



World Geospatial Industry Council

# Spatial Digital Twins UN-GGIM Side Event

2 August 2022

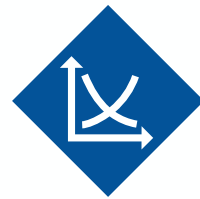
UN Headquarters, NYC

# Event Line-Up

- **Zaffar Sadiq Mohamed Ghouse – AAM, Moderator**
- **Barbara Ryan – WGIC, Report Brief**
- **Arnout Desmet – TomTom, Recommendations**
- **Paloma Merodio Gomez – Mexico & UNGGIM**
- **Eng Mohammad Alsayel – Saudi Arabia & UNGGIM**
- **Kumar Navulur – Maxar, Global Relevance**

# Moving from the Factory to the Streets

## Once the domain of the Manufacturing Environment



Advances in technology, and reduction in costs created interest, application and breadth of use cases.



2021 **USD\$13B** revenue associated with Digital Twins, with an **~\$8B** for the Geospatial Industry.



Projected to rise to **\$45B** by 2026, with **~\$25B** projected for the Geospatial Industry.

# A Private-Sector Contribution to IGIF & GKI

---

WGIC POLICY REPORT: 2022-01

## Spatial Digital Twins: Global Status, Opportunities, and the Way Forward



# WGIC – Policy Committee



**Chair: Arnout Desmet**  
TomTom



**Kumar Navulur**  
Maxar Technologies



**Jayant Sharma**  
Oracle



**Irene Benito**  
Planet



**James Vans Rens**  
RIEGL International



**Zaffar Sadiq Mohamed Ghouse**  
AAM Pty Ltd

# What is a Spatial Digital Twin?



## Definition

***Spatial Digital Twins are the virtual representation of real-world entities and processes***

- *That use positioning and dimensionality to increase the value, insight, and integrity of the virtual model, and*
- *Capable of being updated at a synchronised frequency and fidelity.*



## Attributes

***Whether implicitly or explicitly, Digital Twins include the precise location and relative dimensions of elements included in their models.***



## Benefits

***Spatial Digital Twins improve visualisation, are faster to interpret, and greatly enable socio-economic applications, insight and action***

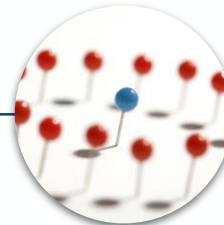
# Focus Areas for the Study



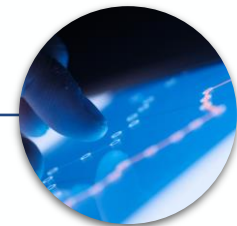
**Standardization and interoperability**



