CS468851

Connected Model Coordination with Autodesk Construction Cloud

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Learning Objectives

- Discover the key aspects of the Autodesk Connected Coordination vision.
- Discover the connected desktop workflows involving Navisworks and Revit.
- Discover the process for sharing federated content across the Construction Cloud.
- Discover upcoming coordination initiatives.

Description

With next generation technology, much of the model coordination process has been transformed through automation and digital collaboration, democratizing the model coordination experience for VDC managers and trade teams. But a truly coordinated experience isn't possible without connecting all parts of BIM data from design to plan to build.
This session will show you how Autodesk is delivering on this new level of connected model coordination and how integrated workflows will deliver best-in-class model coordination workflows.

Speaker

Paul Walker is a Sr Product Manager in Autodesk Construction Solutions leading the group building model coordination workflows across Autodesk Construction Cloud. Paul was part of the Navisworks acquisition in 2007 and has been in software development for almost 20 years.

The Autodesk Connected Coordination Vision

Background

Every day, thousands of project teams undergo the model coordination process to keep the costliest errors from reaching site, in terms of both cost and schedule.

There are some real horror stories that come from major constructability issues not being caught early on. At best, they can lead to schedule delays and unexpected costs. At worst, they can derail an entire project.

Many teams are still using a model coordination process that was developed decades ago. When Navisworks was created 20 years ago, this model coordination process brought a lot of great things:

- Aggregation and review of multi-format models
- Real time walkthrough on standard PCs
- Clash detection

That process also brings with it some issues that do not translate to how we work today:

- Desktop-based
- Information silos
- Difficulty establishing a single source of truth
- Document management disparate from the tools
- Difficult to collaborate

Navisworks has evolved to be a power tool for the BIM/VDC Manager. However what we've seen are coordination processes that isolate these users – lonely BIM – with other stakeholders playing a more passive role, the entire burden of coordinating models lies with the BIM/VDC Manager, not to mention the bottlenecks you've advised that this creates. With only so many hours in a day, the traditional coordination process is driven by prioritization, looking where you expect to find the costliest problems. It follows that there is almost an acceptance that some errors will make it through to site, and hope that they can be easily rectified and do not turn out to be too costly.

At the same time, while the model coordination process has remained somewhat static, the industry has only continued to evolve. Collaboration has become even more complicated as projects have become more complex and clients expect more from less.

We have customers working on projects with over 1000 models and hundreds of revisions, and others with hundreds of models and thousands of revisions. This is a lot of data, and a lot of change to manage – like drinking from a fire hose, it quickly becomes overwhelming.

One solution to spread the risk is through Integrated Project Delivery, or IPD, which contractually binds project partners and enables them to collaborate more closely earlier on in a project. This can be a good solution for certain projects, but it certainly will not work across the board, and it does not solve the larger issues with the model coordination workflow.

What Autodesk is doing

Our strategy has been to shift the *full burden* of coordinating models away from the BIM/VDC Manager.

By supporting project partners to upload their own models to a common data environment, coordinate them, and automatically detect clashes, it encourages more stakeholders to engage with the federated model and take on increased ownership of coordinating their piece of the puzzle.

The BIM/VDC Manager remains a critical role in the control and success of this process, though increasingly through facilitating others and not doing everything themself. Rather than a bottleneck, this frees them to focus on the biggest, most impactful constructability issues. At the same time, trade partners can deal with more obvious clashes and errors that it does not take a BIM team to solve, and they can iteratively increase the quality of the models they are contributing.

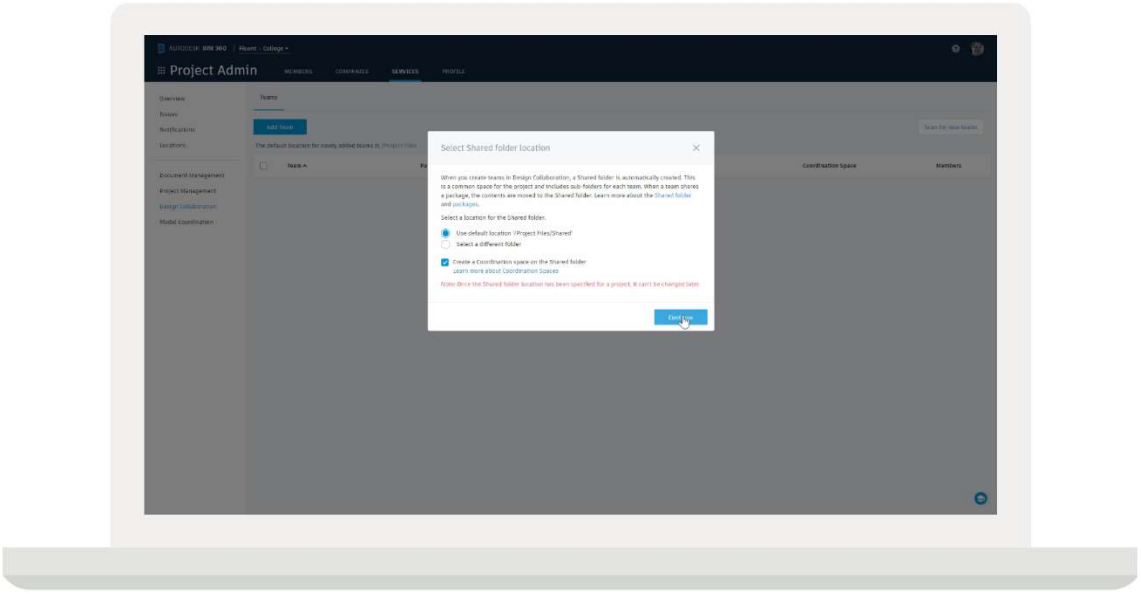
The Autodesk Connected Coordination Workflow

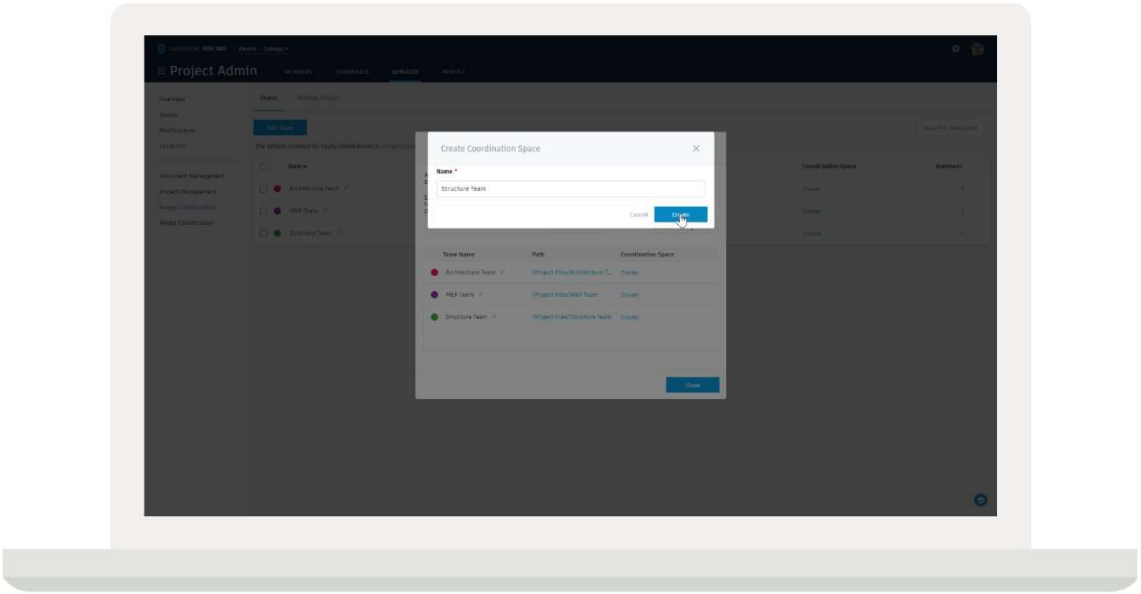
Project setup and configuration

A great coordination workflow starts with great collaboration, and involvement of the various design and trade partners working on a project.

The Design Collaboration module is configured to provide team spaces for these participants, and a common Shared space to distribute content when ready.

