BETTER COORDINATION FOR BETTER OUTCOMES

PUT COORDINATION INTO THE HANDS OF THE ENTIRE PROJECT TEAM

AUTODESK® BIM 360®

1 INTRODUCTION

Designs Are More Complex, Schedules Are Tightening & Expectations Are Increasing

The construction industry continues to soar, and we can expect to see 85% growth in the volume of construction output reach $15.5 trillion by 2030 [PwC]. But with rapid growth comes higher risk.

Designs are becoming more complex, contracts types are evolving, schedules are tightening, and the demand for transparency is increasing. More than ever before teams are feeling the pressure to find creative and innovative ways to execute high-quality projects faster while staying on budget and schedule.

But even with advances in design and technology, construction continues to operate in a fragmented way with a high level of disconnection between phases and disciplines leading to poor communication, lax oversight, inconsistent follow-through, and data loss during handoffs. At best, valuable time is wasted waiting for the correct information, but at worst, work is performed based off of outdated or inaccurate data, and what's the result? Rework.


Courtesy of BNIM

According to the Construction Industry Institute, rework can be as high as 5% of total construction costs. But Navigant Construction Forum reported 9% of the total project cost is closer to the actual total cost of rework – considering both direct and indirect factors combined. Which means if a project is $1,000,000 the cost of rework could be nearly $90,000. Not only does this have a devastating impact on the cost and schedule of the project, but it can also negatively impact client satisfaction and retention.

We understand several factors lead to rework and eliminating rework entirely isn't realistic. But what if you were able to make a simple change to an existing workflow which would allow you to catch and resolve more issues earlier – reducing the risk of budget overruns, schedule delays, and unhappy customers.

So what is this change? Using cloud-based technology to put BIM coordination into the hands of the entire project team.

RESULTS OF REWORK

Labor Costs. Increased labor costs due to performing the same work twice.

Time Spent. The time spent doing the initial work (hours, days, weeks) and now the time spent redoing the work.

Time Lost. Time lost that could have been spent on the next task, leading to potential delays.

Equipment Costs. Unaccounted for daily rental rates of diggers, cranes, power tools, etc. now needed to redo the work.

Wasted Materials. Cost of wasted materials.

Replacement Materials. Unaccounted for & premium costs associated to new materials needed that might have to be expedited.

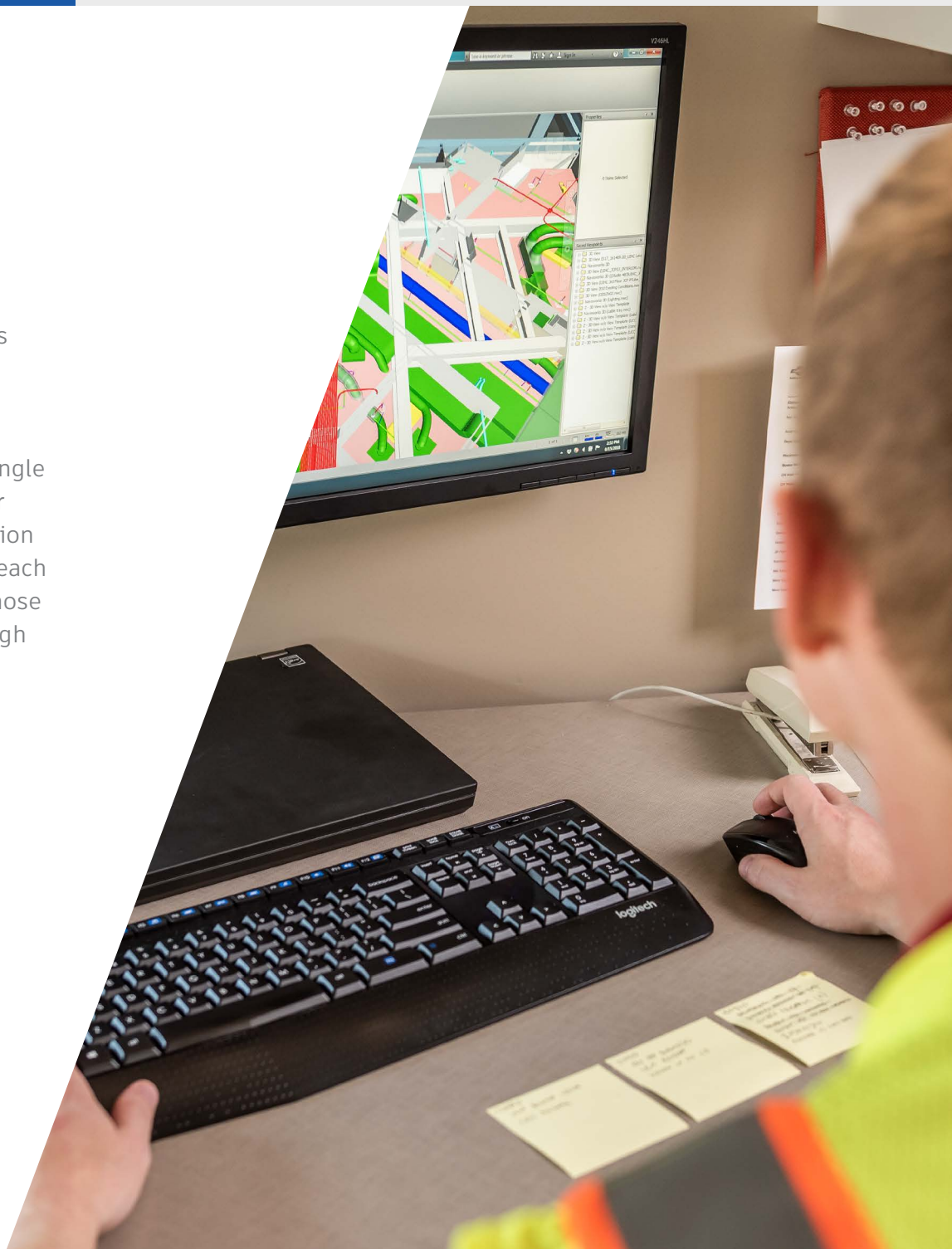
Unhappy Client. Frustration due to schedule delays and increased costs.