**Data sharing**

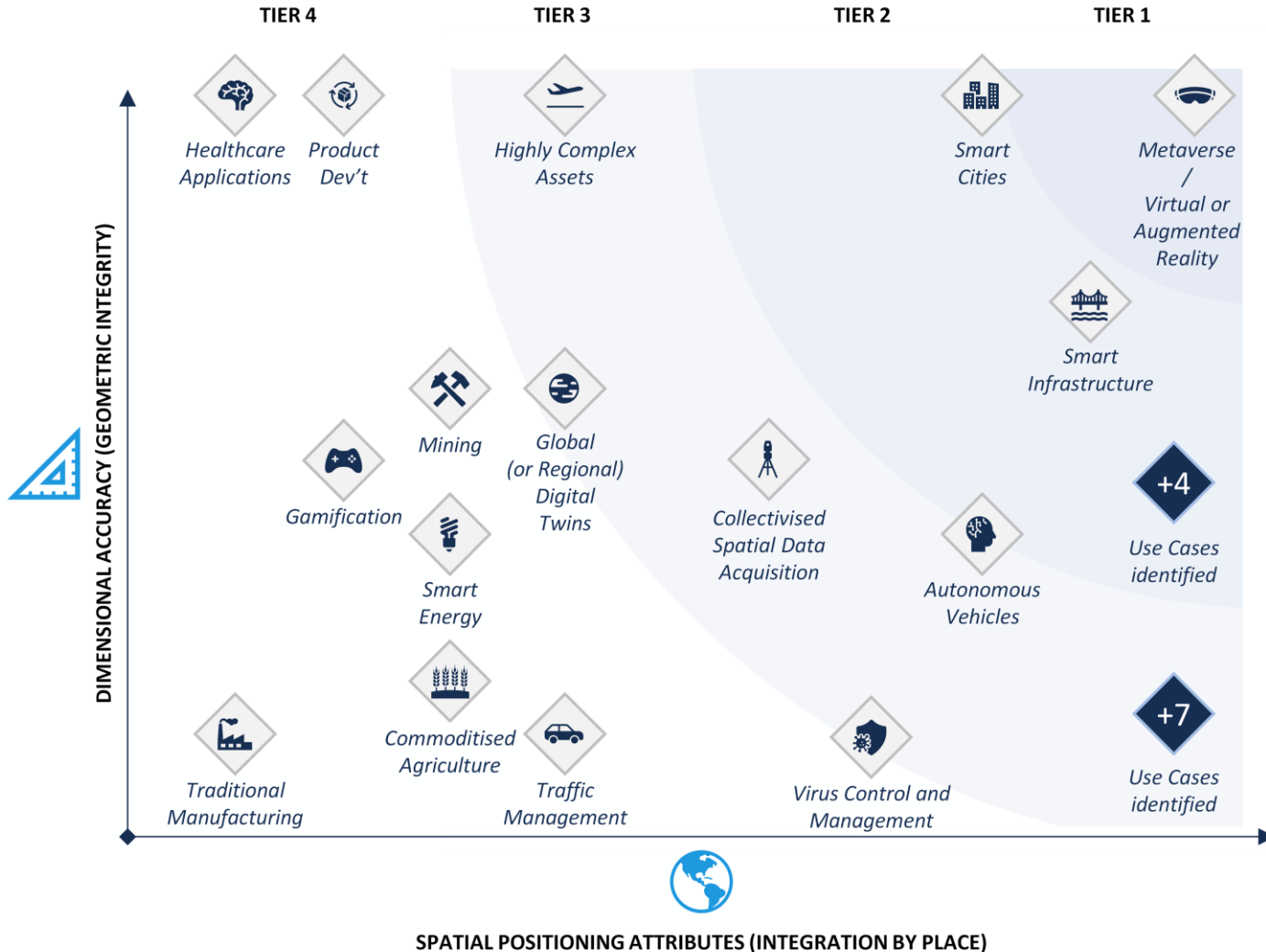


**Public-Private Partnerships (PPPs)**



**Socio-Economic Viability and Return-on-Investment**

# 27 use cases were identified and linked to various business or organizational needs



## Tier 1:

Metaverse and Virtual or Augmented Reality use-cases rely on accurate dimensions and positioning to align the digital overlay (e.g., Microsoft HoloLens or Google Glass).

## Tier 2:

Urban-based applications that have a high reliance on spatial data.

## Tiers 3 and 4:

This wide-ranging set of applications are candidates for further analysis.



# Five key areas need to be established for Spatial Digital Twins Implementation



**CURRENT STATE:** ● Not Established ● Low Alignment ● Some Alignment ● Good Alignment ● Ready

# The Importance of Spatial Data



*All advanced Digital Twin use-cases rely on spatial data  
(Spatial Digital Twins)*



*Geospatial data is fundamental to unlocking more applications  
from existing or future Digital Twin ecosystems*



*Spatial data capture & services by the geospatial industry  
enables improved visualization and modeling*

# Crossing All Scales



Micro (Site-Specific)



Hybrid or Regional (Multi-site or Municipality)



Macro (State, Region, Country or Global)

# Future Vision

Future Vision

*Digital Twins across the globe are updated in real-time, with information flows from sensors/inputs that are underpinned by spatial data, and the benefits, impacts & opportunities available to humanity are realized by aggregating these Digital Twins.*

