

DIGITAL TWIN INITIATIVES ACROSS AUSTRALASIA

Christopher Blackstock – Business Development Manager
27 August 2021

FRONTIER The logo for FrontierSI, featuring the word 'FRONTIER' in white, 'SI' in orange, and a greater-than sign '>' in orange.

FRONTIER .COM.AU

Introduction

FrontierSI is the continuation of the Cooperative Research Center for Spatial Information (CRCSI) and exists to deliver major benefits to governments, industry and the community using our deep expertise in spatial mapping, infrastructures, positioning, geodesy, analytics and standards.

As a not for profit, we are focused on building the capabilities across government, industry and universities to deliver an ecosystem of integrated digital twins



FRONTIER
SI >

Our Australian and New Zealand Partners

Government



University



Industry Partners



FRONTIER
S I >



What are Digital Twins

...and why do they matter

FRONTIER
S
I >

Definition

"The Digital Twin is a data-driven capability that accelerates outcome focused decision making delivering better, quicker and cheaper infrastructure and services"

Source: Australia | New Zealand Digital Twin Blueprint



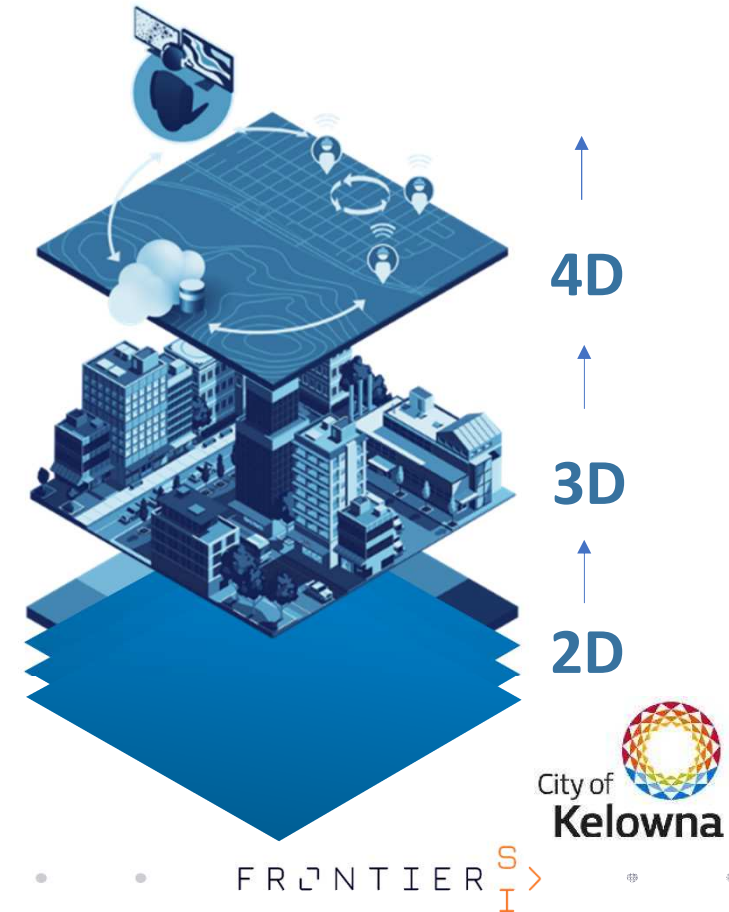
Data-Driven

The basis of every digital twin is the data including:

