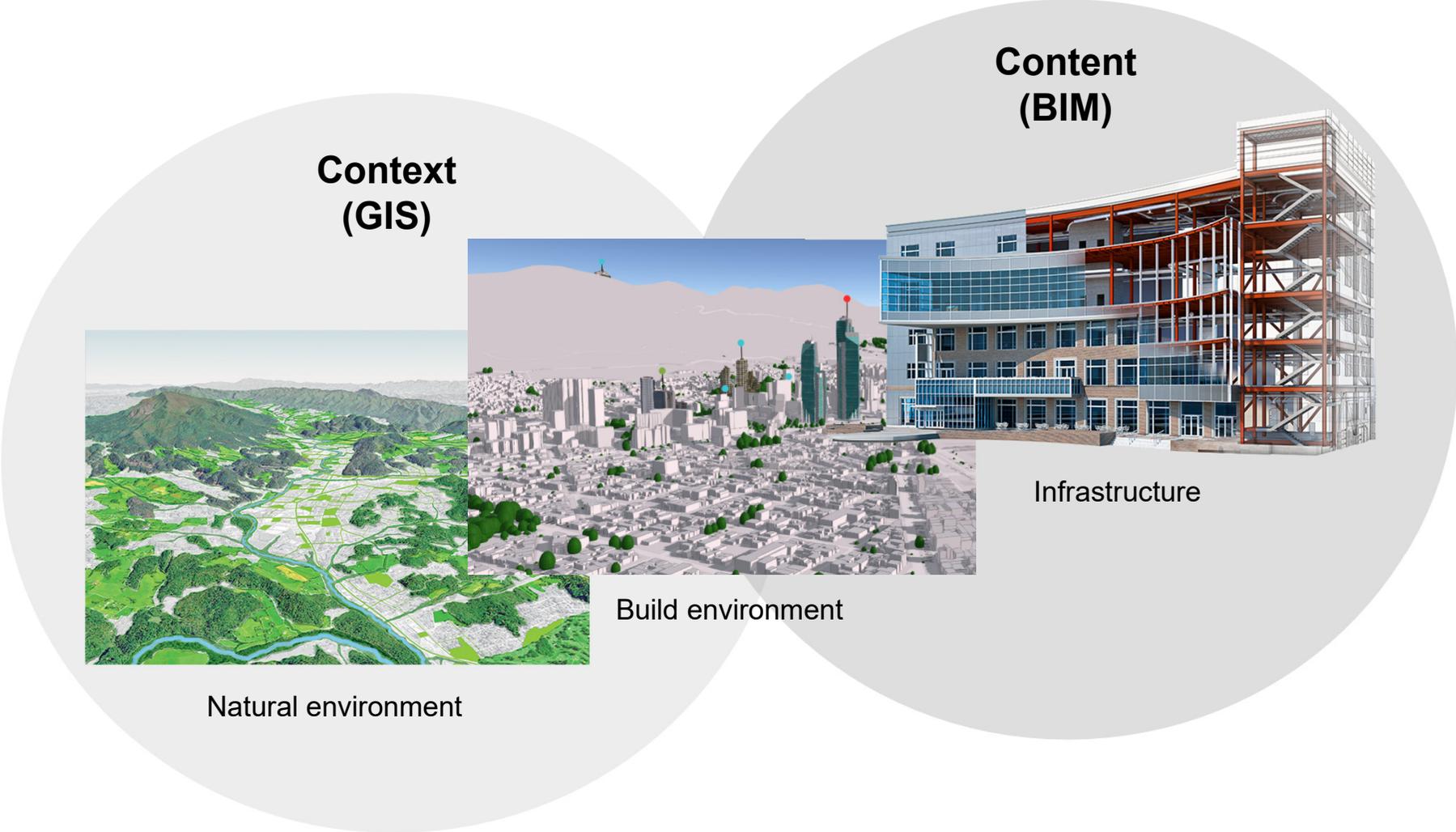
[Guide to Navigating a StoryMap](#)