Voxel Size  
(or Scale)

**Micro-level** for Site-Specific decision-making



**Hybrid-level** for Municipality/Regional areas



**Macro-level** data from available data sources globally.



# Arnout Desmet

Chair – Policy  
Committee, WGIC



# Policy Considerations

## Government

- More communication
- Adopt standards or endorse 'one' Policy
- Promote Open Data / Sharing
- Invest in business/test cases for Digital Twins

## Regulatory/ Standards Bodies

- Establish guidelines based on Req's and Standards
- Collaborate with Government and Industry
- Innovate in approaches to assessing existing guidelines
- Enforce standards compliance

## Industry

- Focus on communication
- Foster and enable collaboration

## Organizations

- Stay on top of what's possible
- Change Management
- Capture knowledge

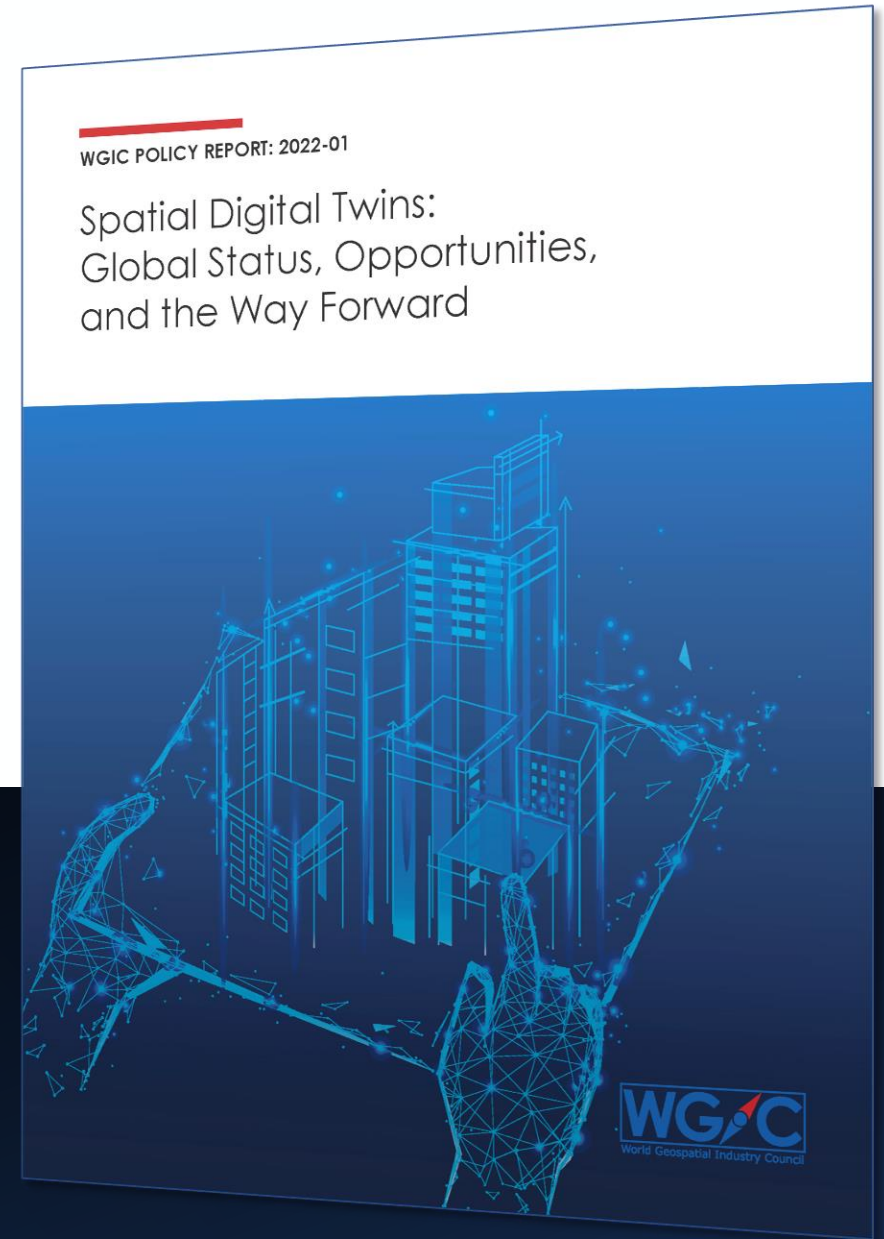
## Training Providers

- Develop Study Programs and Training
- Collaborate with industry and public sector
- Consider skills needed to support Spatial Digital Twin Use Cases

Download the report at:  
[WGICouncil.org](https://WGICouncil.org)



Supported by:



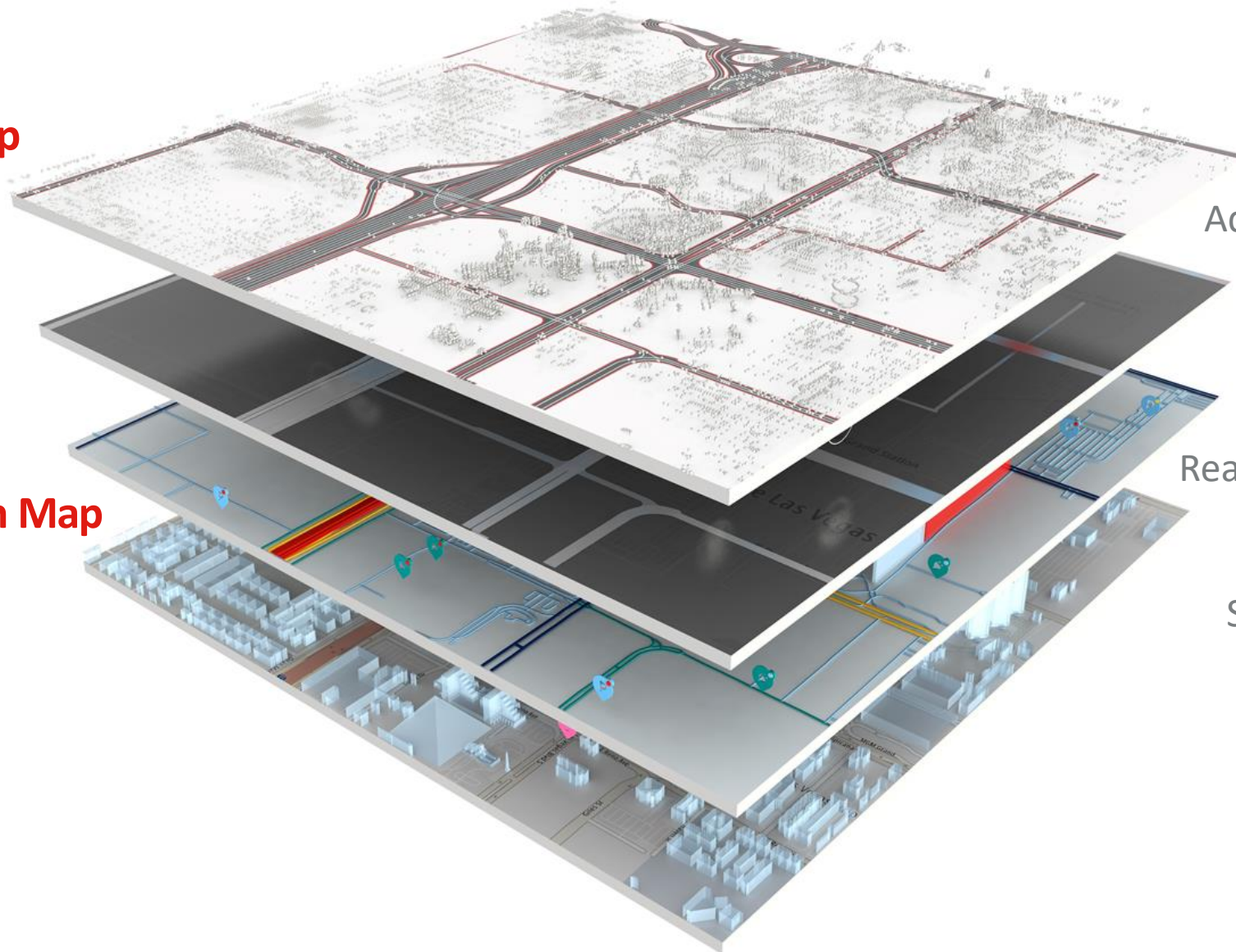
# Digital maps... spatial digital twins of the road network