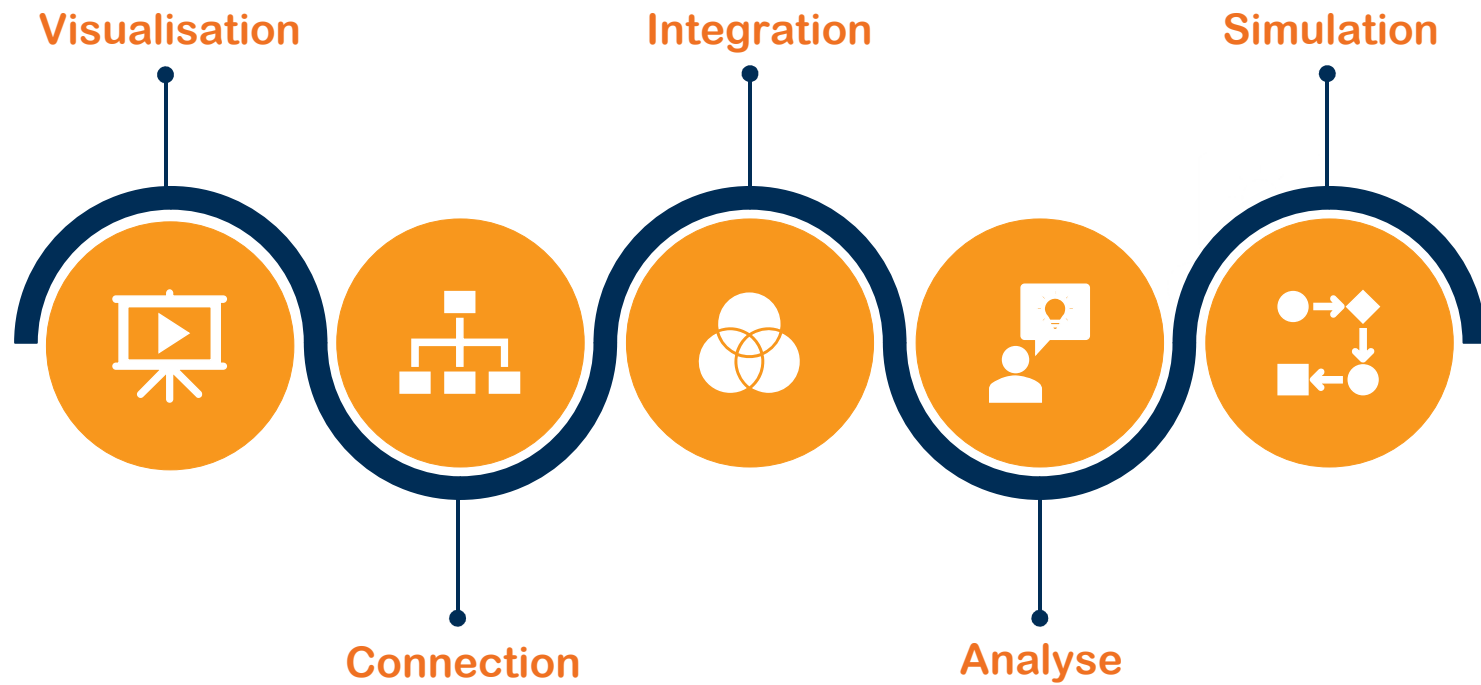
- **2D:** traditional GIS, operational and corporate data,
- **3D:** BIM, LiDAR, terrain models, elevation and slope, below ground assets
- **4D:** IoT & real-time sensors, cameras, SCADA, big data, historic data
- **Analysis & Insights:** historic trends, correlations, future predictions, simulations

“The world’s most valuable resource is no longer oil, but data”

The Economist



Capabilities



Outcome focused Decision-making

The real value of Digital Twins is to drive decision-making and outcomes that address the key challenges faced by governments, planners and organizations today

With significant effort and investment being spent on Digital Twin initiatives across all sectors and levels of government including:

- National government
- State, regional and local government
- Utilities and asset owners and operators
- Vendors, technologists and startups
- Developers, architects and manufacturers
- NGO's, universities and research institutions

