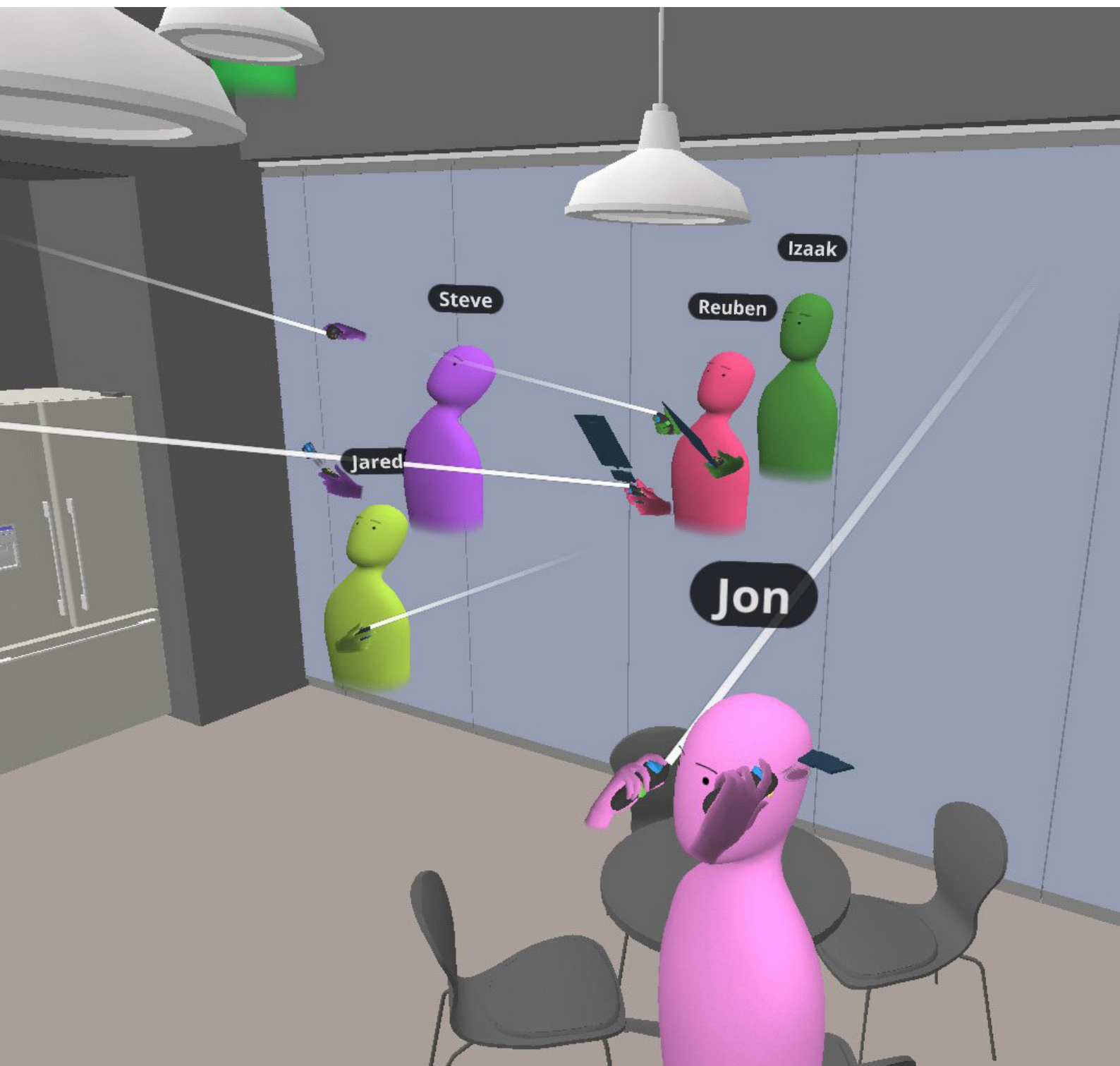




Preventing RFIs and Late Stage Design Changes with VR Coordination

USDA-ARS Laboratory Modernization Project | Case Study



Using InsiteVR, Merrick & Company hosted virtual reality meetings to improve communication among internal discipline leads, prevent RFIs and design changes during construction, and identify issues in their lab model. Team members from 4 different offices were able to meet in virtual reality to review the BIM 360 hosted Revit model at full scale.