**High-Definition Map**

**ADAS Map**

**Live Map**

**Standard-Definition Map**



Autonomous driving

Advanced driver assistance  
Automated driving

EV & parking services

Real-time traffic information

3D visualization  
Search POI and addresses

Navigation  
Traffic sign warning

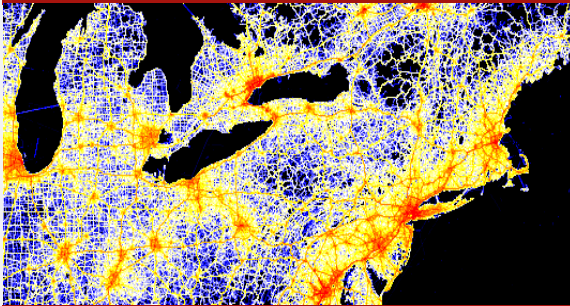
Routing  
Location display



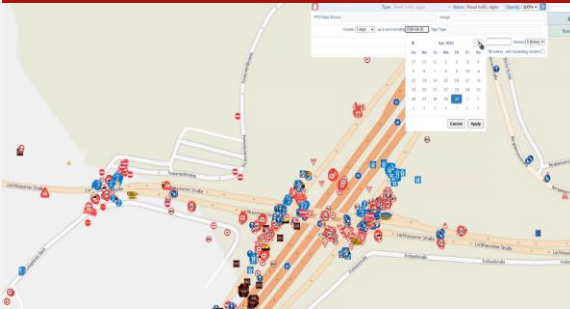
# Maintenance through smart fusion of sources

(Near-to) real-time and global change detection

GNSS trace data



Vehicle-sensor data



Active change leads



Authoritative reference sources

Satellite imagery



Terrestrial LiDAR



Gov<sup>mt</sup> & Partners



# Opportunities & Challenges

- More sensors... more data
- Power of crowdsourcing
- Data democratization
- Public-Private Partnerships
  
- Data access
- Data licensing models
- Data interoperability
- Data scientists



# Event Line-Up

- **Zaffar Sadiq Mohamed Ghouse – AAM, Moderator**
- **Barbara Ryan – WGIC, Report Brief**
- **Arnout Desmet – TomTom, Recommendations**
- **Paloma Merodio Gomez – Mexico & UNGGIM**
- **Eng Mohammad Alsayel – Saudi Arabia & UNGGIM**
- **Kumar Navulur – Maxar, Global Relevance**