This configuration process orchestrates three important areas:
1. Folder structures in BIM 360 Docs,
2. Access control permissions for the file content within those folders,
3. Creating Coordination Spaces for BIM 360 Model Coordination.

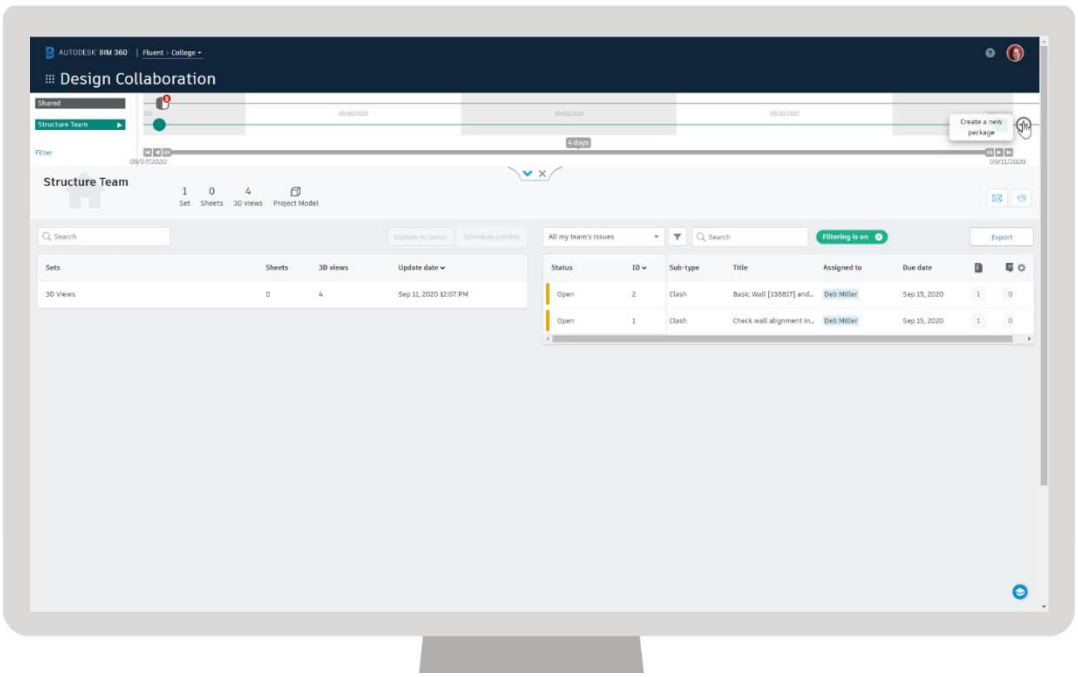


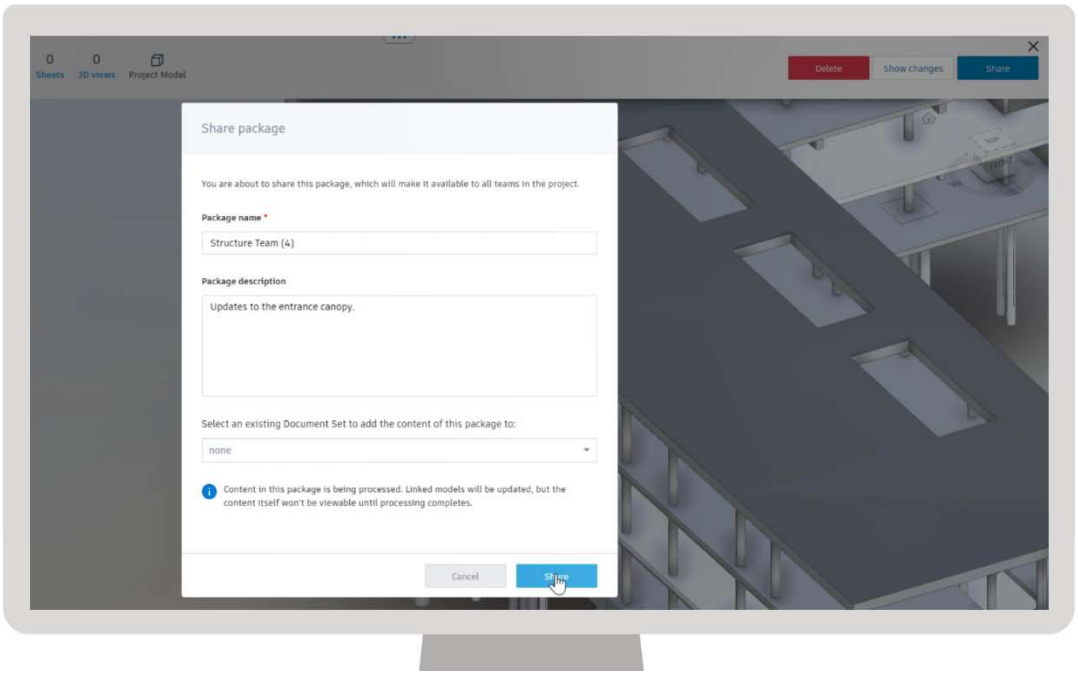


Controlled sharing

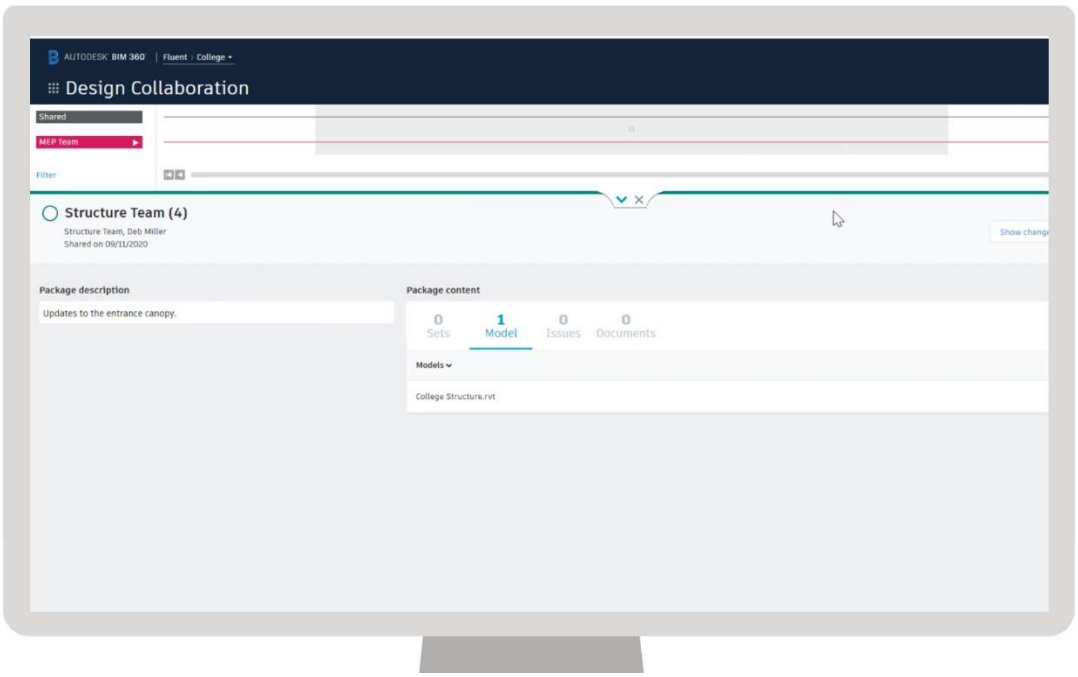
As models are authored the resulting files are uploaded to BIM 360 Docs. In the case of Revit, as demonstrated in this class, we used Revit Cloud Worksharing. Once you sync your live design data, you can then Publish this directly to BIM 360 Docs.
These design files [in BIM 360 Docs] are then automatically picked up by Design Collaboration, providing access to the defined publish set, including 3D views and sheets.

From here you can then create a package, choosing which of those views and sheets you wish to share with other teams.

