# Geospatial Tools that Help Serve the AEC Industry

Read about three geospatial tools that are particularly relevant for the architecture, engineering and construction (AEC) industry: BIM, virtual/augmented/mixed reality, and project collaboration software.

Of the dozens of geospatial hardware and software tools currently in use, only a few – such as bathymetric Lidar, GNSS-based vehicle tracking devices and ground-penetrating radar (GPR) – are not directly relevant to the architecture, engineering and construction (AEC) industry. The rest of the tools are. A GIS interprets the geographic context of a project, while the survey-grade GNSS technology builds it; aerial photogrammetry maps the project's site, as UAVs monitor exterior progress; and mobile indoor scanners such as the Trimble Indoor Mobile Mapping Solution (TIMMS) produce as-built point clouds of the interiors, while building information modelling (BIM) manages the project's full life cycle. In fact, even GPR is relevant, to identify pre-existing underground infrastructure on the construction site. This article focuses on three geospatial tools for the AEC industry: BIM, virtual/augmented/mixed reality, and project collaboration software.
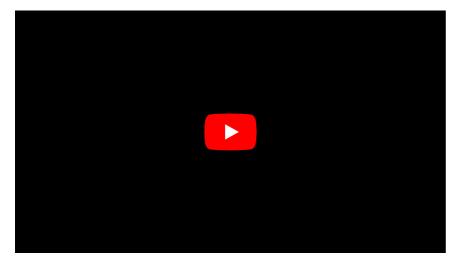
## Building Information Modelling (BIM)

BIM is an intelligent, collaborative process where a 3D model is used to design and analyze building systems quickly and efficiently, reduce cost, and collect and manage building or structure data. It has already yielded measurable gains for early adopters and is widely becoming an industry staple; in some countries, it is already mandatory for public works and for large private ones. Throughout the life of a project, BIM enables team members, owners, and stakeholders to view and mark up the model. In the planning, conceptual, and engineering and design phases of a project, BIM helps planners, architects, and engineers compare design options and select a suitable site. During construction, BIM helps contractors identify structural conflicts. When construction is complete and the building or facility is commissioned, the owners and managers receive not only the physical structure but also its "digital twin," which they can use to: monitor and plan maintenance of the entire infrastructure, model improvements and modifications, manage space use, and optimize energy consumption. For more information, see the Trimble's Constructible Process, or the TIMMS.

## Virtual, Augmented or Mixed Reality

Virtual reality (VR) headsets are mostly used to display 3D representations of models and scenes – such as sharing proposed designs with stakeholders and team members. Augmented reality (AR) headsets go well beyond simple visualization, overlaying BIM models on the existing physical reality, whether live or recorded, and permitting quick access to information about existing features. They also facilitate the comparison of design alternatives, assist in construction and inspection, and enable users to view the aforementioned digital twins for operations and asset management purposes.

Mixed reality (XR) goes even further, enabling users to interact with this immersive environment. The Trimble XR10 headset, a version of Microsoft's HoloLens 2, fits on a hardhat and is designed for industrial and construction environments. Users can see the real world through the visor, then manipulate virtual or augmented elements that are projected holographically over the view.

# Project Collaboration Software

Project collaboration software for the construction industry allows project stakeholders to seamlessly exchange data between their different software and hardware solutions, making project information transparent, traceable, and accessible. Assets such as documents, drawings, and 3D models are made available in desktop, Web, and mobile environments. A dashboard gives users access to projects that they created, as well as those to which they have been invited to participate. They can organize the data by project stage, such as "in progress," "for review," "for construction," and "as built," and access the latest project information anytime, anywhere, and on any device. A great example of such software is [Trimble Connect](https://www.gim-international.com/content/news/geospatial-tools-that-help-serve-the-aec-industry).

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