EXECUTIVE SUMMARY

Project

Merrick project manager, Jon Delay, wanted to use InsiteVR meetings to gain an understanding of how VR could benefit the planning, programming, and design of the USDA-ARS modernization project at the Knipling-Bushland U.S. Livestock Insects Research Laboratory.

Issues Identified
/ hr in VR

23.6

AVERAGE

Timeline

Three 1-hour VR meetings leading up to the 75% submission.

Potential RFIs identified
/ hr in VR

9

AVERAGE

Participants

Project Manager, Architectural Lab Planner, Architect, Structural Engineer, Mechanical Engineer, Electrical Engineer, Plumbing Engineer, BIM Coordinator, IT Services Director

Key Benefits of InsiteVR Meetings

- *Discovered and resolved potential RFIs and change orders that would have been difficult to find using traditional plan views.*
- *Helped prevent design “surprises” via thorough review of end user spaces at full scale.*
- *Improved communication and coordination between disciplines by allowing them to easily review issues together.*
- *Improved the QA/QC process by allowing the team to find more than they would via traditional clash detection.*

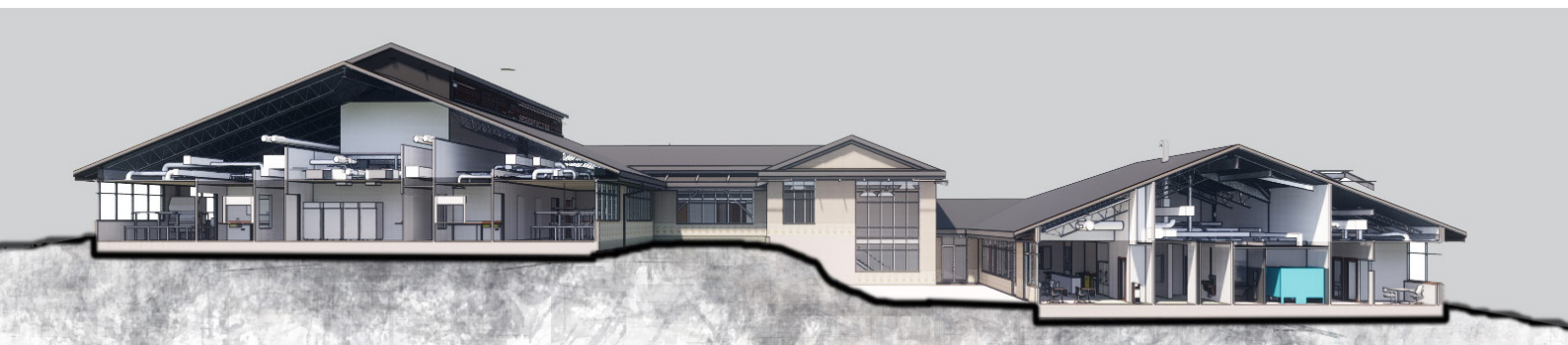




Fig. 1: The Merrick team using Oculus Quests to explore a BIM 360 model together in VR.

FASTER ISSUE RESOLUTION

“One of the main challenges for a Project Architect is to coordinate all of the building pieces/systems and manage adjustments and solutions. VR provides an open forum to expose issues with a group and to interact together to understand and resolve them. This is much faster than conventional explain-respond-verify processes.”

STEPHEN HELGREN, **ARCHITECTURAL LAB PLANNER**, MERRICK

IMPLEMENTATION

Remote Multi-user VR Meetings with InsiteVR

The Merrick team used InsiteVR to host VR review meetings between different members of the project. Participants were not all in the same office and joined the virtual meeting from 4 different locations:

1. Merrick Denver, CO Office
2. Merrick Merritt Island, FL Office
3. Merrick St. Louis, MO Project Office
4. Merrick San Antonio, TX Office

The team jumped into VR towards the end of their regularly scheduled skype coordination meeting. Fernando De Luna, Associate Architect, hosted the VR meeting from his Oculus Quest and all participants easily joined from their own Oculus Quest using a 6 digit meeting ID.

The VR meetings did not replace any traditional meetings, but formed a valuable addition to the existing process.

Easy VR Setup with Oculus Quest

The team used 6 Oculus Quests to host the VR meetings.

From a designer familiar with VR to a senior engineer new to VR, the Oculus Quest allowed everyone to join VR meetings in **less than 2 minutes** without any complex set up.