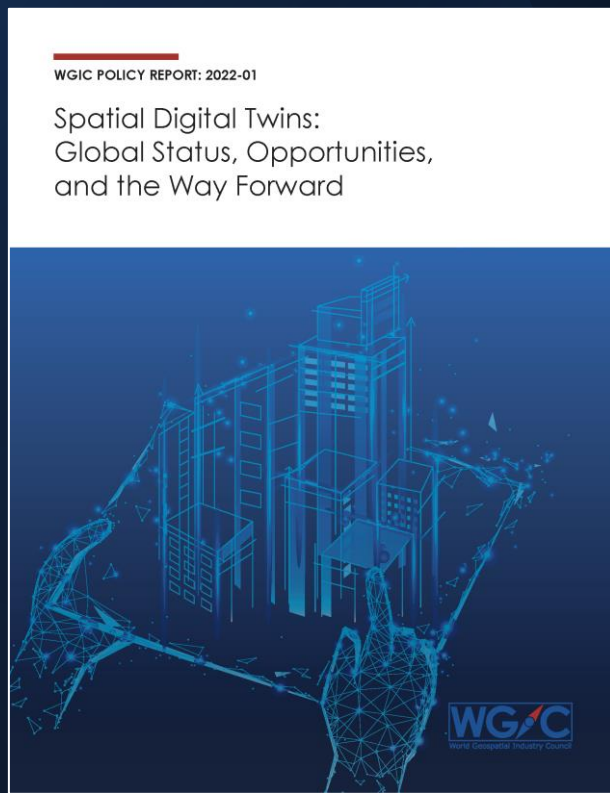
Welcome you to a Networking Reception  
immediately following the  
Spatial Digital Twin Side Event

6 PM to 8 PM | UN Visitor's Lobby

UN-GGIM Delegates & Partners are Invited

# Back-Up Slides

# Thanks to Contributors



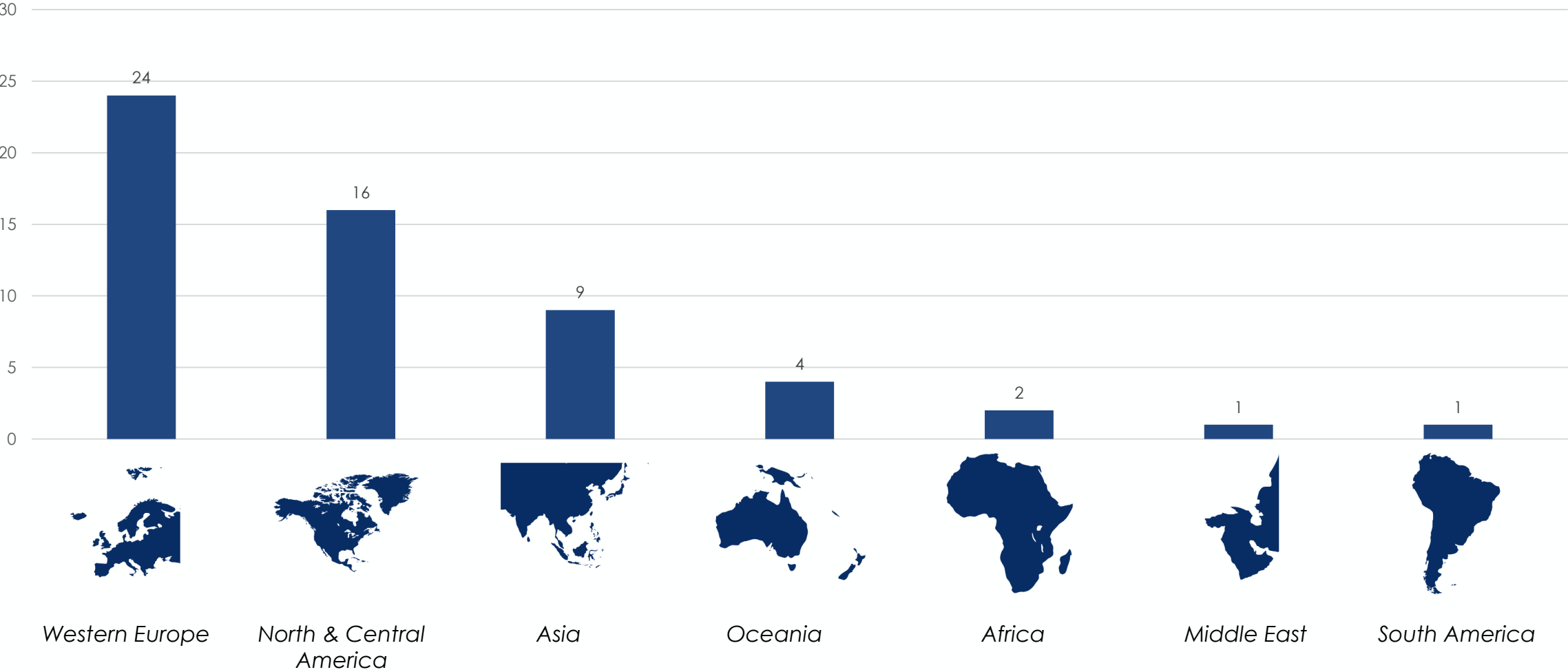
Members of the WGIC Policy Committee,  
who acted as the Steering Committee for  
this research study