2 TRADITIONAL BIM COORDINATION

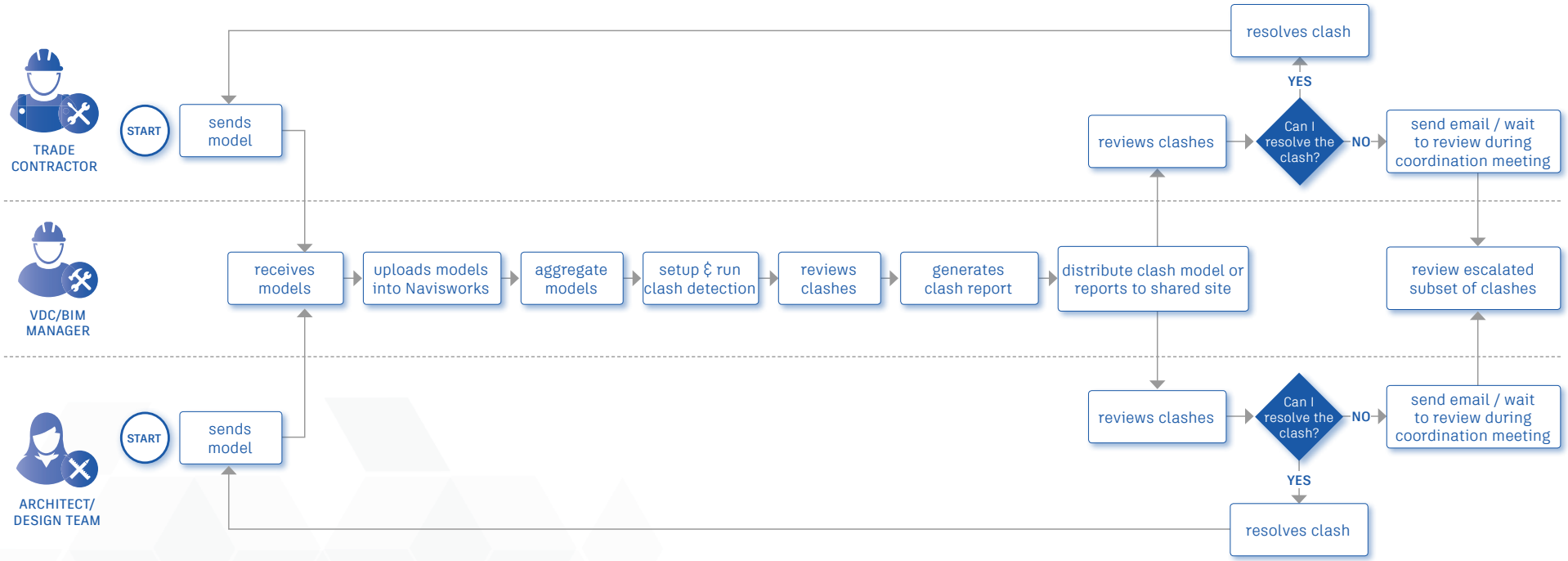
BIM Coordination The Traditional Way

BIM coordination is an integral part of the construction process to reduce the risk of rework caused by design changes, owner changes, errors, and omissions.

Traditionally the coordination workflow is centered around a single person, usually the VDC/BIM Manager at the general contractor who uses a software like Navisworks to carry out the coordination process. This individual is responsible for gathering data from each discipline, finding coordination issues (or clashes), grouping those clashes, assigning ownership, and managing the process through resolution. Let's take a deeper look into this workflow.



Traditional Coordination Workflow

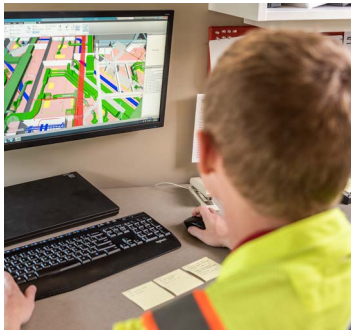


1. Each subcontractor, consultant, and fabrication team builds their own model usually using different softwares (e.g. Tekla, Sketchup, AutoCAD, Bentley, and Revit).
2. They share that model and data with the VDC/BIM Manager.
3. The VDC/BIM Manager aggregates the data in a product like Navisworks and analyzes the models for clashes.
4. The VDC/BIM Manager then generates a clash report and shares the report with the design and MEP/FP teams.
5. The clashes are discussed during the weekly or even biweekly coordination meeting.
6. Each team then goes back to work to resolve the clashes assigned to them.