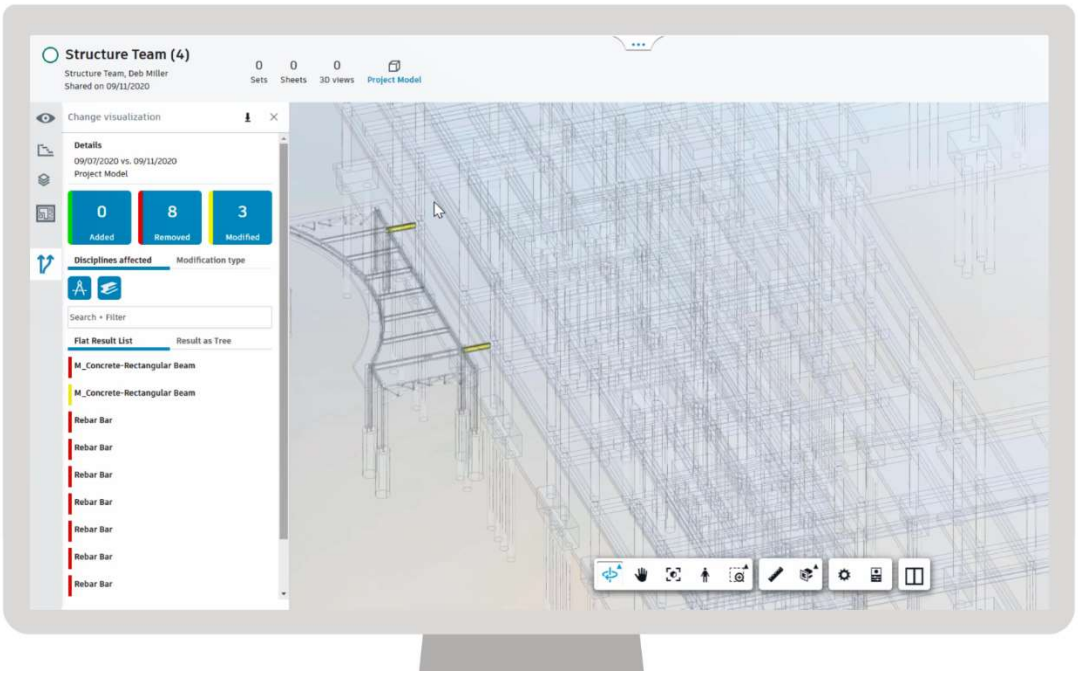




Other teams can then see that a new package has been shared.

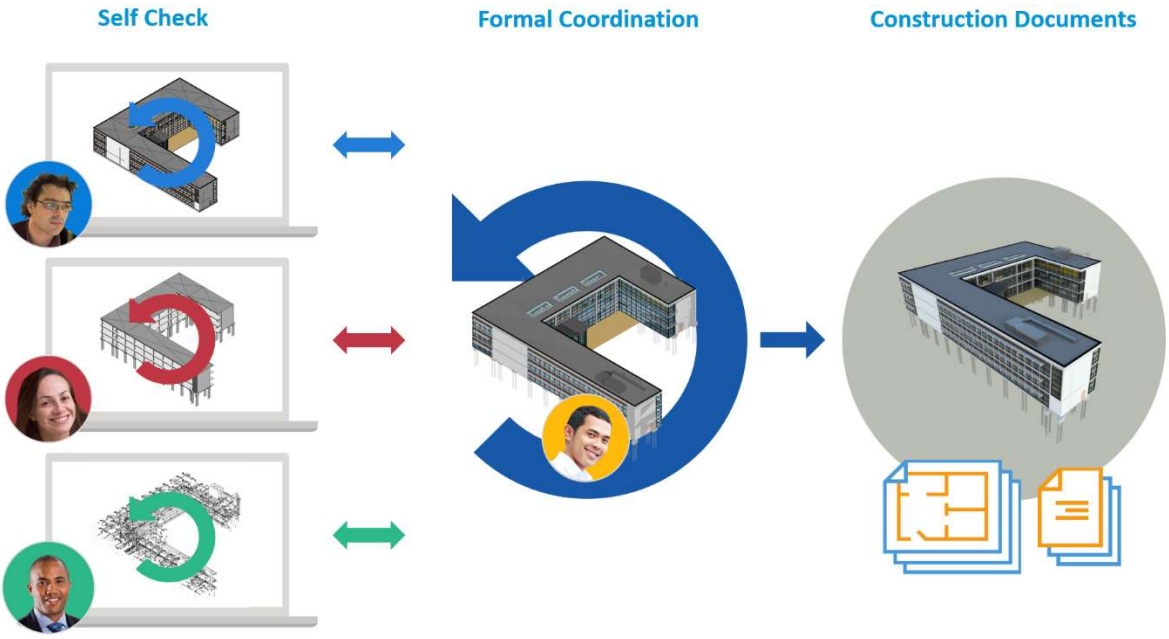


Change visualization shows exactly what has changed since the previous version. Helping to decide whether to consume and start working with that new update.

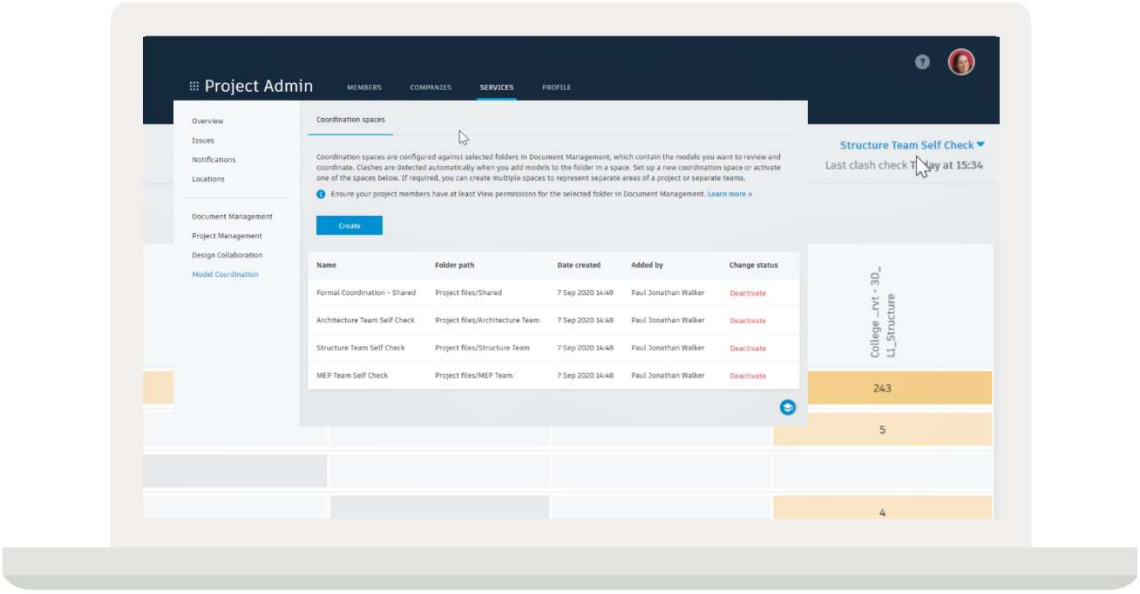


Self-checking

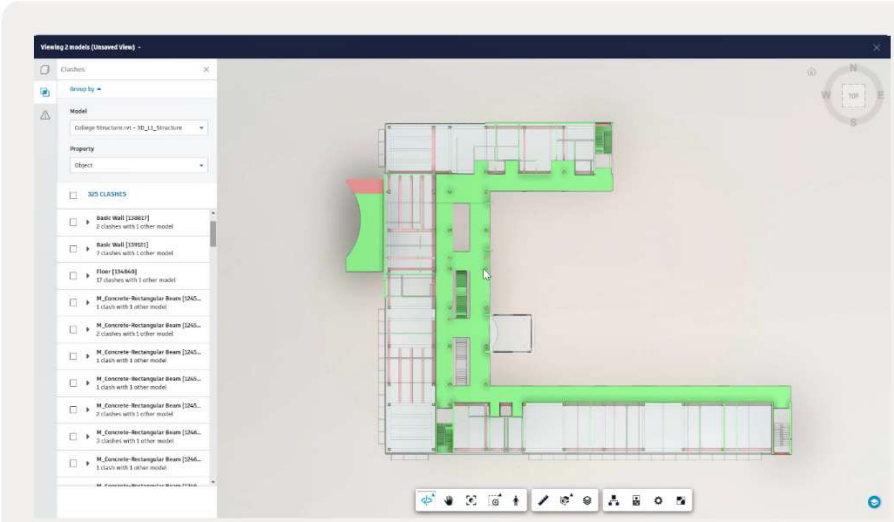
Model Coordination can be configured for multiple teams, supporting discipline self-checking.