Subject Matter Experts (SMEs) -- inside and  
outside WGIC

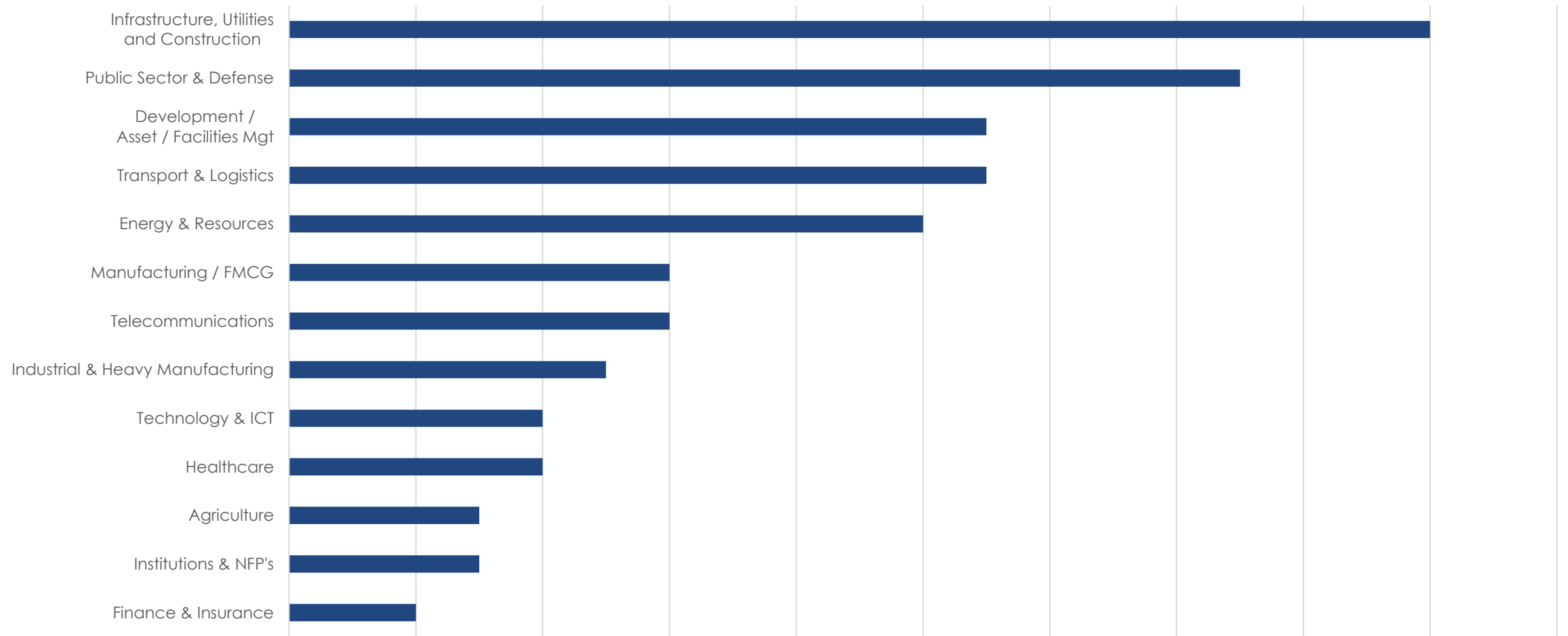
WGIC Partner Organizations

Thomas Werner and IGS, Melbourne,  
Australia

# Expert Engagement by Region

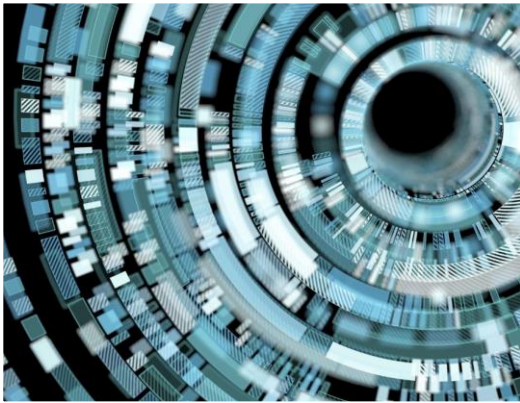


# SME Engagement





# Spatial Digital Twins – The Opportunity



*Permits modelling and visualization of the real world and its processes.*



*Holistic & dimensionally accurate representation of assets, infrastructure and systems.*



*Spatial data is key to align the digital and physical worlds.*

# Spatial Digital Twins – The Uncertainties



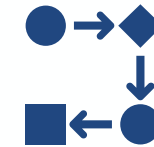