This process is repeated over and over again until the coordination issues are resolved and each time a model is updated.

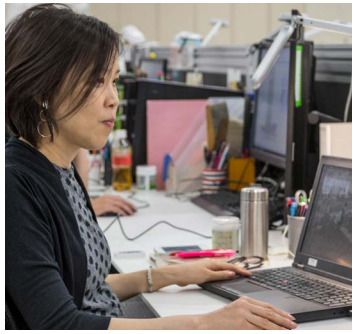
Struggles With This Approach

Reliance On One Individual



A potential bottleneck is created by putting one person in charge of mitigating hundreds to thousands of clashes. To cope with the volume of clashes test strategies are employed to only look for clashes between certain sets of priority objects, leaving many others untested with the likelihood of slipping through the cracks.

Siloed Information

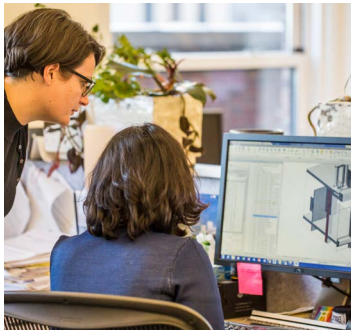


Everyone working through the coordination process has their own systems in place for file management and communications, which only slows down file sharing and is oftentimes disconnected. To make matters worse, if team members want to look at clashes on their own, they need to have the right software, training, and access to all of the latest and greatest multidisciplinary models.

Time Is Money

The coordination process is lengthy, and with project schedules becoming tighter, coordination time often bears the brunt of this tightening and is essentially shortened as well. Every time a new model iteration is available, the VDC/BIM Manager has to run through the entire workflow causing them to spend a majority of their time on non-optimal activities.

Need For Specialized Software



Traditional coordination processes usually require expensive software with expert users. This can be an issue when stakeholders want to look at clashes on their own. They need to have access to both the specialized software the VDC/BIM Manager is using as well as all of the multi-discipline models.

Trade Partner Isolation

More often than not, between coordination meetings with the group, trade partners are left to work on their own to adjust and update their given scopes of work, and communication between the trade partners during this model adjustment time is minuscule.

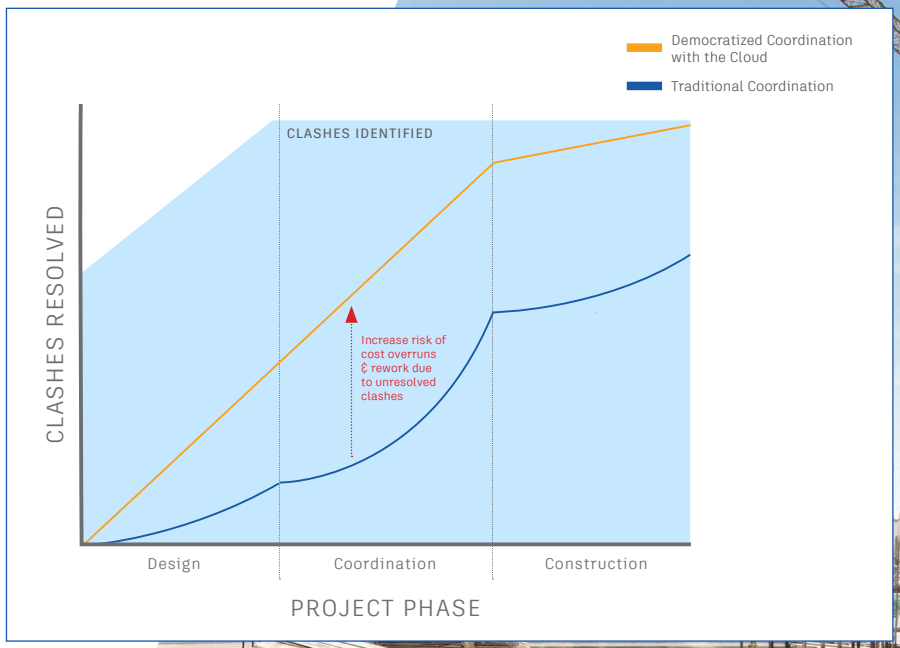
The Cost Of Clashing

Yes, the traditional coordination process can work. But with this process, how many clashes are really resolved, and what is the actual savings?

In most commercial construction projects, there are thousands of clashes identified by coordination software (or during the coordination process). But with thousands of issues identified and the reliance on a single individual to manage the resolution process, efforts are only focused on resolving significant problems between certain sets of priority objects.

But these significant issues only account for a small percentage of the overall issues identified. So ultimately a massive number of unresolved “small” issues build-up throughout the coordination process and make their way onto the construction site.

So how can we estimate the impact these small issues can make once they hit the construction site? The actual cost of a clash is hard to define. You have to consider the materials wasted, new materials needed, the cost of labor on-site and in the office resolving the issue, the cost of machinery, possible schedule delays, any penalties that might be involved, and possible legal costs. The American Institute of Architects and Association of General Contractors, have estimated clashes can have an average cost of $1,500 per instance.