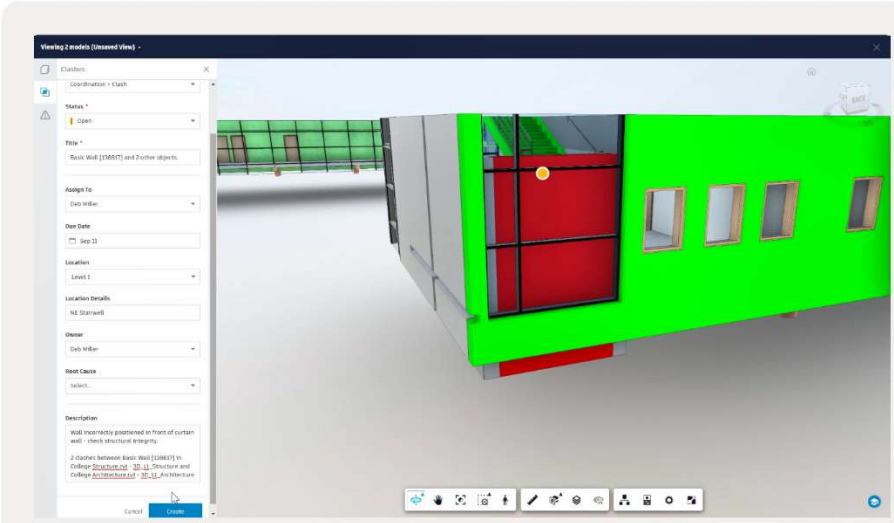
This set up was shown earlier as part of Design Collaboration configuration; however, if not using DC, you can manually configure this [in Model Coordination Admin] working directly with folders in BIM 360 Docs.



Individual discipline or trade teams can check their own [work in progress] models, in context of other [shared] disciplines through multi-model review and automated clash detection offered by Model Coordination. This is a unique result of automated clash detection, whereby project stakeholders who would otherwise not conduct clash detection are now empowered to self-check their own models.



Issues can be raised to track work for their team, fixing obvious problems and increasing the quality of their own models.



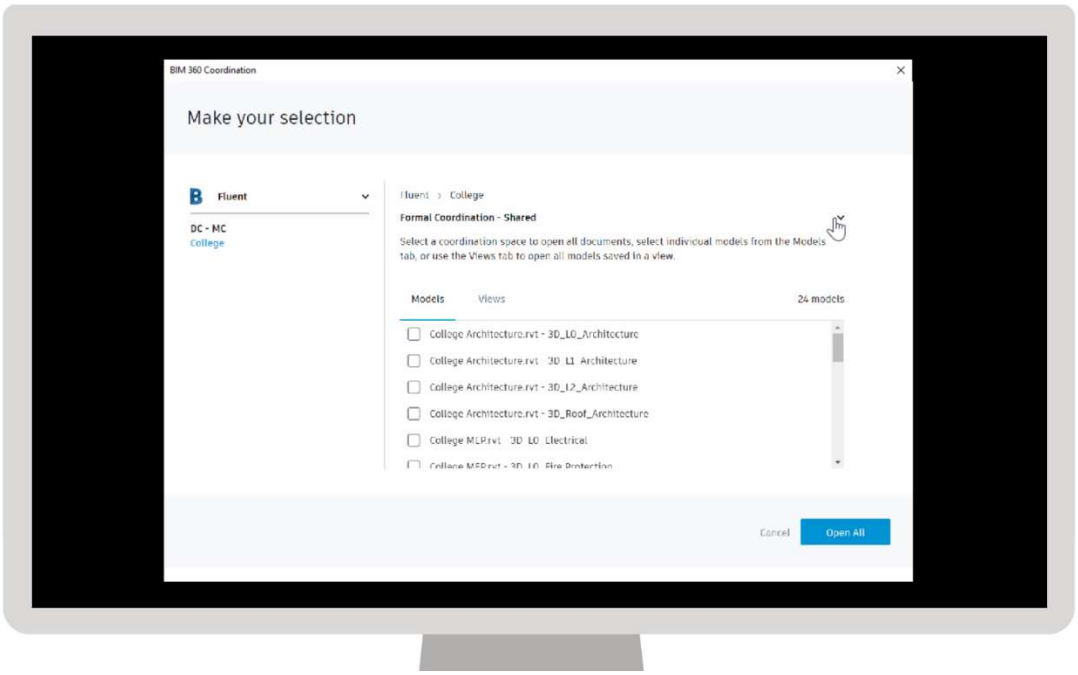
Issue details are captured, including a screenshot of the problem, and are accessible through various client interfaces, as described below [Navisworks, Revit].

Formal coordination

As projects progress, GC's who wish to use Navisworks for formal coordination can now benefit from the latest BIM 360 integration.

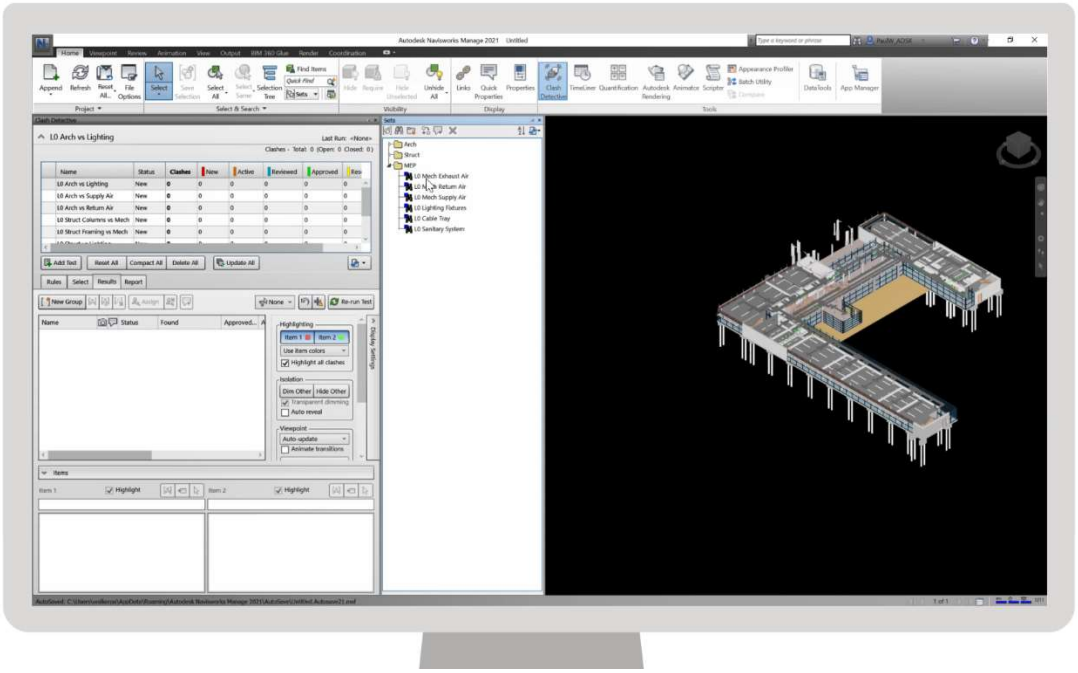
Connecting directly to Model Coordination, Navisworks can access the same Coordination Spaces and cloud hosted "Shared" models.

Choose to open all models, a custom selection, or a curated View pre-defined in Model Coordination. This ensures project members are working with the same versioned models, whether using desktop or web.

