

Vision 2021 – Greg Schleusner

Project Creation

- Open a webpage and locate the project location via on map
- Overlay various jurisdictional information on the site, taking note of a discrepancy
- Outline the proposed building shape on the site.
- Submit a intent to build permit by adding a bit more information to the submission via an online form while simultaneously alerting the site/civil engineer of the bust in the gis data that they should coordinate with the jurisdiction
- Submit and save the project

INFORMATION GENERATION

Once the project is created and located on the project site various types of analysis take place automatically and are delivered to the entire project team via links to a central data source. Including;

- Climate Study
- Code Summary
- Similar Buildings of the same type near the new site
- Urban Scale opportunities for district type energy use and production
- Carbon Tax rates and incentives based on this sites jurisdictions
- Etc.

Design Initiation

As the team begins working on the project numerous technologies are brought to bare to both enable many tools and workflows but also continuous refinement.

- Design applications connect to web services to collect information already entered about the project but also dynamically bring together more data about the site and building context
 - Surrounding buildings and site context dynamically delivered based on the level of detail needed for the various design tasks
 - Existing Site infrastructure geometry along with capacities and other important design data
 - Higher resolution weather information from remote sensing, micro drones, and existing anonymous buildings that build a complete micro climate of the building site

- As designs develop team begin working in various tools. Some of them classic bim tools other that have become bim enable do to heuristic analysis capabilities of modeling technologies. These tools share a central core enable by;
 - Database to database connected design data stores
 - Data services that feed design criteria to all the modeling applications
 - Specifications
 - Building Program
 - Coding Systems
 - Client Data standards and requirements
 - Code restrictions and constraints
 - Cost information
- On a nightly bases as team members go home for the evening the servers hosting the designs begin severing the models to both industry standard model checking tools but also to custom solvers based on firm specific IP. All rules and algorithms are built using an open analysis framework that is built from atomic level modules. This combination of analysis and AI develop multiple new solutions to various design challenges that are stored along side the current and all previous versions of the design. These could include;
 - Code Review
 - Energy Performance
 - Multi-Parameter optimization of thermal, structural, and envelope...
 - Space Layout
 - System Connectivity
 - Circulation
 - Maintenance
 - Clash Detection
 - Etc.

Design Development

Each morning the various members of the design are presented with a serious of optimized options that they review and score based on their various qualities. The scored designs form the basis of physical and virtual meetings during which teams tweak and massage the properties of the design while getting near real time feedback on a multitude of parameters. The design information is both viewed and delivered in various forms on various devised from the same data sources. This allows someone to illustrate the same data as;

- Charts and graphs and diagrams
- Reports
- Specifications
- Drawings
- Renderings
- Sequenced animations

- Illustrative interactive presentations
- Thematically colored and scaled models
- Etc.

Presentation devices include screens in all sizes and shapes, augmented overlays on rapid prototypes. New interfaces that include other senses are just becoming common including targeted audio, video and haptic devices that allow the delivery of materiality to remote participants.

As the design takes its final shape all the interactions between team members that have taken place on the design platforms integrated communication system is analyzed for unfulfilled requirements and patterns for the next project.

Virtual Assembly

As components of the design become fixed they are released to vendors via the design platform. Based on the level of project security vendors are provided just enough information via the models for them to submit engineered versions of each building system. For simple building components information is delivered back to the owner, contractor and designers including complete bids.

More complex and integrated building component suppliers request access to more design data so they can use their proprietary IP, algorithms and optimization routines to suggest suites of solutions based on their products. These could include;

- Façade and HVAC
- Lighting and Façade
- Structure and HVAC
- ETC...

All of these competing solutions are again delivered to the team alongside the design allow them to pick and choose solutions that result in the best building for their needs. As they make selections these components and systems populate and replace the design models with accurate engineered and fabrication information.

Assembly

As the engineered building components arrive on site and are assembled the role of the design team is still to monitor progress, but this occurs using new technologies that require limited onsite interaction. On a daily basis small robots or soft body drones autonomously traverse the building site scanning RFID tags, producing point clouds, generating thermal imagery and heaps of other information. If any of the

information is outside of the project tolerances the contractor is alerted with a “request for inspection” by which they address the issue.

Operate

Because the project has been connected and analyzed from beginning to end the operational phase for most buildings has become much more efficient. The AI and analysis engines that “solved” the building are the same ones that now analyze the real building doing route cause analysis of system failures and dramatically limiting the ability for buildings to fall out of optimal.

As buildings became more quantifiable they became much more important assets to both businesses and financial markets. The ability to instantly understand the total cost of replacement has enabled new markets to develop that are based on the newly quantifiable risk that a building represents. This in turn leads to more investment and returns for the building market as a whole.