Improve The Process With The Cloud

As we've seen the traditional coordination workflow is cumbersome, prone to human error, and limits the number of issues that can be reviewed and resolved before construction begins. But what if we told you utilizing the cloud can make your coordination workflow stronger, setting your project up for success.

4 IMPACTS OF CLOUD-BASED COORDINATION

1. Shared responsibility

If BIM coordination was a shared responsibility across the whole project team, how would it impact the length of the coordination process? It would **reduce the length of the coordination process** by enabling all stakeholders to participate, increasing accountability, visibility, and transparency while also allowing more coordination issues to be identified and resolved quickly.

2. Continuous resolution of clashes

If you could empower all disciplines to continually resolve conflicts how would it impact their decision-making ability? It would **improve the decision-making ability** of designers and fabricators by letting them continually resolve clashes independently of the VDC/BIM Manager, allowing them to deliver complete and more accurate detailed designs to the construction team.

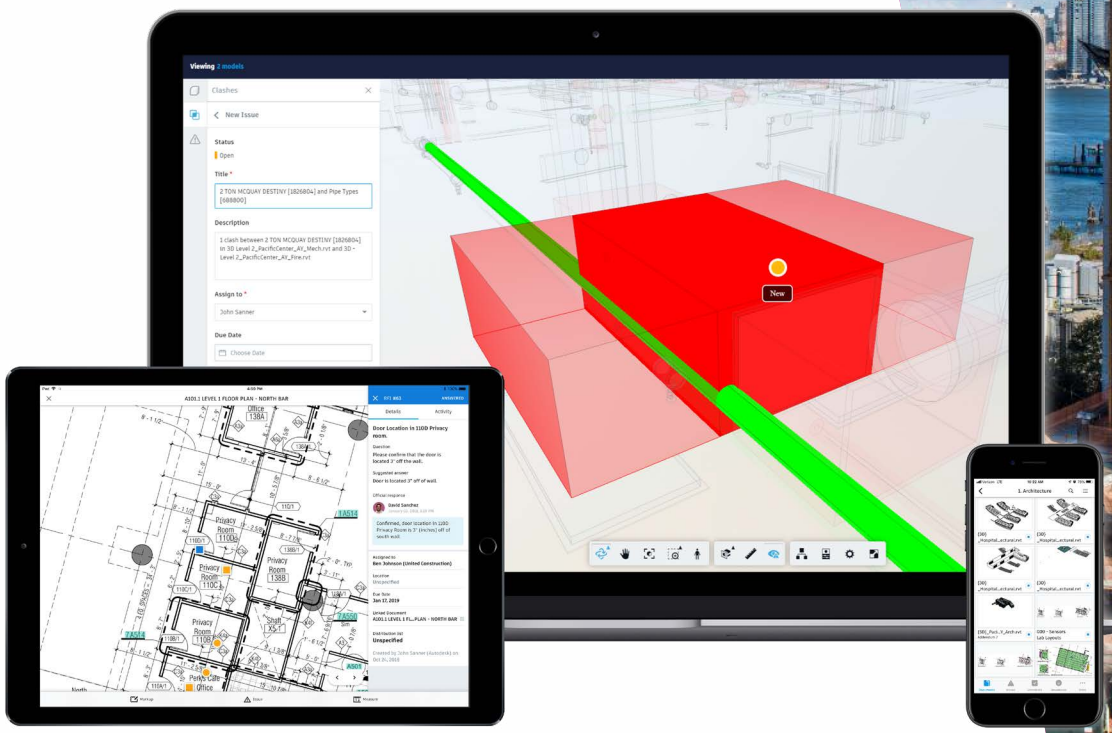
3. Earlier clash identification

If you could resolve more issues before construction begins how would it impact the value of BIM? It would **offer more value to investment in BIM** by enabling teams to identify more issues during the design phase, where it is far less costly to resolve.

4. Closed-loop clash resolution

If you could systematically assign coordination issues and track to resolution how would it impact project delivery? It would **speed the project delivery process** by making it simple to assign coordination issues to responsible parties, enable ongoing collaboration between trade partners, and visibility that those issues are resolved on time.

So how can you make this a reality? With a cloud-based construction management platform like Autodesk BIM 360, teams can start to democratize coordination processes and bring more accountability to model authors while reducing the strain on VDC & BIM managers.