1. Introduction



Storymap

GIS and BIM Integration



Case Study 3

Melbourne Innovation District (Pre)Digital Twin



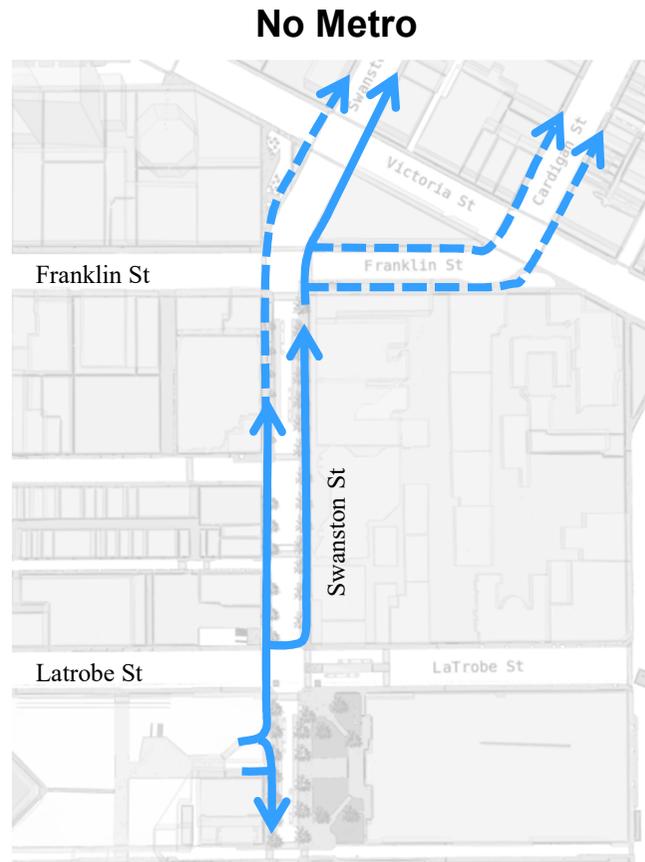
Approach

Use cases

To undertake this study the following two use cases have been developed

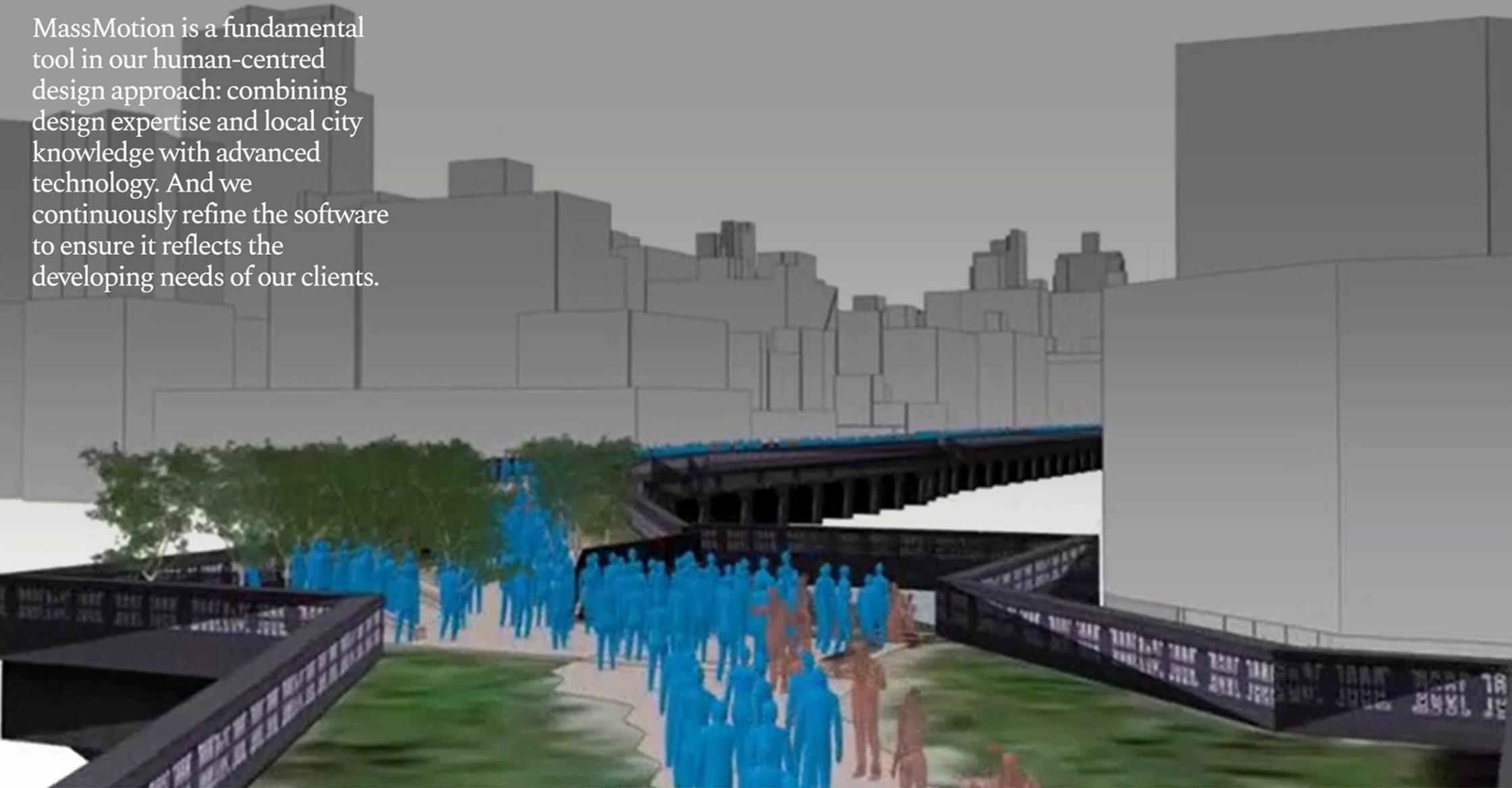
- **Baseline Scenario**
- **Metro Scenario**