BIM 360 to VR in Seconds

Using the InsiteVR for BIM 360 integration, Revit models were directly pulled from BIM 360 docs into multi-user VR meetings. This allowed the Merrick team to confidently host VR meetings in the latest published version of the Revit model without the need for any model prep or game engine conversions.

Training

Before using InsiteVR for review meetings the team underwent a hands on training session with InsiteVR. This training was critical to make sure everyone was comfortable with the hardware and the software.

During the training the team learned to use speech-to-text, sketching, measuring, and screenshot tools which were critical to documenting issues while in VR.

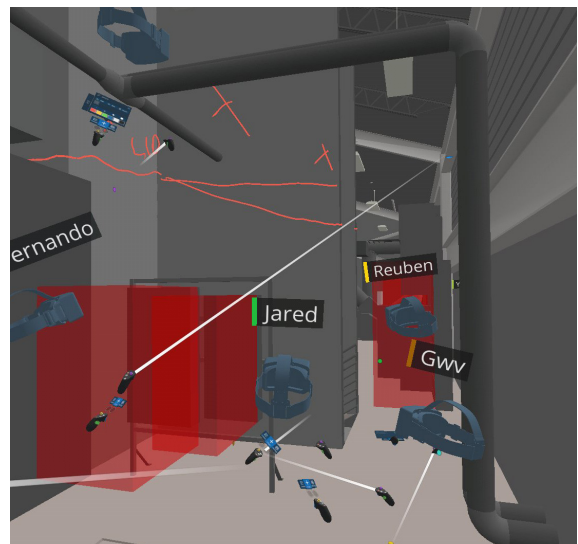


Fig. 2: The team addressing missing wall components.



Fig. 3: The team notices and discusses structural elements in the windows of a lab eating area.

PREVENTING LATE STAGE CHANGES

“The ‘Anti Surprise Act’ is what we’re after so a client is not walking through a building that’s nearly complete and they’re wondering why there’s a diagonal brace going through the windows. If we can use VR to point that out during the design phase that’s a key benefit.”

RFIs often times have no warning they’re coming and you might be in the middle of another project deadline. If we can use VR to avoid RFIs it helps improve the overall workflow of the entire Merrick organization.

JON DELAY, PROJECT MANAGER, MERRICK

RESULTS

Merrick used InsiteVR to review their Revit models as they prepared the 75% submission. In just three 1-hour VR meetings, the team **identified 71 issues ranging from potential RFIs to modeling errors to simple clashes.**

According to a study published by Navigant Construction Forum, the average RFI costs \$1,080 and takes about 8 hours to review¹. When RFIs are issued, project staff may be on new projects and addressing the RFI eats into productivity and design time for other projects.

With InsiteVR, the team was able to address issues in the model that might not have been caught by traditional clash detection with Navisworks. These issues can make their way into the construction documents and come back as RFI's or even worse change orders. **For every 1 hour in VR the team identified an average of 7 potential RFI's, which is the equivalent of over \$7,000 in response cost and 56 hours in response time.**

As a multidisciplinary AE firm, Merrick was able to take advantage of VR meetings to streamline communication between 4 office locations and multiple disciplines. Issues could be easily explained and everyone's expertise was used to solve them on the spot. InsiteVR enhanced the QA/QC process to help the team produce **higher quality BIM which in turns leads to better construction documents.**

Half of the project team had not used VR prior to the proof of concept. Despite committing to 4 hours of VR meetings and having to learn new technology, the project manager felt that **the use of VR was not disruptive to meeting critical deadlines.**

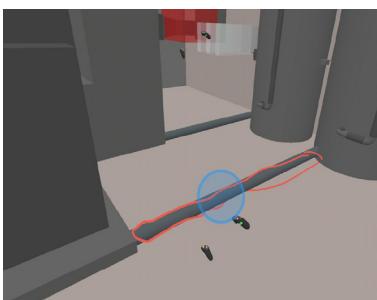
In a post proof of concept survey 100% of the respondents said they thought the VR meetings helped them **communicate better with each other** about necessary changes or conflicts. Additionally, 100% of respondents said they would recommend VR review meetings to other projects and colleagues.

¹ Hughes et al, Impact & Control of RFIs on Construction Projects, Navigant Construction Forum, 2013



PREVENTING LATE STAGE DESIGN CHANGES

With InsiteVR, the team was able to analyze lab space design more closely from an end-user perspective. By walking through the model at full scale the team was able to identify and address several elements that the client might have asked to change once construction started.