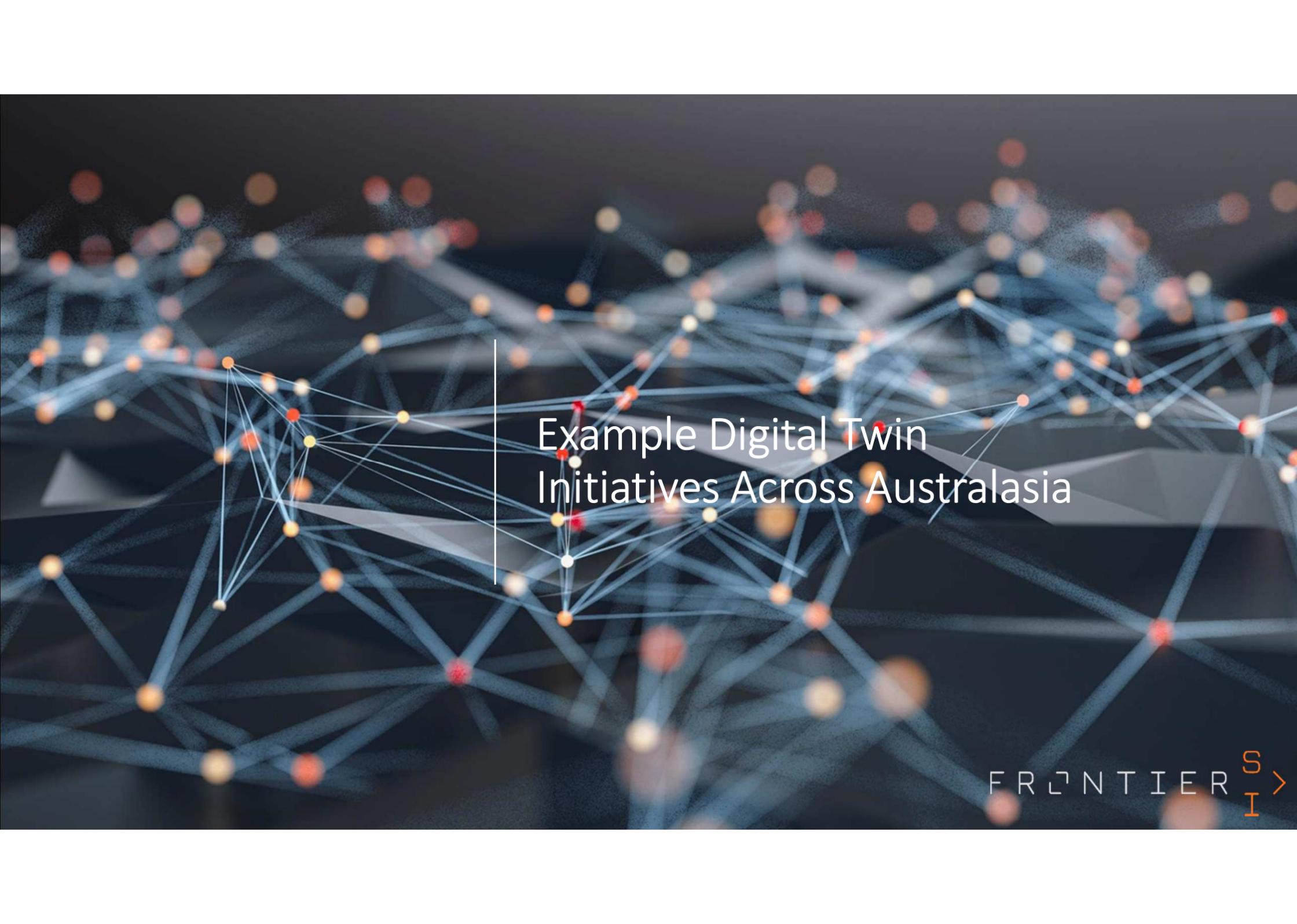


Sectors & Use Cases

Digital Twins are being utilized, or planned, to address local, national and global problems across a wide range of sectors and use cases, such as:

- **Major infrastructure & transportation**
- **City planning & design**
- **Community health & livability** (i.e. air quality, heat stress)
- **Emergency planning & response** (i.e. flood, fire)
- **Event security and operations**
- **Natural ecosystem modelling & simulations**
- **Carbon accounting & environmental**
- **Agriculture** (i.e. farm management, supply chain)
- **Resilience & Sustainability**