- Melbourne Central Station – east exit
- Library Station – Latrobe exit
- Library Station – Franklin exit



Note: Sketches show primary pedestrian routes from each of the Swanston St adjacent station exit. There will be a more a mix, the sketch is intended to demonstrate the big change in movement patterns.

MassMotion is a fundamental tool in our human-centred design approach: combining design expertise and local city knowledge with advanced technology. And we continuously refine the software to ensure it reflects the developing needs of our clients.

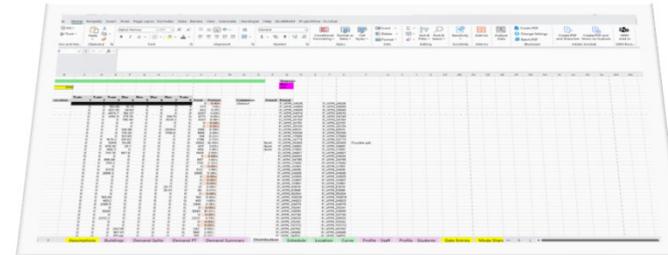


City Pedestrian Model

Approach – inputs

Demand

- CLUE data on building
- VITM inputs
- Census



Geometry

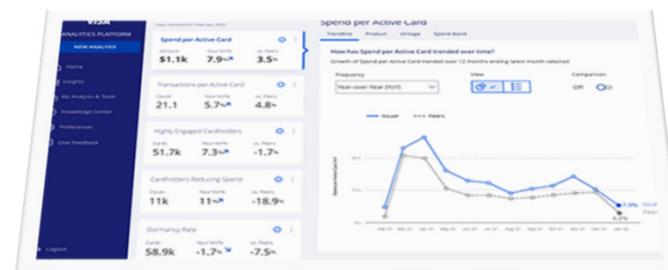
- CoM Footpaths
- CoM Buildings/Properties
- CAD drawings
- Aerial imagery



Engagement / Activation

Pending

(VISA dashboard shown as example)



Results



Baseline (no Metro)



Scenario 1 (with Metro)

