



MINISTRY OF INDUSTRY  
SCIENCE, TECHNOLOGY & INNOVATION



NATIONAL INSTITUTE OF SCIENCE,  
TECHNOLOGY AND INNOVATION

# STI Focus

SCIENCE, TECHNOLOGY AND INNOVATION

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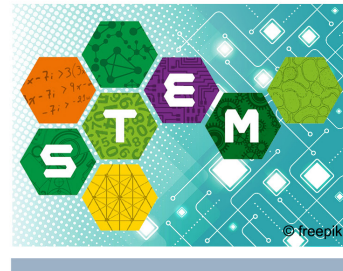


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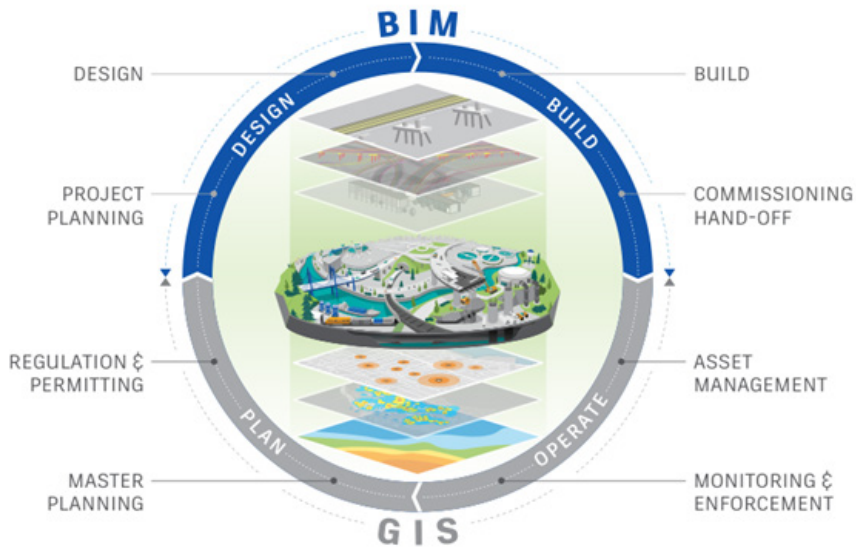


Figure 1. Integrating BIM and GIS- Data at the Center

## Highlight

- Senior Minister of MPWT, H.E Sun Chanthol, remarked at a World Economic Forum event held via video conference on June 29 under the theme “Recovery of Business Activity: Revitalizing the Regional Economy with a Sustainable Supply Chain.” Addressing world leaders at the event, he highlighted the Kingdom’s “readiness” to embrace the regional digital economy. “Cambodia has prioritized on promoting digital systems to ensure the smooth flow of goods, services, skills, capital, and data. The Kingdom needs to focus on legal and institutional cooperation to more effectively adapt to the digital revolution in trade, investment, trade facilitation, small and medium enterprises, and skills development,” he said.

- In order to achieve these above goals, H.E Sun Chanthol, has in recent years, made it a top priority that the MPWT would become one of the pioneers in not only digitizing the important data and information but also digitalizing the processes in the tactical and strategic management and administration of the transportation infrastructures, namely, roads, aviation, maritime, inland waterways, railways, public services like vehicle registration. Moreover, this all paves the way for the eventual digital transformation of the MPWT in the fast-realizing Industry 4.0 Revolution.

## 1. Transforming Infrastructure in Planning, Design, Construction, Operation & Maintenance (O&M)

Governments around the world need to invest \$57 trillion in infrastructure through 2030 to keep up with global GDP growth, according to McKinsey. That is a massive incentive for the AEC industry to improve productivity and speed up project delivery. Construction is ripe for disruption, and two of the technologies playing a central role in its transformation are Building Information Modeling (BIM) and Geographic Information Systems (GIS).

Evidence has been mounting for years that BIM-driven 3D modeling and data visualization are essential for major urban construction projects. However, before the pandemic, the World Economic Forum estimated that only around a third (PDF, p. 4) of infrastructure, and public works firms had fully integrated BIM tools into their operating models.

### • *Project Handover Process*

The GIS specialist receives raw BIM or CAD data. Then, they must update and manipulate it manually in preparation for importing it into a GIS database. The flow of information usually goes in one direction, which is not taking advantage of project data across workflows.

### • *Outdated Data*

The likelihood of human error in the manual data input process can result in the loss of critical information. Exporting data manually also makes it “outdated” in sense, since it can no longer be accessed directly by the BIM or CAD program from which it originated.

### • *Nonauthoritative System of Records*

Projects teams might incorporate GIS data that is not connected to an authoritative system of record, and so designs may be based on inaccurate and out-of-date information.