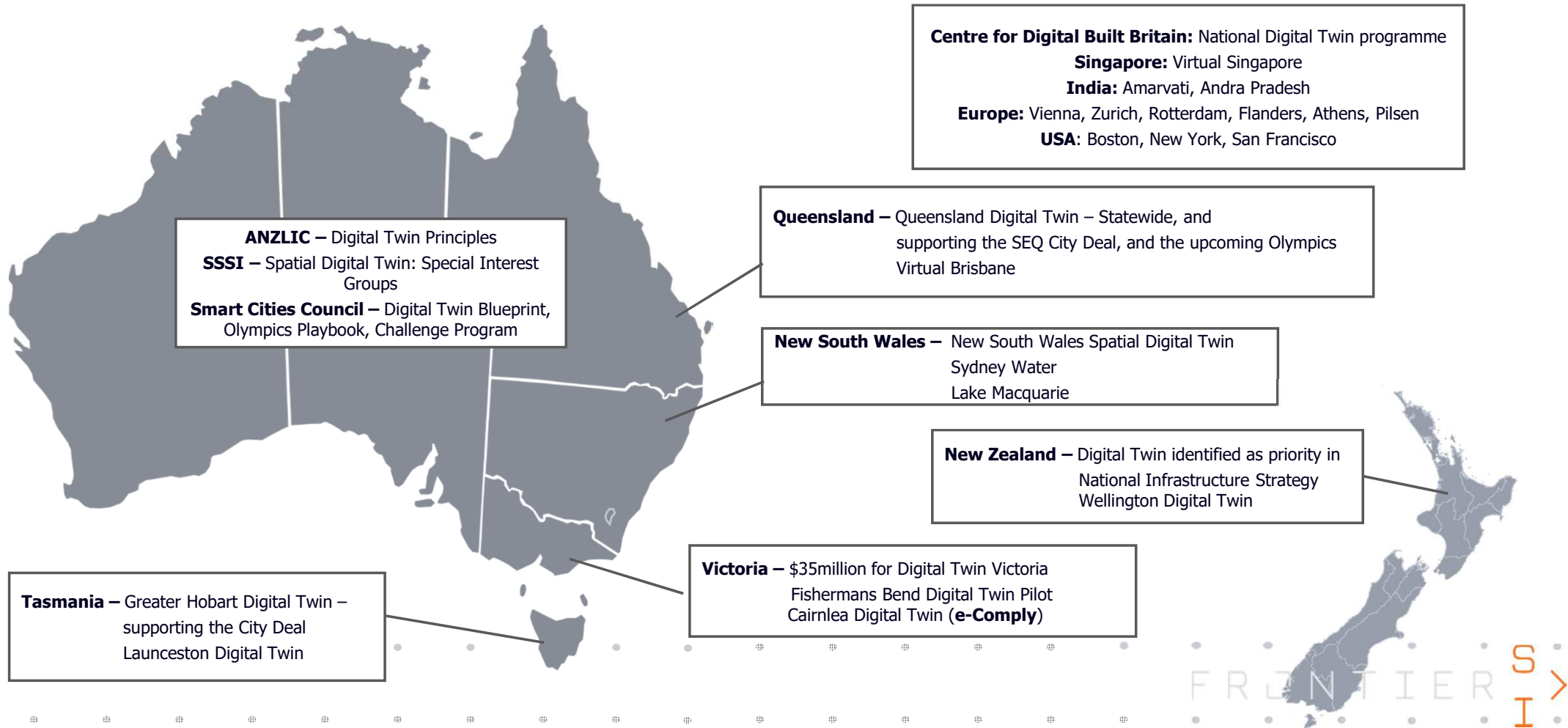




Example Digital Twin
Initiatives Across Australasia

FRONTIER
S
I >

Digital Twins – State of the Nation

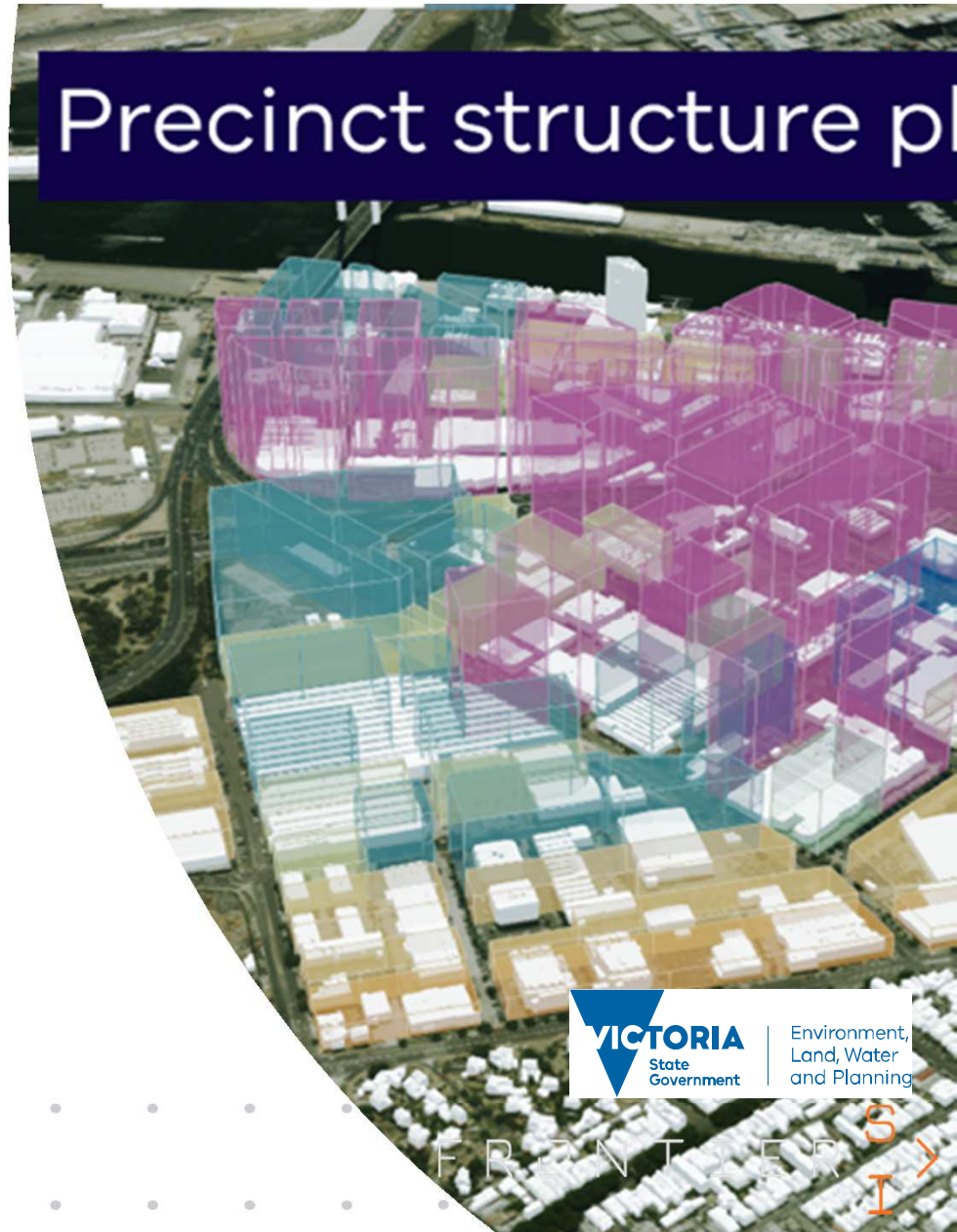


State Level Twins

Queensland, NSW and Victoria have all been pushing to establish state level digital twin programs over the last few years, with Victoria recently being awarding \$35m for their Digital Twin program.

The Victorian program is described as being set to **“revolutionise how we plan, model, and consult on the built and natural environment”**.

The business case was successful after a recent pilots that demonstrated significant process optimization, and cost savings, particularly across development / infrastructure planning, application and assessment workflows.