Current Scenario – Baseline

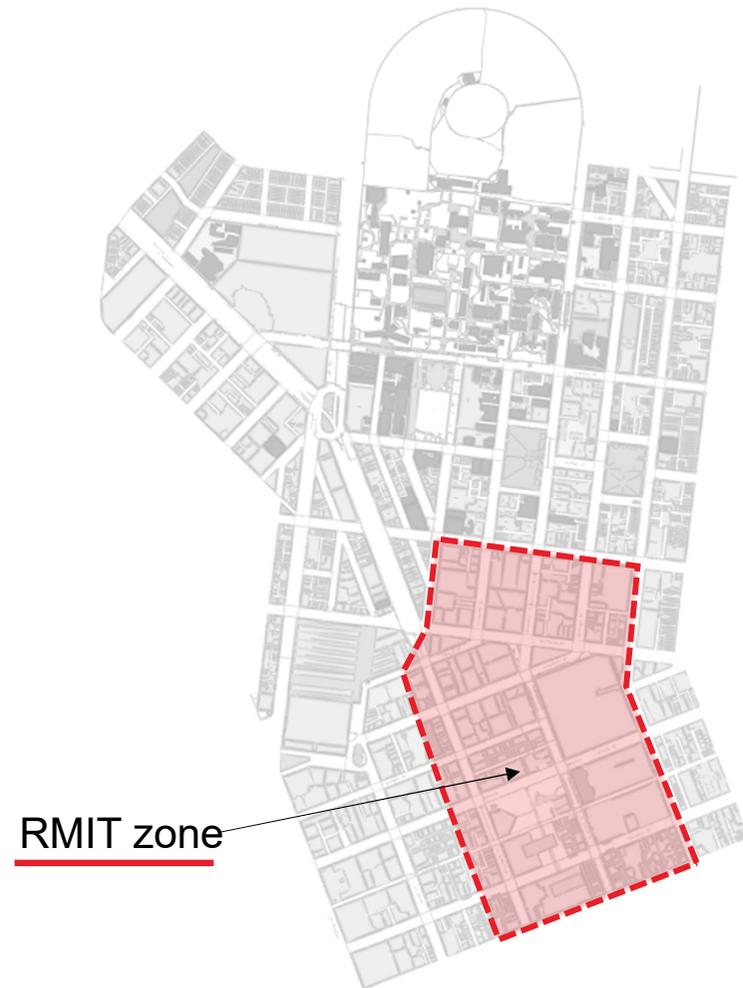
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	Data set	Source	Comments	Fit for purpose	Ideal temporal update
Geometry	Building Footprints	City of Melbourne	Good quality	●	12 months
	Doorways and Counts	Not Available	Ideally need doorways and counts	●	1 month
	Footpaths	CoM (Open Data)	Good although some edits required, not a true reflection of pedestrian areas used	●	12 months
	Crossings	CoM	Good	●	12 months
	Signal time at Crossings	VicRoads (Open Data)	Only used at Victoria Street Crossing	●	Average Peak/Non Peak
	Bikelanes and counts	CoM (Counters)	2 bike counters available in the precinct	●	12 months
Demand	Workers	CLUE (CoM)	Data processed to assume a daily average	●	12 months
	Residential Dwellings	CLUE (CoM)	Good	●	12 months
	Retail (visitation)	CoM CLUE: Retail space available	Not used. Does not reflect demand	●	3 months
	Student arrival profile	Not available	Not used	●	Peak and off peak / Special Events, (annual update)
	Transport – Trams (patronage)	Potentially available (DTP)	Not used	●	Peak and off peak (annual update)
	Pedestrian Counts	CoM (hourly counters)	Greater coverage needed (direction and minute based time interval)	●	Minute and direction update required

City Pedestrian Model

Approach – RMIT precinct

- Develop a proof-of-concept model, pre-digital twin pedestrian model of the RMIT precinct.
- Understand the impact of Melbourne Metro Stations to RMIT and UoM precinct
- Review available data
- Inform next steps