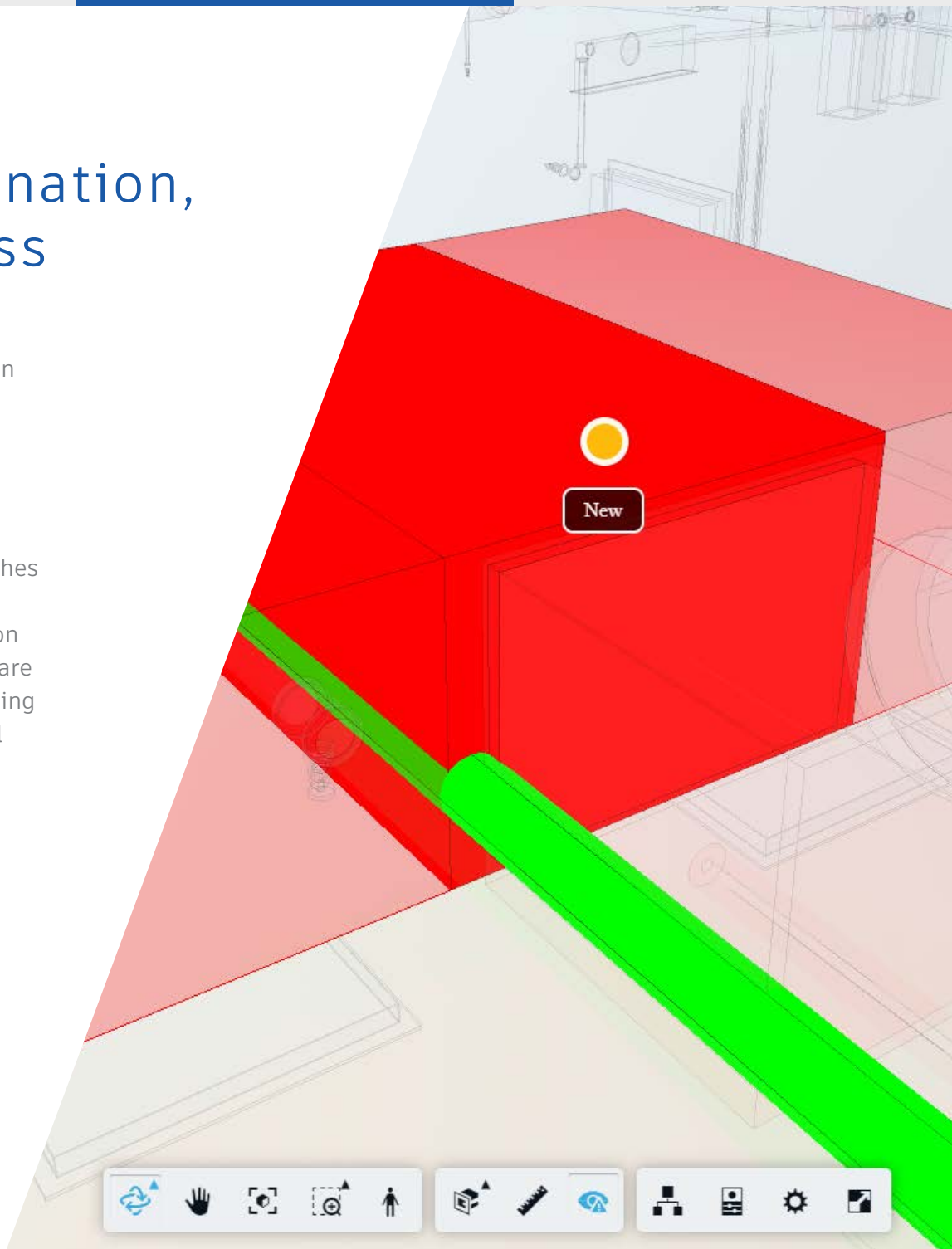


3 BIM COORDINATION IN THE CLOUD

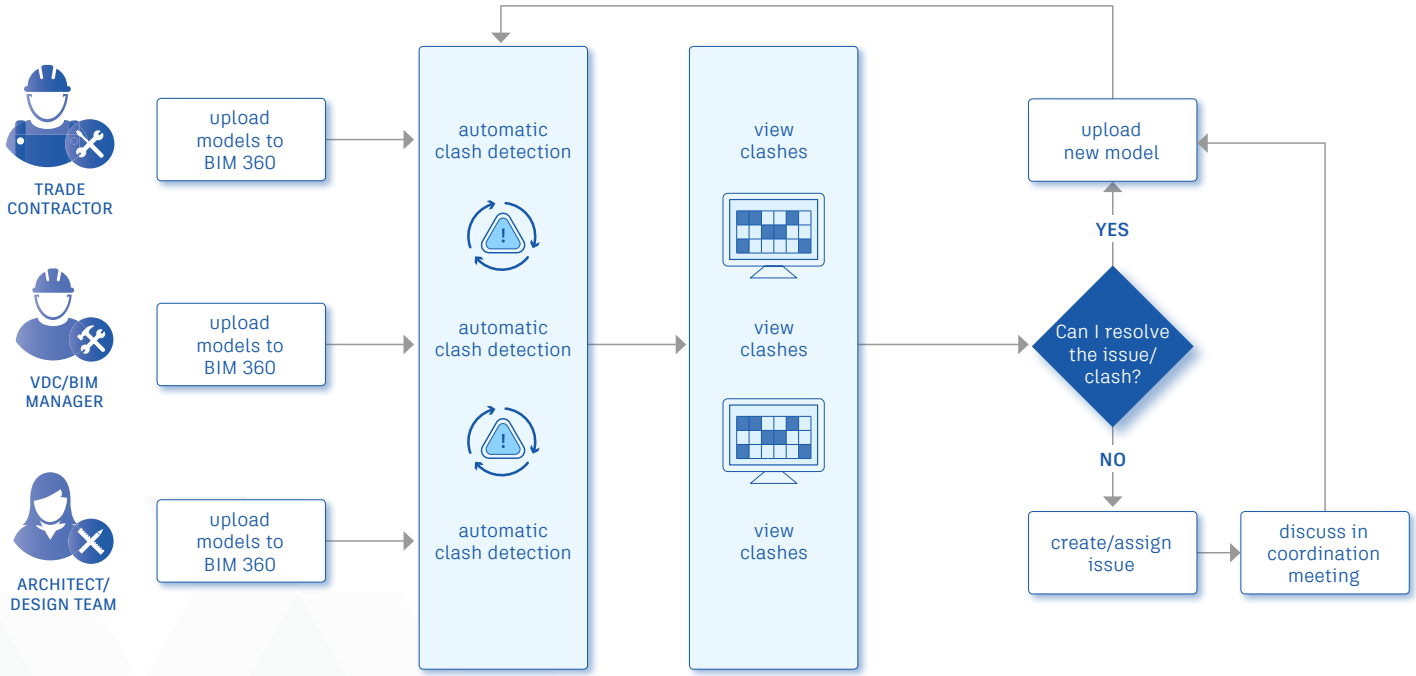
Democratized BIM Coordination, The Key To Project Success