2032 Olympics

There are a lot of discussions around how a state level Digital Twin for Queensland will be needed to successfully plan for, prepare and build for and deliver a successful, sustainable and profitable 2032 Olympics in Brisbane.

There is no other way to enable the level of coordination, collaboration and evidence-based decision-making and planning required to plan, build and deliver such major initiatives, including:

- **Major Infrastructure**
- **Impacts & Benefits** (economic, env, social, etc.)
- **Sustainability & Resilience**
- **Operations & Security**



Digital Twin for Flood Resilience in NZ

Flood risk management and mitigation requires substantial amounts of spatial data related to infrastructure and the environment, making it challenging and expensive to develop suitable risk assessments or scenarios.

This project will develop and test a New Zealand flood resilience digital twin, comprising of water models (drinking water, wastewater and stormwater), flood mitigation and other infrastructure, high-resolution topography and land cover data, and implemented for selected urban areas.

Partners:

- University of Canterbury, LINZ, National Institute of Water and Atmospheric Research



AusEnHealth Digital Twin

The Australian Environmental Health Digital Twin is a national digital environmental health decision support platform to support adaptive planning, vulnerability assessment and decision making.

The objective of this project is to better understand how extreme weather events, urban heat sinks, air quality (i.e. bushfire smoke), and other environmental factors impact health at a local and regional level to identify vulnerable populations and predict future disease burden.

Partners

- QUT, QLD Dep. Of Resources, Curtin University, Geoscience Australia, WA Department of Health, NGIS