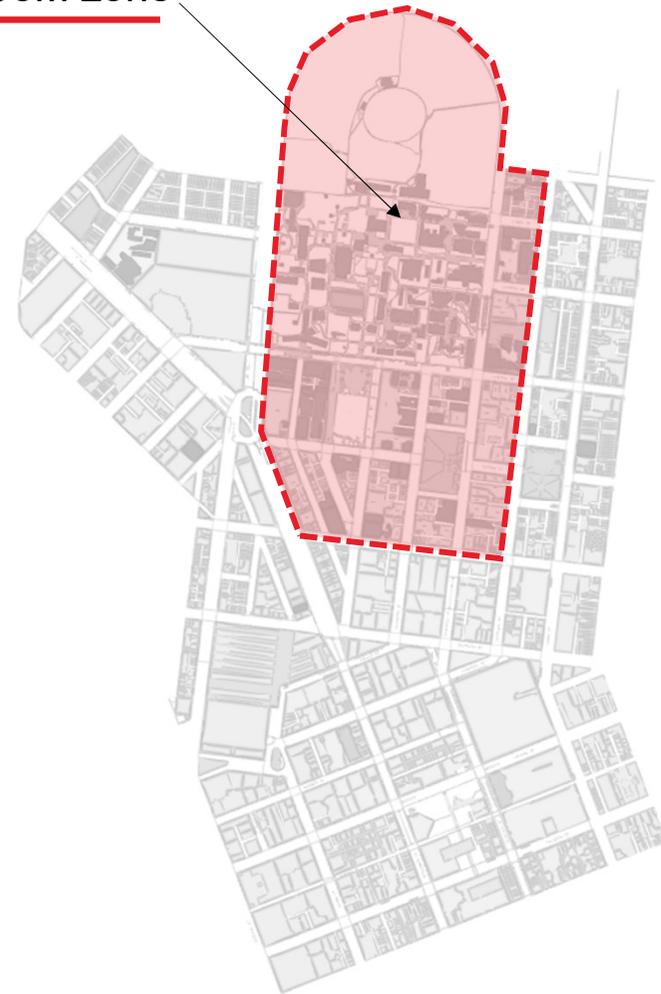
City Pedestrian Model

Approach – UoM precinct

- Expand the initial RMIT model to encompass UoM and the Melbourne Innovation District
- Inform the impact of Melbourne Metro to the UoM Parkville Campus
- Assess future masterplan – layout, buildings etc.
- Assess construction staging – upcoming masterplan developments

Note, UoM campus model has been developed with more detail about the campus buildings, including pedestrian counts, building information, class timetabling and detailed campus drawings.

UoM zone



City Pedestrian Model

Approach – Melbourne Innovation District

View models

MID expanded
zone



Next steps

Where to from here?

Many angles to approach the next steps....

- Develop data inputs
- Consider use cases
- Include broader stakeholders

Understanding the desired use cases

- Provisions
- Safety
- Day night
- Inclusiveness and accessibility
- Travel times
- Route availability
- Experience (shade, temperature, sightlines)



AURIN & Arup Hackathon



Hack Themes

- Demographic and Workforce Transformation
- Climate Transition
- Urban Digital Twins



Summary

- **Technology integration** like 3D GIS and BIM is providing new ways for communities and decision makers to come together to plan and communicate.
- The potential to use these technologies currently relies on **skilled practitioners** and the data is often fragmented.
- With **more accessible data** it will become possible to build better and more realistic models.

Future Pathways for 3D GIS-BIM Integration

Our case studies demonstrate that seamless GIS-BIM integration creates more livable, sustainable urban environments.

Australia leads with innovative approaches that connect built infrastructure with spatial planning, enabling truly data-driven cities.



Standardised Data Protocols

Develop common frameworks for 3D GIS-BIM data exchange.



Collaborative Governance

Engage diverse stakeholders through interactive digital platforms.



Sustainable Outcomes

Measure and model environmental impacts of development decisions.



Educational Initiatives

Train tomorrow's planners in integrated spatial technologies.



The most relevant SDGs related to the presentation and theme of this session

1st relevant SDG

11 SUSTAINABLE CITIES AND COMMUNITIES



2nd relevant SDG

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE



3rd relevant SDG

13 CLIMATE ACTION



SUSTAINABLE DEVELOPMENT GOALS

International Federation of Surveyors supports the Sustainable Development Goals



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Geospatial Council of Australia

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STEP 1: SELECT HERE THE THREE MOST RELEVANT SDGs
STEP 2: COPY THE SDG INTO PREVIOUS SLIDE

Grid of 17 Sustainable Development Goals (SDGs) with icons and titles: 1 NO POVERTY, 2 ZERO HUNGER, 3 GOOD HEALTH AND WELL-BEING, 4 QUALITY EDUCATION, 5 GENDER EQUALITY, 6 CLEAN WATER AND SANITATION, 7 AFFORDABLE AND CLEAN ENERGY, 8 DECENT WORK AND ECONOMIC GROWTH, 9 INDUSTRY, INNOVATION AND INFRASTRUCTURE, 10 REDUCED INEQUALITIES, 11 SUSTAINABLE CITIES AND COMMUNITIES, 12 RESPONSIBLE CONSUMPTION AND PRODUCTION, 13 CLIMATE ACTION, 14 LIFE BELOW WATER, 15 LIFE ON LAND, 16 PEACE, JUSTICE AND STRONG INSTITUTIONS, 17 PARTNERSHIPS FOR THE GOALS.

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Future Recommendations



Integrate AI-driven Solutions

For predictive analytics, urban trends forecast, and infrastructure needs



AR/VR Integration

Enhance urban design simulations



Interactive Tools

Enable resident participation in planning



Scale GIS-BIM

Scale methodologies & promote cross-industry and academic collaboration.



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