Democratized coordination is simply the idea of making coordination efforts and in this case, specifically clash detection capabilities, accessible to all project stakeholders. **Why is this important?**

When using the right cloud-based technology like BIM 360 enables all stakeholders to be involved in the coordination process in real-time, allowing them to identify and resolve clashes on their own. This ultimately reduces the number of “small” clashes that typically make it on-site and alleviates the strain on the BIM/VDC Managers. They can now become the expert they are supposed to be, focused on pre-empting problems and identifying trends versus spending a majority of their time on non-optimal activities.



Coordination Workflow With BIM 360



1. Individual model contributors upload their models to a central location within BIM 360. Files are version controlled and time stamped when uploaded and all stakeholders have access to view this information.

   As models are published, the list of clashes between objects is generated automatically. These clashes are presented in a clash matrix, ready for review, and are grouped by model object, type, layer or system.

2. Rather than waiting for the next coordination meeting stakeholders can immediately review and start resolving their clashes. Clashes can be marked as 'not an issue' where model updates are not deemed necessary, for example when it's known that a clash wouldn't exist during on-site fabrication/installation.

3. Trade partners can assign issues to themselves to take responsibility for individual or groups of clashes, improving their own model quality. And VDC/BIM Managers can assign clashes to project members to initiate conversation and track coordination issues through to resolution.

This democratization of coordination with the cloud brings more accountability to model authors while greatly reducing the number of clashes that make it onsite.

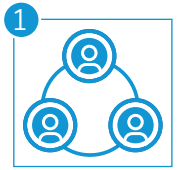
BIM 360 MODEL COORDINATION + NAVISWORKS

It is important to note cloud-based coordination tools like BIM 360 do not need to be a complete replacement for traditional coordination technologies such as Navisworks. But instead, when used in conjunction with one another, they complement each other and add value to the process.

The value of this approach is that all disciplines can coordinate and do clash detection on their own, resolving the more obvious coordination issues. This not only increases the quality of their trade models but saves times during coordination meetings because smaller clashes don't need to be discussed. Enabling the VDC/BIM Manager to play a more significant facilitator role and spend their time digging into specific areas more granularly with software like Navisworks.

> *"We're seeing an interesting democratization of the tool. Rather than needing an expert in Navisworks or Revit, anyone can look and use BIM 360 Model Coordination."*
>
> – DENNIS MCNEAL, BIM MANAGER, AECOM

5 Benefits Of Cloud-Based Coordination



Lowering the barrier of entry

Giving all key stakeholders access to the federated models and involving them in the coordination and BIM collaboration process earlier keeps the entire project team in sync and generates more constructible models. The VDC/BIM Manager no longer needs to be involved in every step of clash detection and resolution.

Removing information silos

Rather than working in siloed systems, a connected cloud platform like BIM 360 enables teams to centralize their project data with access anytime, anywhere. Clash data is no longer buried in reports or stored on one power-users machine. All disciplines have access to real-time clash data, 3D models, 2D sheets, and other necessary documents – increasing efficiency, improving quality, and reducing risk.

Automated clash detection

Clash detection no longers needs to be a linear process reliant on manual steps from the VDC/BIM Manager - download, upload aggregate, test setup, run clash detection, review, report, distribute.

With the power of the cloud, when models are published or updated in a tool like BIM 360, clash detection runs automatically, cutting down what used to be a lengthy process into a matter of minutes. Using BIM data clashes are grouped and easily viewable in a clash matrix with heat maps identifying high clash areas

to help prioritize coordination efforts. This not only increases efficiency but provides visibility into coordination issues that may not have otherwise been caught, minimizing the risk for rework later down the line.