IDENTIFYING "NON CLASH" ISSUES

Using InsiteVR to inspect the model allowed the team to find issues that might have slipped through automated clash detection. Examples include trip hazards (pictured to the left), missing handrails, and elements blocking doorways or hallways.

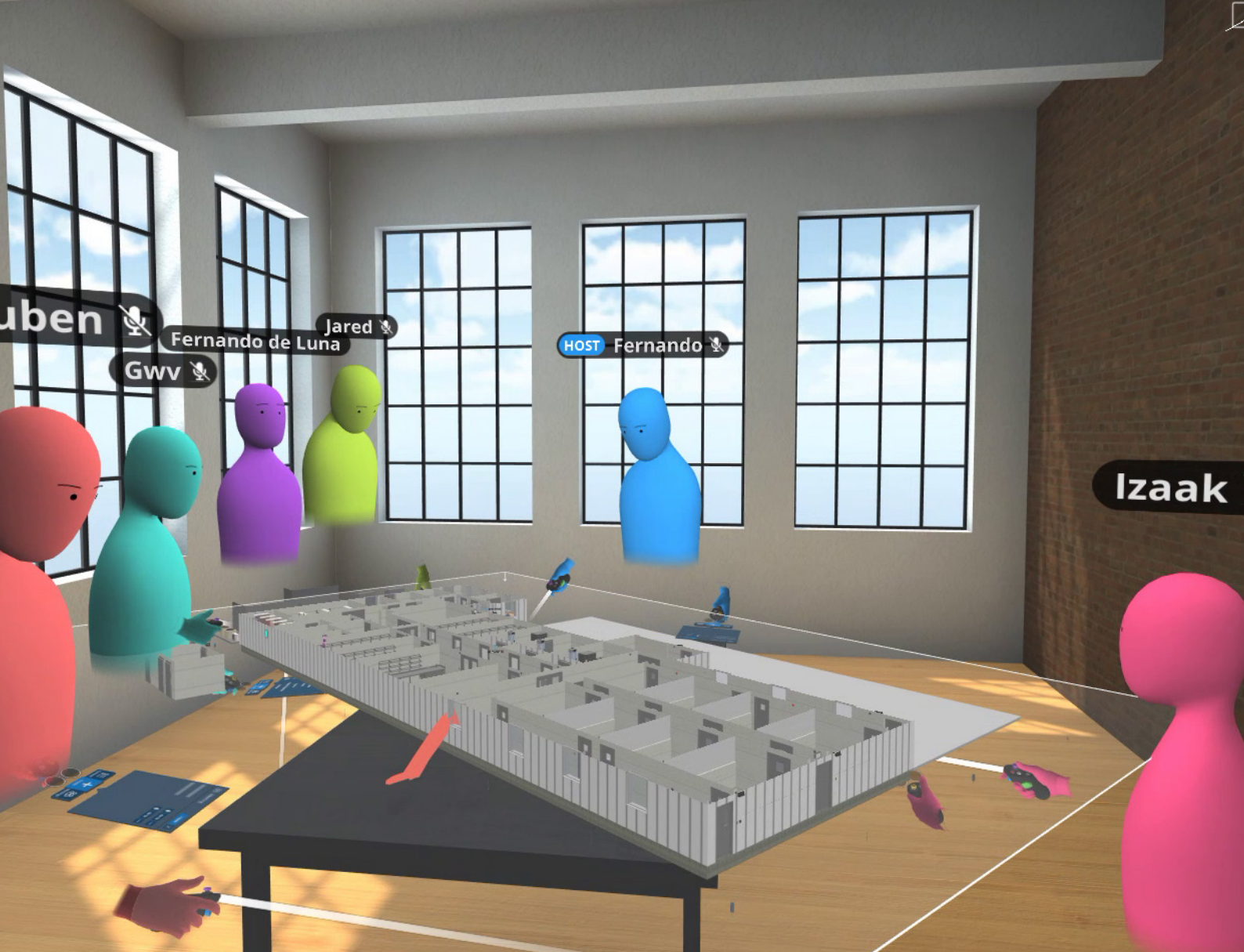


Fig. 4: The team gathers around a scaled version of the model to review the overall layout.

FINDING MORE CLASHES

"I was able to find many more clashes and member elevation issues while in VR that I could then relay to the Revit coordinator so they could update the model."

IZAAK BARELA, **STRUCTURAL ENGINEER**, MERRICK