VR in Engineering, Architecture, and Construction

By Rune Vandli

Over the last few years, Virtual Reality (VR) has moved from a gimmick to a valuable tool in the construction industry. Studies show that a large and unnecessary part of a construction budget is typically allocated towards fixing mistakes made during planning and execution or correcting bad solutions after work is completed. The root cause of this is a lack of clear communication among stakeholders. The cost of fixing completed work becomes more expensive late in the project. Too often, it results in either high costs or sub-optimal solutions for the end-user. A large percentage of these issues can be prevented with clear and understandable communication early in the project.

Building Information Modelling, BIM, has been increasing communication and collaboration in design for years. The problem is that BIM has been primarily available to design professionals. In fact, the Connected Construction survey by Autodesk showed that leaders and decision-makers in the owner, developer, and end-user roles are least likely to use digital tools and BIM for making decisions.

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Virtual Reality

VR is a tool available to communicate BIM clearly to everyone involved in the project and make sure they fully understand the challenges the project is facing. This makes it a large part of the solution for communication between BIM experts and inexperienced stakeholders and decision makers. VR is the tool to democratize BIM for everyone, not just design professionals and specialists.

The Value of VR

Everyone involved in the project has different potential benefits that can be extracted through VR implementation.

Reduced Decision-Making Time

Using VR gives decision-makers a 1:1 scale experience of the project and proposed solution. This gives them the full context and enables them to understand the challenges and proposed solutions with additional clarity. For example, critical areas may need testing to find the optimal solution; bring the team into those areas virtually to show and discuss multiple solutions.

Data gathered from major nursing-home and hospital projects show that VR achieves a 90% reduced decision-making time.

Test Groups and End-User Satisfaction

Building owners and end-users experience increased satisfaction through being able to follow the process earlier, closer, and more frequently in a way they can fully understand. VR clearly communicates the proposed solutions and requires no prior knowledge of BIM or floor plans to participate.

Bringing advisors and test groups, such as wheelchair users, into the design review makes accessibility an integral part of the design and not an afterthought. Simply complying with accessibility regulations does not necessarily mean the solution is the most practical.

In the healthcare industry, doctors and nurses can review treatment and operation rooms to ensure that the size and equipment layouts are functional and that sightlines from the outside are acceptable.

Life safety engineers and construction safety managers can review a virtual building to plan for scaffolding, tie-offs, and access.

Reduced Travel

VR has the benefit of being 100% remote, making it easy for geographically spread teams. During pandemics and lock-downs, VR is a communication enabler. A recent PricewaterhouseCoopers UK study showed that, on average, 60% of meetings could be digital, reducing the time and cost spent on the road. This time can be used productively and bring added value to the project. Communication can also be enabled between contractors in the field and the office's design professionals and decision makers. As a result, the carbon footprint is reduced accordingly.

Critical Success Factors

As with any new technology or process, a handful of factors determine success or failure. VR is no different. Implementation should include:

- Define clear, narrow, and measurable goals for what to achieve by using VR.
- Anchor these goals within the leadership of the organization and the project team.
- Establish a process required to reach these goals. VR providers are eager to help you do this, so take advantage.
- Commit the time and resources required to reach the goals.
- Tracking is key! Track the successes closely, evaluate the findings, and adjust along the way.
- Industrialize – Document the successes and processes to repeat them in current and future projects.∎

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