4

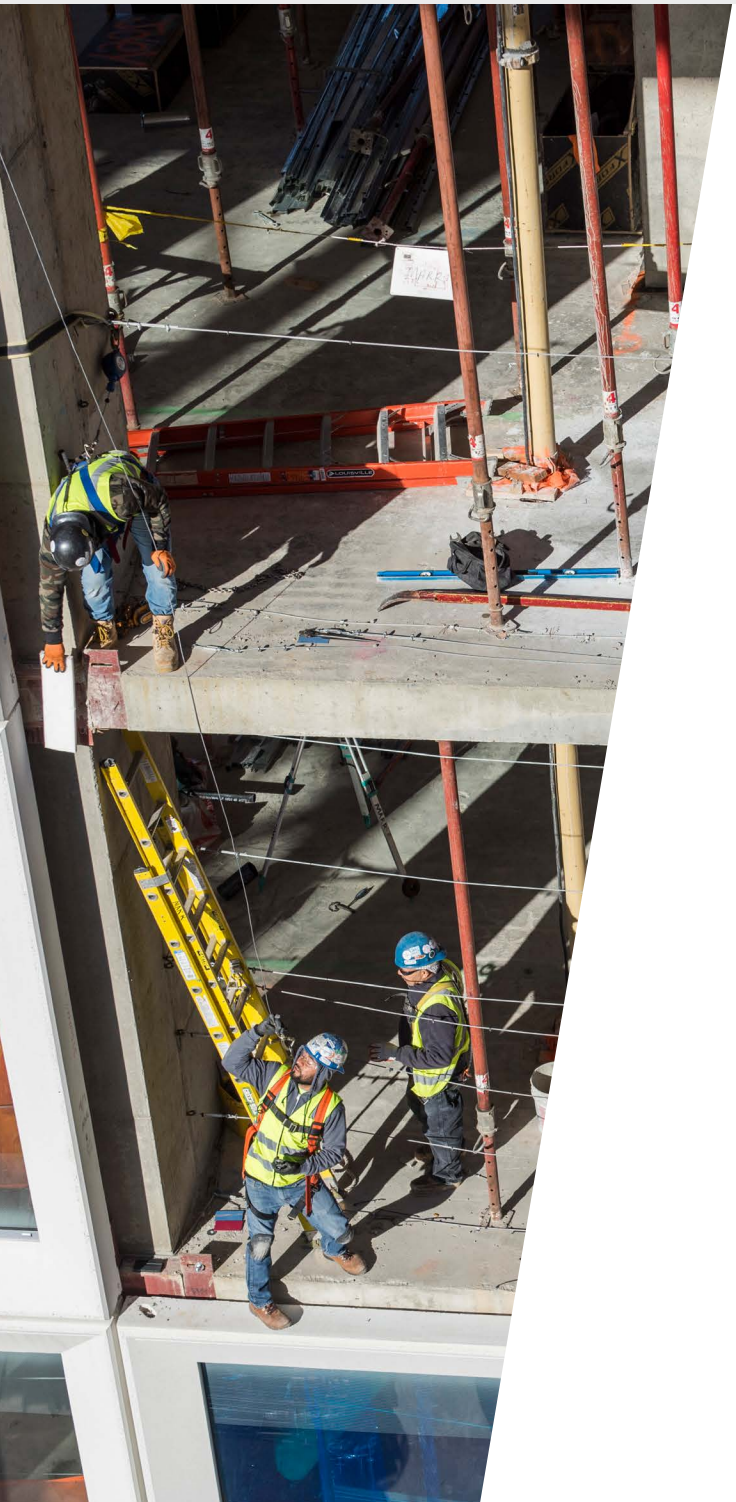
Removing noise (when a clash isn't a clash)

Rather than relying on the assumptions of the BIM Coordinator before a meeting, putting coordination efforts into the hands of a broader range of stakeholders allows them to bring their expertise to the process and help reduce "noise" such as false positives. BIM 360 makes this process painless with the *Not an Issue* workflow. Users can group large numbers of clashes using BIM data to speed up the review, and if further attention is not required, they can classify the group as 'Not an Issue.' Clashes closed in this way will not re-appear as further model versions are published. This Helps stakeholders focus their attention on the issues requiring action and any new issues detected.

5

Transparency in the clash resolution process

With automatic clash detection and clash grouping via BIM data efficiency increases and workload minimizes by being able to treat multiple clashes as a single issue, also providing all disciplines with quick visibility into the impact of their changes. And with software like BIM 360 that has enhanced issue management features, accountability and transparency in the clash resolution process are achievable. An issue can be created from a clash or group of clashes and assigned to a team member; an email notification is sent to the assignee, allowing them to access the issue directly. They can then view details, respond with comments, include attachment, and update the issue status. The model changes can then be reviewed, and the issue closed out when the clash is resolved.



Benefits For The Entire Project Team

PROJECT MANAGEMENT	• Easy access to project-specific data • Quickly identify major issues & trends early to resolve proactively • Reduce duplication of effort, administration & tasks
DESIGNERS & TRADES	• Work together efficiently with all project stakeholders • Gain insights on decisions taken & correct whenever necessary • Improve model quality & reduce design rework
VDC/BIM TEAMS	• Minimize administration burden & push coordination responsibility to design & trade teams • Identify changes, non-issues & group problems • Simplify the distribution & management of clash issues
CONSTRUCTION TEAM	• Reduce the likelihood of rework stemming from poor design quality or missing information • Track the full history of any issues that reach the field • Identify issues & changes that may affect construction

The Value To You

Now that you know the benefits of cloud-based coordination for the entire project team let's look at the value it brings each stakeholder.