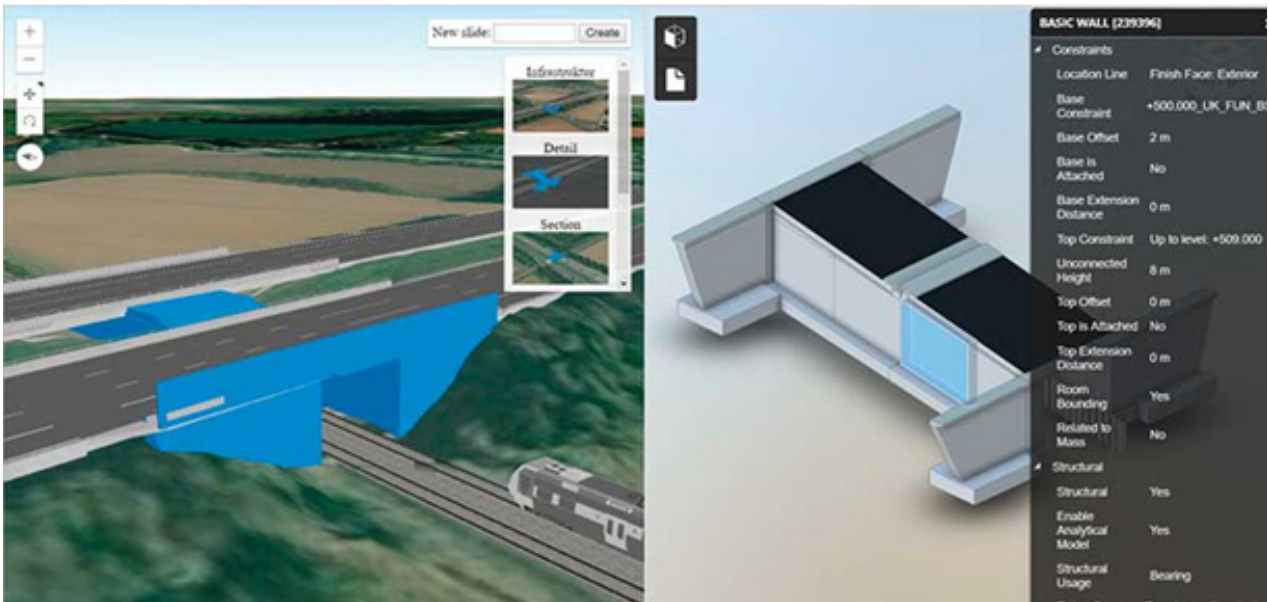


Figure 2. Esri and Autodesk are already Experimenting with Integration Options such as this Prototype Integration of the ArcGIS Online and Autodesk BIM 360 Web Viewers

The rest are missing out on better collaboration between project partners, cost and resource savings, shorter project lifecycles, improved building management and safer construction sites.

The current ways of working between BIM and GIS teams hamper our ability to meet global trends.

These processes are prone to not just inefficiencies but also critical data loss, leading to increased risks. The BIM data formats used by key government departments are a patchwork with disparate objects holding back interoperability and collaboration. These inefficient ways of working are key drivers to help integrate BIM and GIS data and technologies.

## 2. A New Approach: Data at the Center

MPWT is working to promote and advance BIM and GIS for Infrastructure as a digital conduit of information between the design, construction, and O/M of an infrastructure asset. Increased access to and better integration of geospatially located data will increase the team productivity and efficiency of project delivery.

## 3. Current Tools and Technology for Integration of GIS and BIM

Esri's work with Autodesk will include transforming the project life cycle, providing the continuous context of the site and the environment around BIM projects, and detecting site change. In addition, improvements are planned for the overall process of designing and visualizing the real world in 3D and building technologies to help optimize infrastructure operation. Ultimately, Esri's work will encourage the use of its open platforms for innovation and sharing.

Esri has made progress in providing an open platform for the data flow. Its significant contributions to 3D technology and standards should drive innovation associated with BIM-GIS integration and, more broadly, GIS. After several years of research and development, Esri released Indexed 3D Scene Layers (I3S), under Creative Commons licensing as an open specification in April 2015. An Open Geospatial Consortium, Inc. (OGC) Community Standard, I3S enables the distribution of large 3D datasets over the Internet and on local devices.

Bentley Systems Incorporated can create I3S data with its product ContextCapture, and users can publish and access the data in ArcGIS Online through Esri's open ArcGIS REST API (GeoService REST). Esri is looking forward to further collaboration with Autodesk, Bentley, and other industry leaders to help simplify workflows and improve outcomes for the GIS users.

## 4. Conclusion

1. MPWT is on its way to establish the national transportation infrastructure policy and strategic plan for the short and long-term vision keyed on the digital transformation in response to the 4th Industrial Revolution national strategic road map (national policy) 2022-2025 and long-term vision 2035 on "Planning/ Programming, Design, Construction, O&M, Retirement/ Decommissioning of transportation infrastructure systems to respond to the Fourth Industrial Revolution."

2. This policy and strategic plan will be in alignment with the missions and objectives outlined in the "Cambodia Digital Economy and Society Policy Framework 2021-2035" and "Cambodia Digital Government Policy 2022-2035," and they will be based on BIM GIS and adopting Open Technologies to ensure a digital ecosystem that is strong and resilient to various crises and timely response to the fast-moving development of digital technology.

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