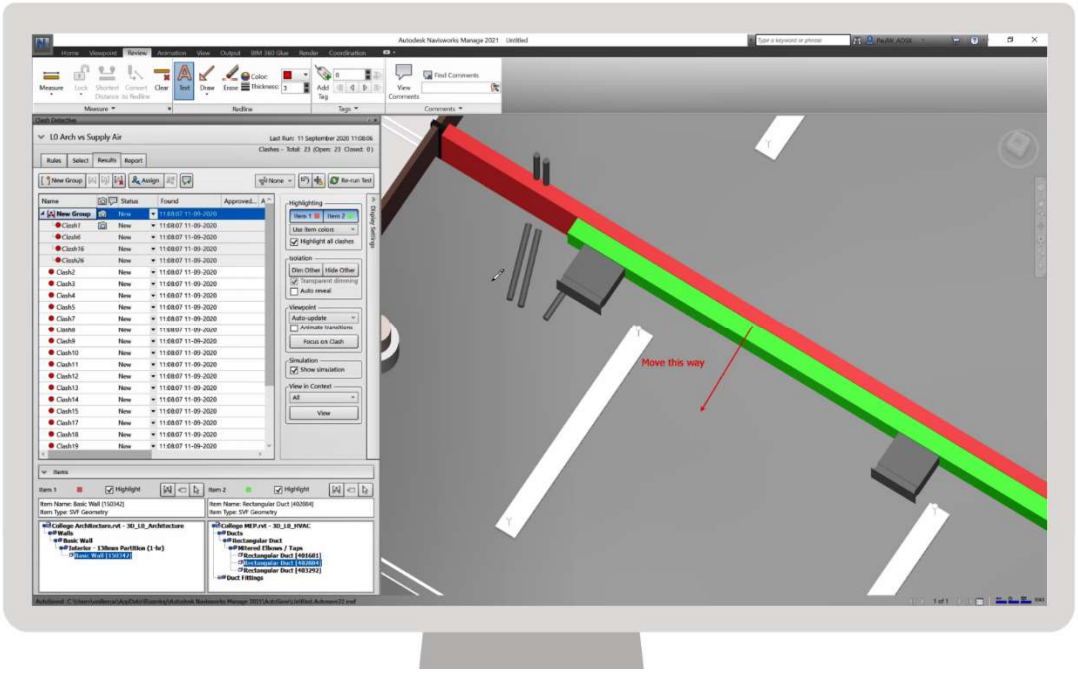


Once in Navisworks, you can leverage the wide variety of tools, from 4D simulation and visualization, to clash detection.

With access to search sets, this enables specific clash tests (including clearance tests) to be defined and run.

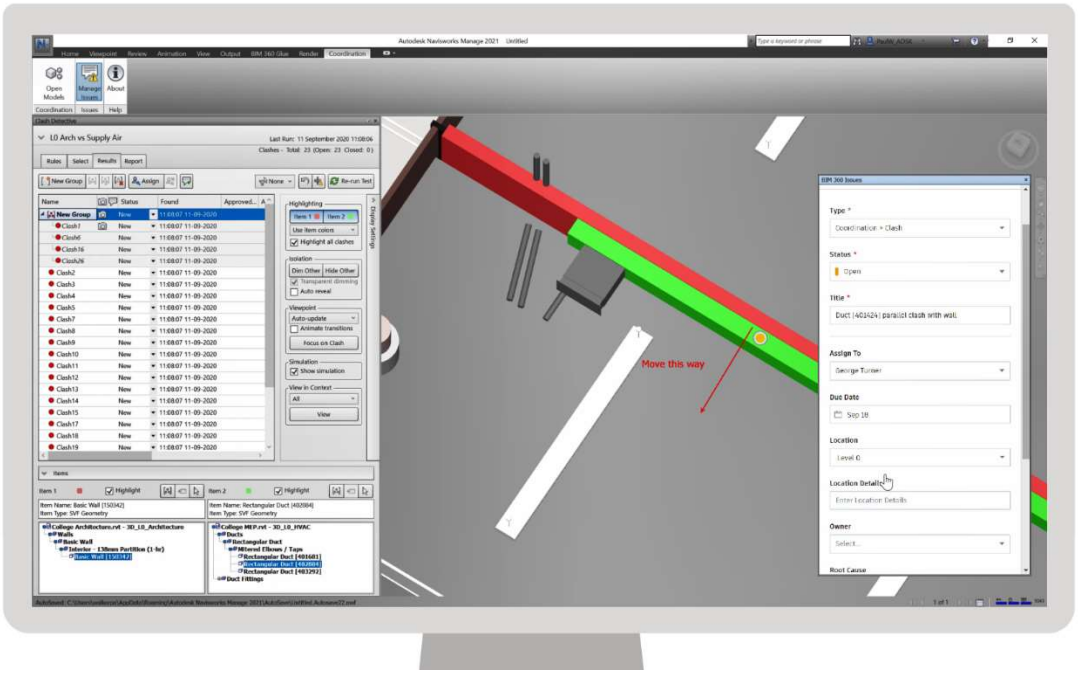


Navisworks provides 'power-users' with the review tools they are familiar with, including clash grouping, navigation and markup tools.



Note: Whilst it is possible to use Model Coordination for 'formal coordination' working with the models in the 'Shared' folder, we recognize the value and familiarity of Navisworks to many of our customers, therefore we recommend using this complimentary workflow to enhance what many of you are doing today. See the Recommended Workflow Guide at the end of this document for more information.

When assigning a clash or constructability problem, Navisworks users can now create BIM 360 Issues associated directly with the authored model managed in BIM 360 Docs. The issue will therefore remain associated with the authored model when new versions are published to Docs.



These issues are accessible across all BIM 360 Issue clients, and provide an automatic screenshot attachment, including markups.

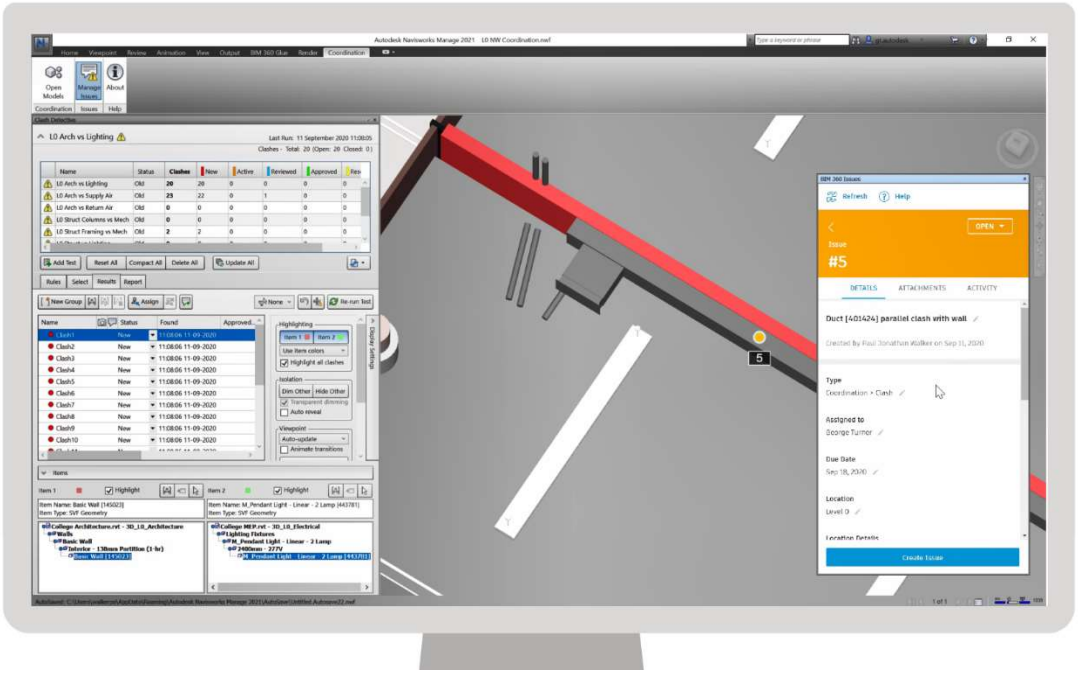
Sharing NWF files

A further benefit of the Navisworks-Model Coordination integration is the ability to share NWF files with other Navisworks users.

With access permissions to the coordination space in Model Coordination, another user can now open the NWF file in Navisworks.

With the NWF referencing the same models as Model Coordination, access control is managed in one centralised place – that being BIM 360 Docs.

Once opened, the 'other' user has access to all Navisworks data saved in the NWF plus access to all model-associated issues.