Over-use of synonymous terminology – metaverse, mirrored world, digital twin etc.



Calling 3D and 4D models Digital Twins



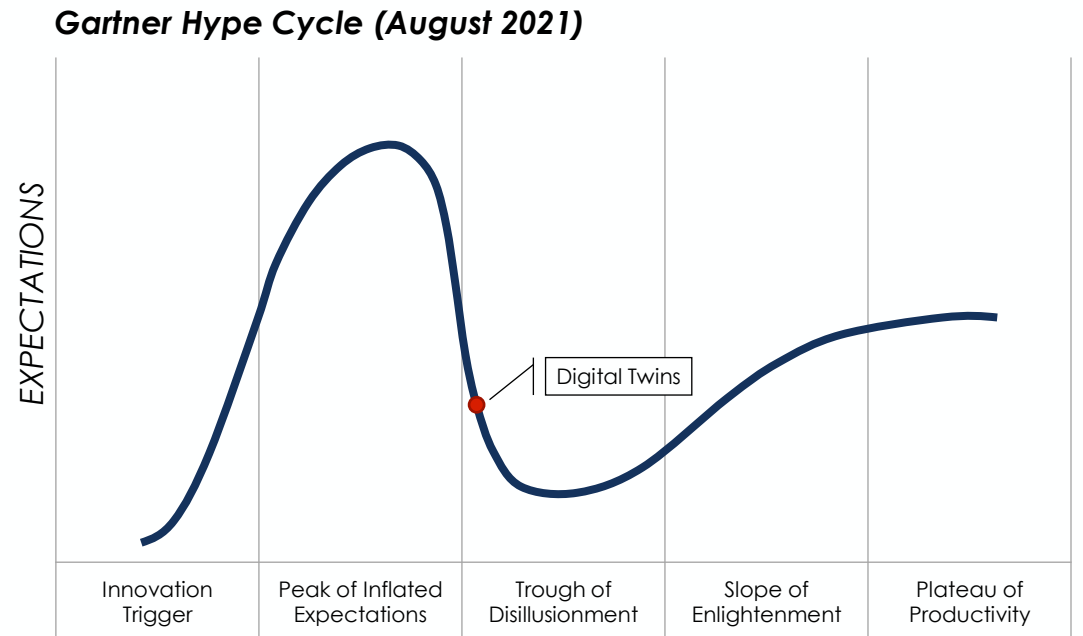
Hacking existing models or using simplified meshes for visualisations



Export and Import data instead of integrating systems

# Gartner's Hype Cycle

- The 'technological push' of Digital Twins is over
- Geospatial data will create an 'applications pull' to unlock re-applications and use cases
- More value will be derived from Digital Twins than the original inception use-cases



Source: Gartner