GENERAL CONTRACTOR

- Able to play an increased facilitatory role
- Easily engage all key stakeholders
- Automated detection & grouping of clashes increases efficiency
- Visibility of coordination issues between all disciplines
- Increased accountability & transparency through issue tracking

DESIGNER

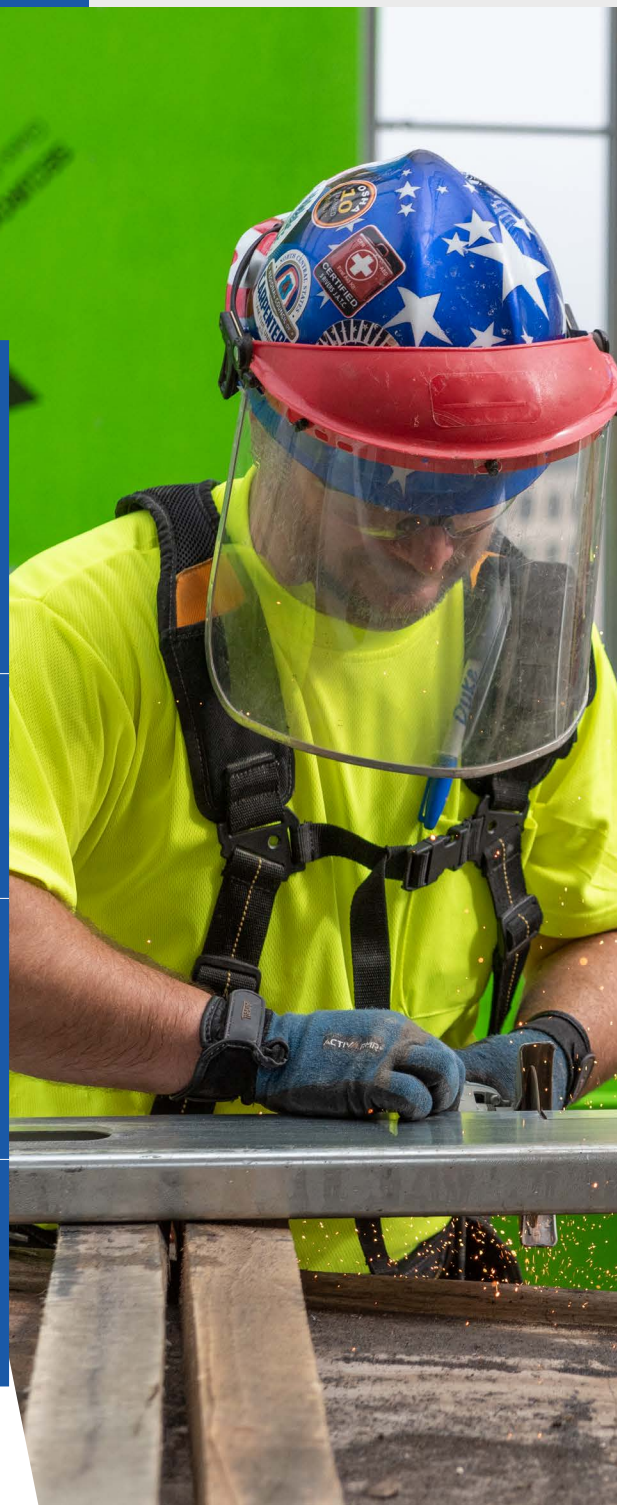
- Increased coordination with disciplines using different authoring applications
- Ease of self-checking for coordination issues with own design

TRADE CONTRACTOR

- Ease of participation
- Minimal training required
- Increased accountability
- Visibility of potential site issues & input into issues which will need design changes

OWNER

- Dashboard based visibility into progress
- Promotes collaborative relationships & proactive behavior
- Enhanced project outcomes



4 LETS TALK ROI

Lets talk ROI

Before investing in technology, most will likely calculate their return on investment (ROI) to determine whether expected returns outweigh and justify the costs. But calculating the costs and gains for BIM coordination isn't that easy, there's more to it than simple spending and fees. Here's what your peers have to say about democratized coordination with the cloud...

"Due to BIM coordination and multi-discipline collaboration, our project was delivered with less than one percent rework – on a typical job, we expect to have between eight to ten percent rework."

– RUSS DALTON, BIM DIRECTOR, AMERICAS, AECOM

"With BIM 360, we don't have to wait for weekly coordination meetings anymore. Clash detection and coordination happens in real-time."

– CHRIS WEAVER, DIRECTOR OF TECHNOLOGY, ANDY J. EGAN

"We have the assurance that we're installing in the field per a coordinated model and doing it right the first time. It's revolutionary."

– ONDREI POLIAK, VIRTUAL CONSTRUCTION MANAGER, PCL CONSTRUCTION

"What used to take us six weeks, now takes us 24 hours."

CHRIS CROWE, ARCHITECT, AECOM

"By implementing and using BIM 360, we have seen an enormous increase in information consistency and quality across the supply chain. Rework and cost of failure have been significantly reduced across all project stages."

– GERT-JAN DITSEL, BIM MANAGER, DURA VERMEER

START DEMOCRATIZING THE COORDINATION PROCESS TODAY

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