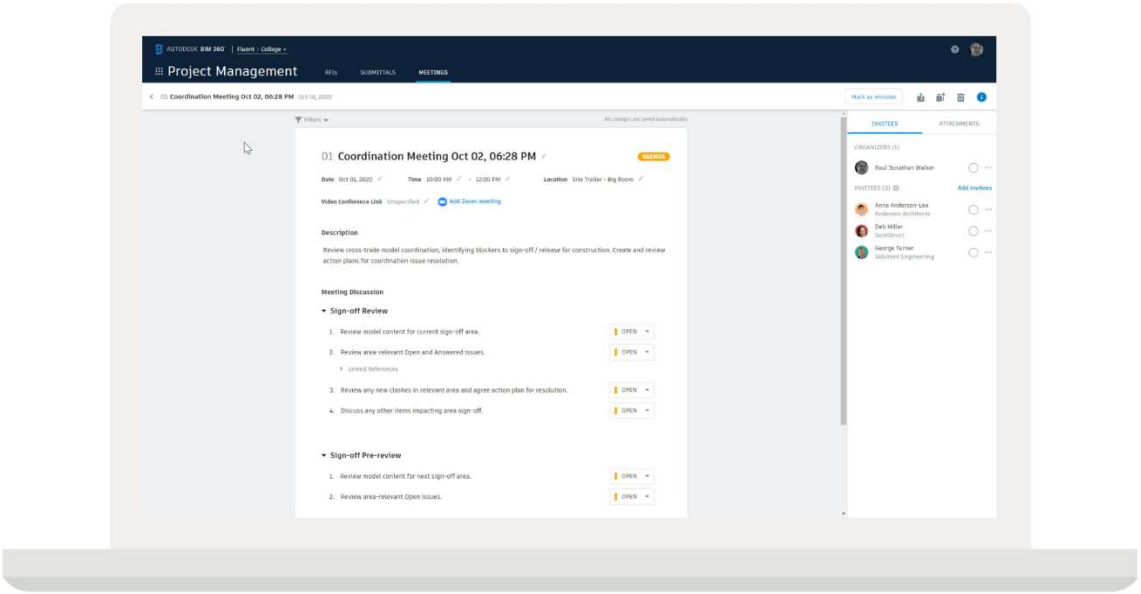


Meetings

An important part of the workflow is the coordination meeting - where stakeholders come together to discuss progress and actions towards sign-off, and how more complex problems can be resolved.

With the asynchronous analysis and review covered earlier, these meetings should now be focused on these outstanding issues, not basic clash review.

The Meetings module enables you to create and schedule meeting agendas, identifying participants and topics to be covered, including a list of outstanding issues.



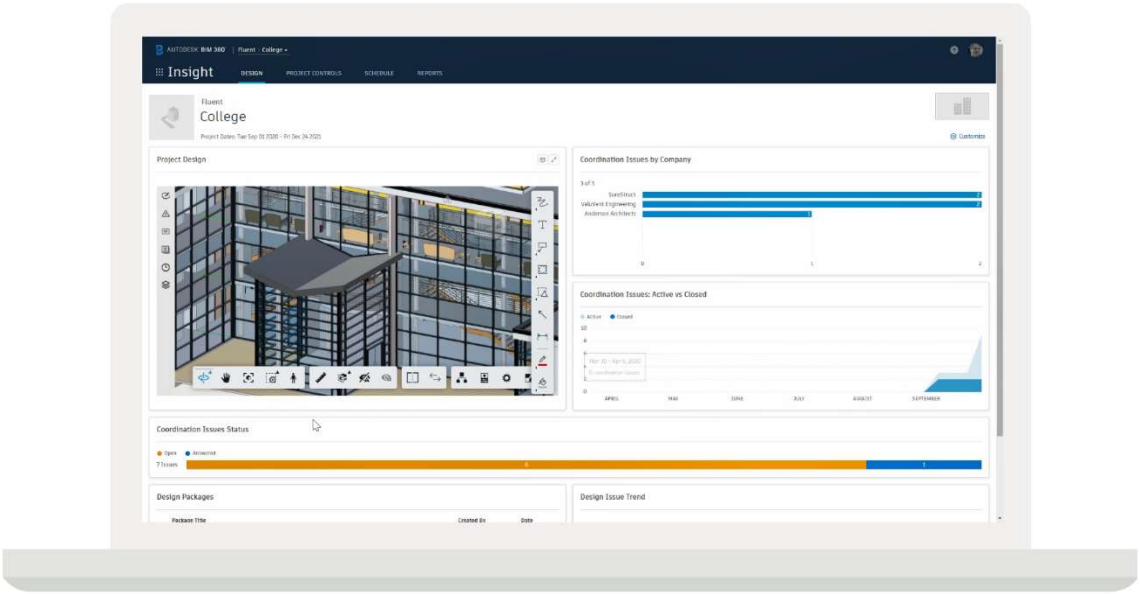
This can then be used during the meeting itself, with live linking to issue details and models, which can be assigned, comments and instruction added, with due dates for commitments and so on – no longer requiring such detail to be captured as markup on a viewpoint.

All this interaction can be recorded in the integrated meeting minutes.

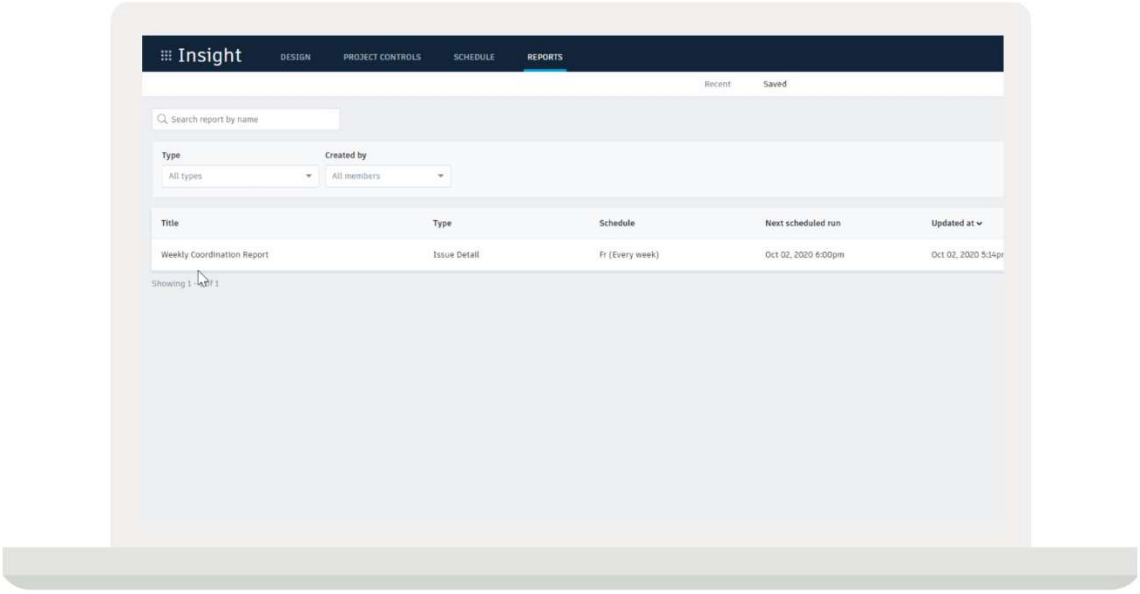
Insight dashboards and reporting

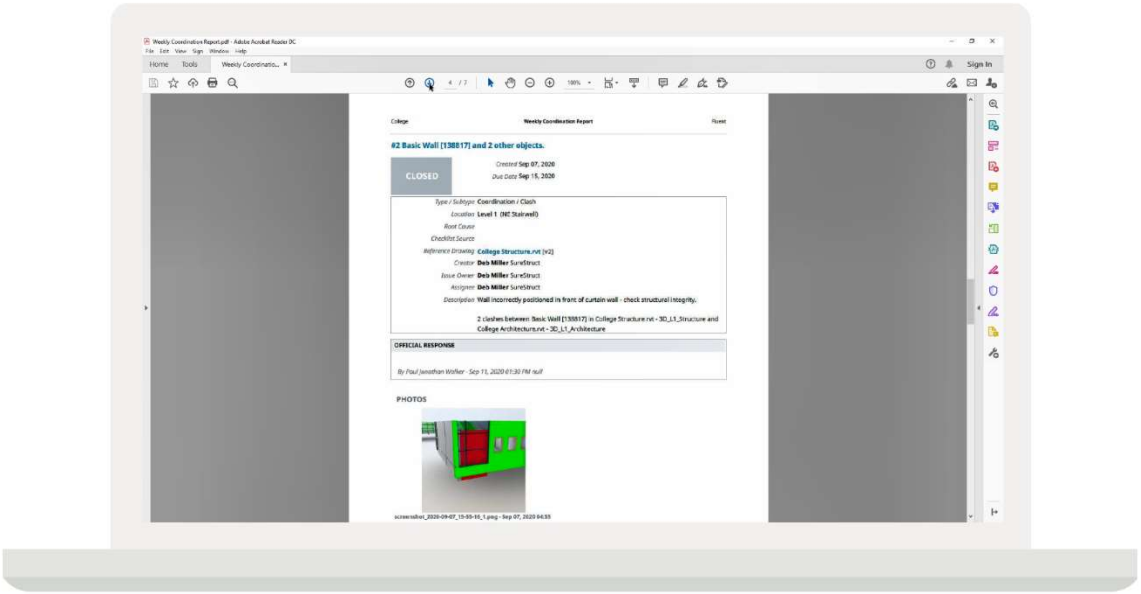
Use dashboards and reporting to maintain control and oversight of the coordination activity happening before and after the formal coordination meeting.

