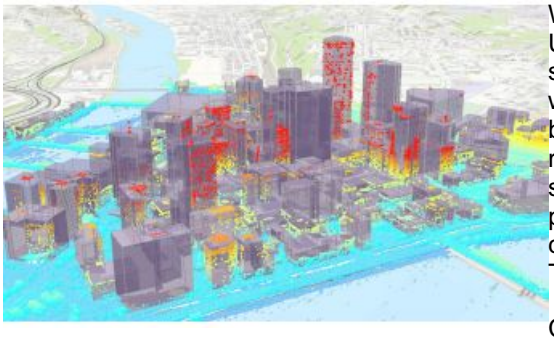
3D DATA VISUALIZATION FOR URBAN DESIGN AND PLANNING

Planning Information for the Public Falls Short of Reality



Working with Pittsburgh's City Planning Department, a Carnegie Mellon University research team completed an in-depth study of the current use of 3D software for planning tasks and public communication.[1] The team started with several assumptions: the public has difficulty understanding most site and building plans and other types of visual material but does understand artist renderings; most architectural and planning firms use 3D visual programmes such as Geospatial and Building Information Modelling (BIM) software; and city planning departments that communicate with the public know how to communicate their visual documents in ways that citizens understand them. These assumptions were however wrong.

Citizens expect design communication to accurately depict proposed projects and changes to the built environment. Generally, the public does not connect with abstraction and simple models, nor understand the vocabulary used by the design and planning professions. The general public often takes the word of professionals, believing that their communication tools are understood by public officials and in their best interest. But, as evidence-based information is becoming more common, the public is beginning to question what is being presented to them. The real estate industry understands this very well and uses augmented reality (AR) to 'walk through' buildings and homes for sale using sophisticated animation to sell their products. Why are the planning and design professionals not doing the same? It turns out that there are a number of reasons.

City planning departments across the US report using ArcGIS and are beginning to use ArcGIS Pro. 2D plans, diagrams and axonometric views based on plan projection, sometimes combined with photographs, dominate the visual material. There is some experimentation with CAD 3D for city models, BIM and phone-based AR, but no virtual reality (VR). Most planning departments do not have the budgets to purchase 3D software, the computing and equipment to run it, or the staff who knows how to use it. Software developers cite the small city planning market compared to the larger design industries as the reason for planning software to be the last to be developed.

Architectural, landscape and urban design firms use BIM and rendering software; however, very few are exploring AR and VR. Some university-level design and planning programmes are beginning to explore 3D visualization in graduate studies but very few are doing so in undergraduate programmes. Notable is the vital use of 3D software in medical, gaming, computer science and some engineering curricula.

Higher cost gaming computers with large quantities of RAM and high-end graphics cards are required to perform VR and data-intensive illustration tasks. Additionally, BIM software is not compatible with location-based geospatial software, a situation long recognized by geospatial experts but not necessarily by architects and designers. Each of these model differently. BIM models in abstract Cartesian space based on points located on the x, y and z axes, while the geospatial platform uses the GIS coordinates of latitude, longitude and altitude. While there are bridging programmes that can link them, these require professionals with coding expertise.

One challenge is creating reality using modelling software. Research with outdoor lighting and visual perception revealed that we do not see in the same way that we model.[2] Modelling software does not make the distinctions that the eye does: depth of field is illustrated by perspectival size with little distinction in line weight. Creating realistic foregrounds and midgrounds is very difficult and time consuming, a task typically overcome by detailing a few foreground objects to suggest a realistic setting. The public interprets renderings, 3D models and even 3D animation as intended reality or merely eyewash, knowing the end result will be quite different and often disappointing.

The recent development of 3D software that combines locational and spatial modelling shows promise and, when combined with robust realistic-appearing libraries of objects and features, will go a long way toward reaching a level of visualization that is

publicly acceptable. We also look forward to visualization software that creates views and VR that ‘sees’ with human-oriented optics.

Today’s 2D and abstract visualization environment is so embedded in the design and planning industries that it is structural. The public, though, is becoming more data aware and we can expect the demand for understandable and realistic design information to become more pronounced. This is good time to start thinking differently.

[1] https://kilthub.cmu.edu/articles/3D_Data_Visualization_for_Urban_Design_and_Planning/8021123. Over 300 contacts were made with planning departments, universities, design professionals and software developers.

[2] Quick, S. et al., May 2016. “LED Street Light Research Project, Part II: New Findings.” Remaking Cities Institute, School of Architecture, Carnegie Mellon University.

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https://www.gim-international.com/content/article/planning-information-for-the-public-falls-short-of-reality