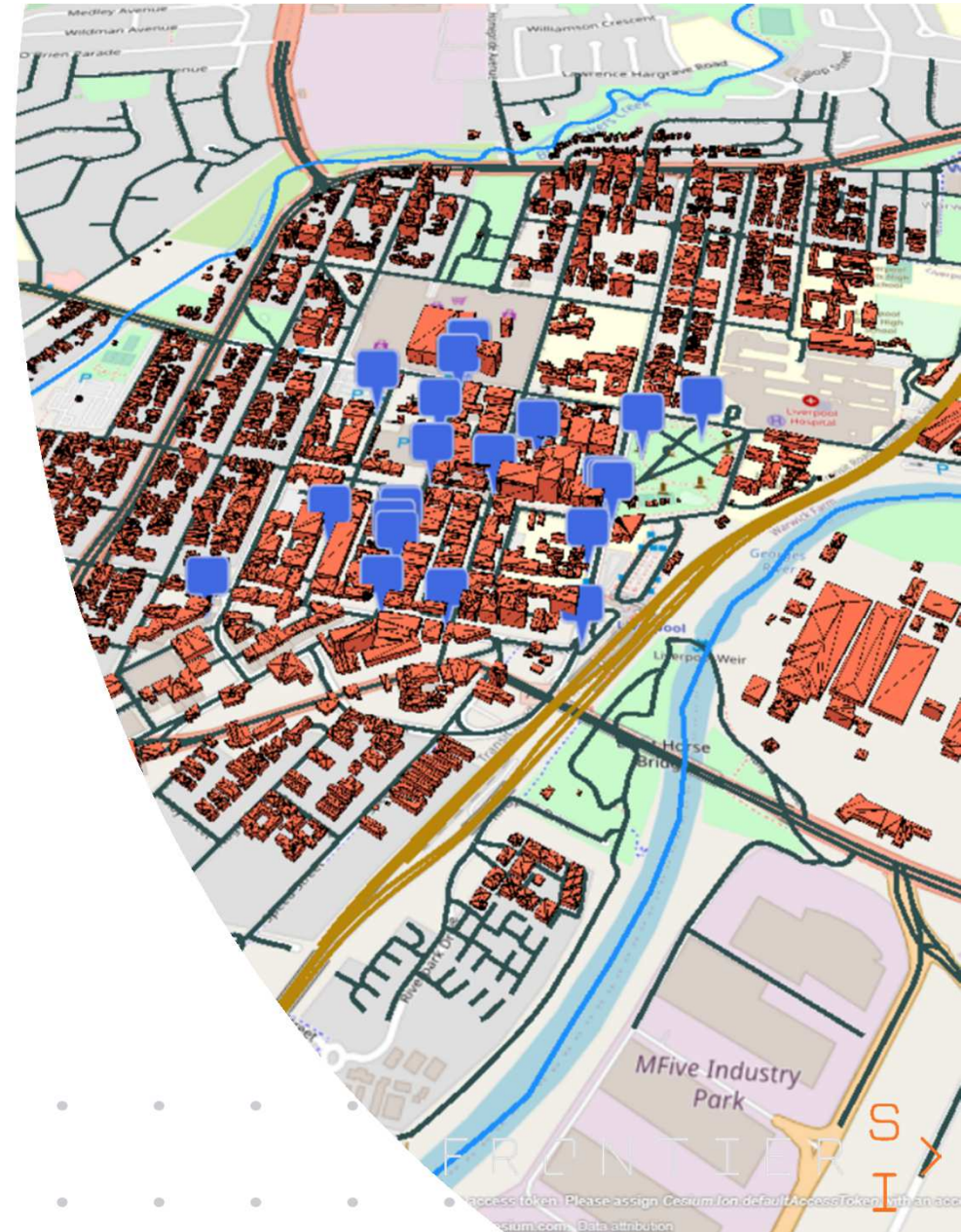
Liveable City Digital Twin Pilot

Piloting a precinct level, analytics-aided, and standards-based 3D/4D digital twin in Western Sydney (NSW) focused on urban liveability and climate adaptability use cases.

This project is piloting a digital twin illustrating and modelling how human behaviour (i.e.: movements) change as a function of a complex interaction of environmental and physical conditions.

Partners:

- UNSW, CSIRO Data 61, NSW Spatial Services, Aurin, Astrolabe, QLD Dep. Of Resources



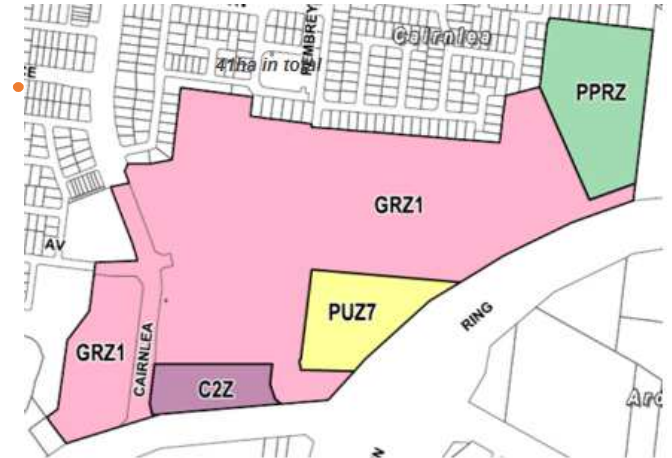
Fisherman's Bend Precinct Digital Twin



Automated 3D Building Assessments

*Known as **e-comply**, this Victorian project uses complex 3D spatial analysis to test whether planned buildings comply with the small lot housing code – the complexity is that the rules apply differently for 1 house, or groups of houses.*

Incorporating 2D and 3D data (including BIM and 3D Building Assessments) this project demonstrated the platform, operating model and usability of a system that has resulted in streamlined building assessment, application and approval timelines.



Environment,
Land, Water
and Planning

FRONTIER S I >



Key Takeaways

Lessons Learned



Data

- Digital Twins are a way to unlock data from silo's
- Data needs investment
- Security and privacy are paramount
- Digital Twins are not just about the data



Technology

- Governance & federation models are still in development
- Upskilling of the workforce is essential
- Digital Twins need to involve the private sector, as well as government and research
- Digital Twins are not just about the technology



Value Proposition

- Value proposition must be clearly defined and articulated
- Targeted at leadership – focus on the problems they are trying to solve
- Consider who is going to use it, how will they use it, and what questions they will ask
- Digital Twins are not just for the technical people



Thank you

FRONTIER
S
I >