Dashboards provide insights into distribution of issues amongst stakeholders, who's closing them out, or where there might be a problem, and so on.



Define and schedule coordination reports to be automatically generated, filtered by status and assignee, and sent to a stakeholder distribution list, including issue details and screenshots.

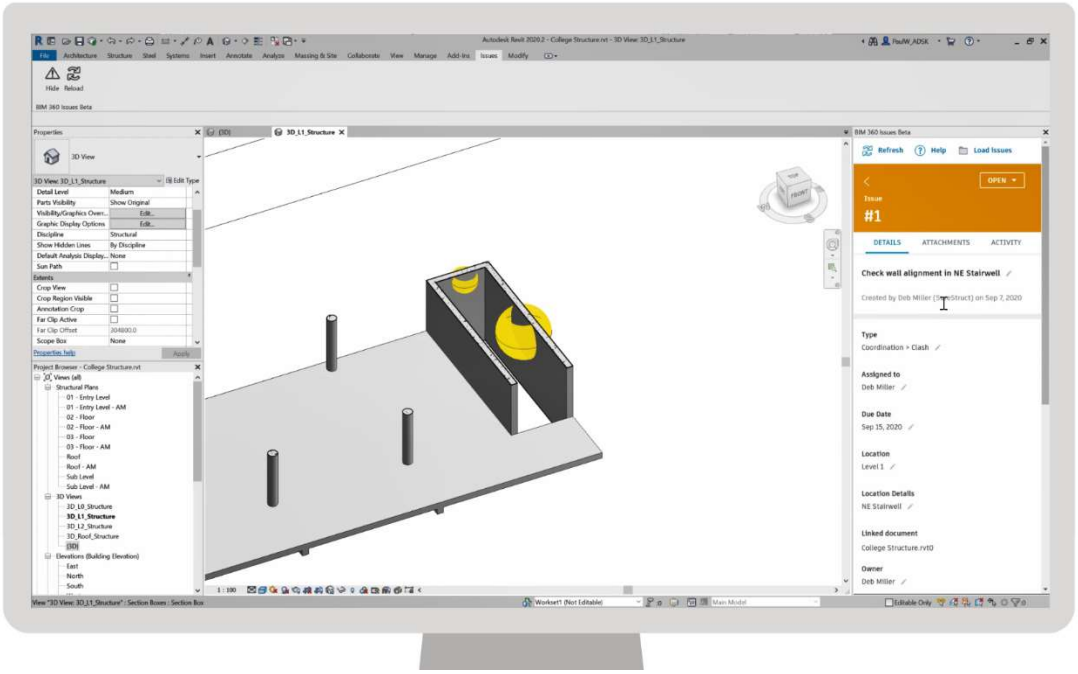


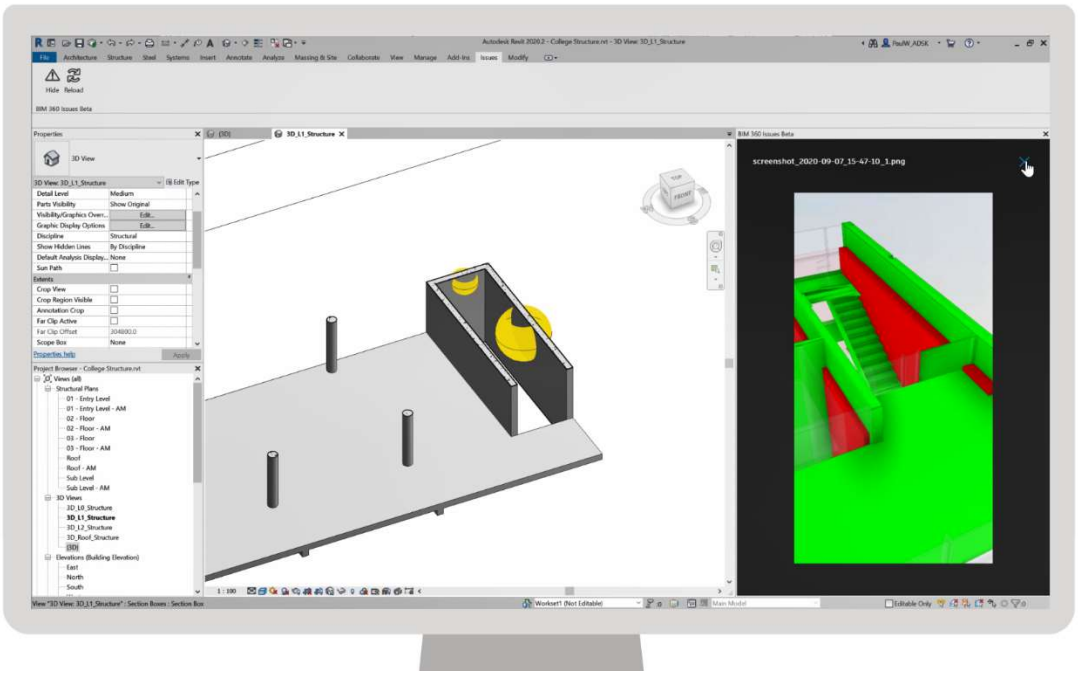


Issue resolution

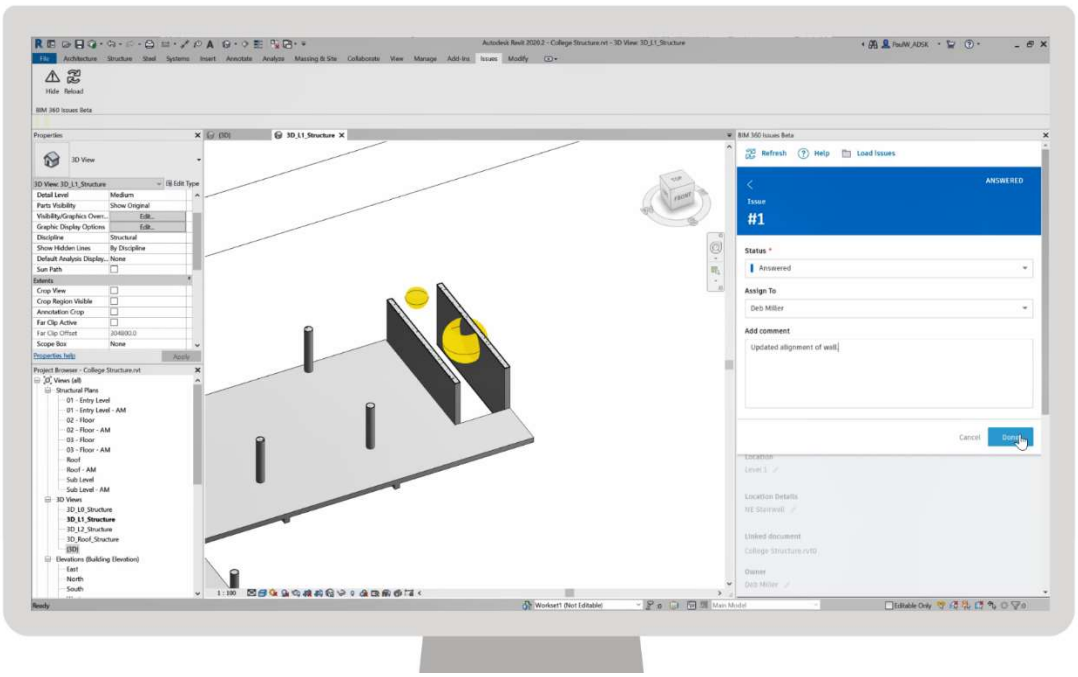
Whether issues are detected and raised in Navisworks, Model Coordination, Design Collaboration, Docs or any BIM 360 Issues connected-client they can now be accessed in an Open Beta of the Revit Issues Add-in.

