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

Serryn Eagleson and Lina Gonzalez (Australia)

Key words: Capacity building; Geoinformation/GI; Spatial planning; Urban renewal

SUMMARY

In the face of rapid urbanisation and increasing complexity in infrastructure planning, the integration between 3D Geographic Information Systems (GIS) and Building Information Modelling (BIM) has the potential to transform urban infrastructure design and construction. Using the following three case studies this paper explores how the integration of GIS and BIM has significantly enhanced spatial analysis, planning and decision-making processes: □□Case Study 1 Adelaide City Plan, □For Adelaide City Plan, spatial analysis and visualisation enabled assessment of the city dynamics, providing location intelligence essential for sustainable urban planning. Using tools such as ArcGIS Pro for spatial analysis and Rhino and ArcGIS Urban for scenario modelling, planners evaluated accessibility and future development opportunities, aligning strategies with population growth and equitable access for employment, education and open space.□□Case Study 2 La Trobe Street Tram Stop Upgrades in Melbourne□As part of Melbourne's tram network reform, the integration of BIM and GIS has enabled the development of a digital twin approach, centralising 3D spatial data with real-world asset information. Leveraging a web portal to visualise 2D maps and 3D scenes, the project streamlined the planning and design of tram stop upgrades while improving collaboration with stakeholders such as the Department of Transport and Planning (DTP) and Yarra Trams. This innovation optimised project tracking, coordination and delivery, supporting decision-making for high-capacity infrastructure.□□Case Study 3 Digital Twin for the Melbourne Innovation District. □The Melbourne Innovation District is located in close proximity to the Melbourne Metro stations and is set to undergo significant changes in the way pedestrians move around the district. For this project 3D GIS data has been integrated into a pedestrian simulation digital twin allowing multiple stakeholders to visualise and plan how the urban realm will accommodate the opening of the new Metro Stations. □□The results demonstrate that by combining 3D GIS and BIM within workflows we can bridge the gap between spatial analysis, detailed design, and real-time monitoring, it ensures smarter, data-driven decisions while enhancing

community engagement and stakeholder collaboration. The future potential automate alignment with United Nations Sustainable Development Goals (SDGs), specifically Goal 11: Sustainable Cities and Communities. As the digital workflows improve to support more inclusive, safe, and accessible urban environments.