BIM 360 Issues within Revit will take you to the saved camera position for the associated 3D view and provide details of the issue and any associated screenshot - particularly helpful in understanding the reported problems.

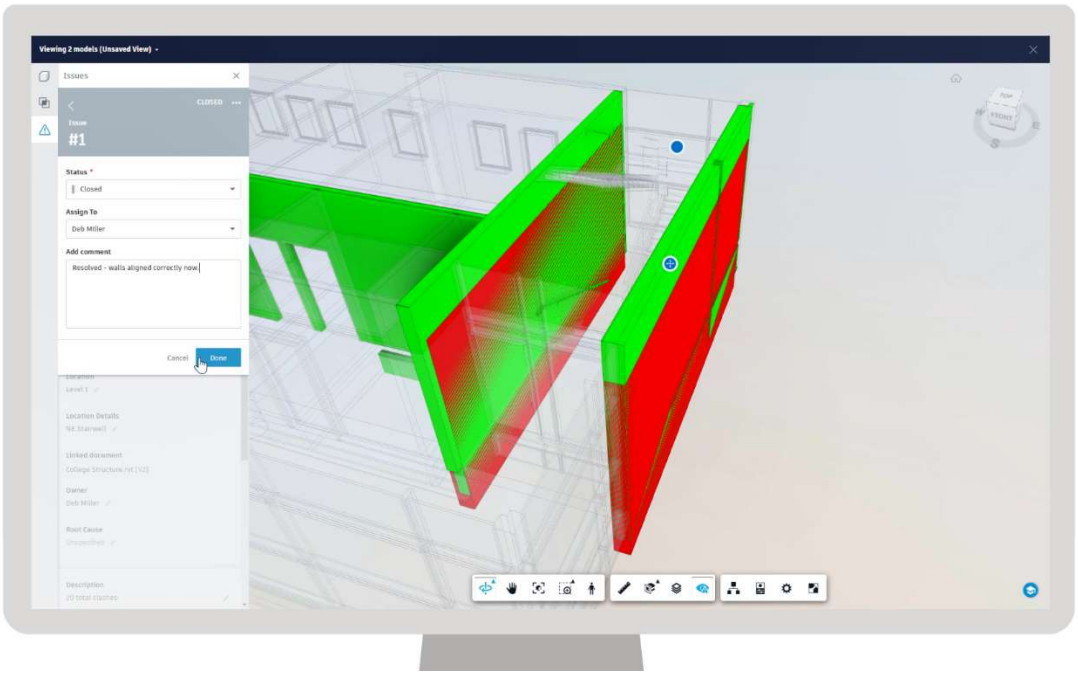




After updating the model to resolve the problems, the issue status can be updated and comments added directly from Revit then repeated for subsequent issues, which can be prioritized and filtered by due date and other attributes.

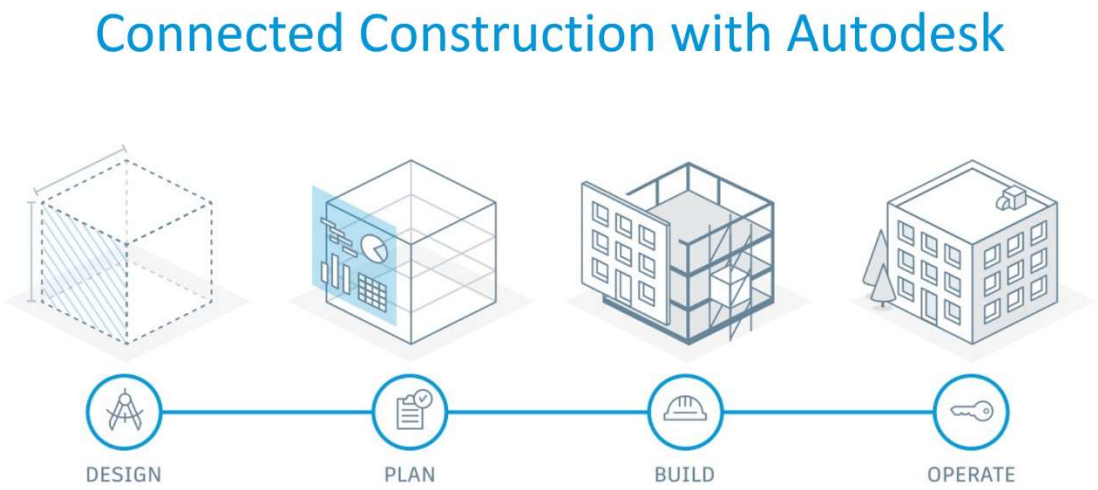


Sync'ing and publishing the latest changes to Docs will trigger Model Coordination to pick up the latest content, automatically updating clash tests and enable validation of issues before closing them out.



Those validated changes can then be shared via Design Collaboration with all stakeholders, as a new package version – adding a layer of control whilst ensuring everyone has access to the latest and greatest versions.

Connected Construction with Autodesk Construction Cloud



Bringing together these workflows we are not only helping the design coordination process, we are helping the whole project team across all project phases.

By helping to increase the quality of sign-off models, this increases the quality of construction documents being handed off to the Build phase.

Outcomes of improved model coordination

You have learned how a better model coordination process can help the project team and BIM/VDC Manager in a practical way – but these improvements can also make a huge long-term impact at the organizational level.

Further reading

There have been several sessions at previous Autodesk Universities, presented by customers providing their perspective and workflows with BIM 360 Model Coordination, including:

INSTRUCTIONAL DEMO CS322514

Democratizing Clash Detection with BIM 360 Model Coordination to Improve Design Quality

Dennis McNeal, Matt Anderle

INSTRUCTIONAL DEMO AS322218

Cloud-Based Clash Detection for Megaprojects Using BIM 360 Software's Model Coordination

Cameron Schaefer. Pedram Oskouie

INSTRUCTIONAL DEMO AS226612

Don't Wait Until the Glue Dries—Move to Model Coordination

Katie Watton

Recommended Workflow Guide for Navisworks + Model Coordination

The September 2020 BIM 360 Issues for Navisworks update (available to download from the Autodesk App Store), provides a powerful integration with BIM 360 Model Coordination, enabling connected-coordination workflows across desktop and web. BIM 360 Coordinate customers can now follow a new workflow and benefit from the best of both solutions - automated clash and ease of use in Model Coordination for discipline/trade self-checking; and specific clash checking and 4D simulation in Navisworks for the experienced 'power-users'. BIM 360 Issues provide a common method for assigning tasks to improve model quality and tracking these through to completion.

Whilst this latest version can continue to support the NWD-based issue workflow, managed via Desktop Connector (as offered by BIM 360 Issue Add-in v1), it is recommended to Open Models from Model Coordination for an improved collaborative experience:

1. **BIM 360 Setup**
   a. Create folders in BIM 360 Docs Project Files with permissions for members participating in design development and coordination. This can either be managed directly in BIM 360 Docs, or via Design Collaboration Admin.
   b. Create Coordination Spaces in Model Coordination Admin, mapping to your 'Team', 'Shared', or other 'Coordination' folder. This can also be configured via Design Collaboration Admin.

2. **Upload or Publish Model Content to Your Docs Folder(s)**
   a. It is recommended to save models (or 3D Views in Revit) isolating trades/disciplines by location, e.g. level.
   b. Upload DWG or IFC files directly in BIM 360 Docs; save RVT files as Revit Cloud Model; or if co-authoring cloud models, use Revit Cloud Worksharing.
   c. If using Design Collaboration, create, share and consume Packages between Teams. If not, model files can be manually copied between folders in Docs to emulate this workflow.

3. **Curation of Review Content (Optional)**
   a. Starting in Model Coordination, search/filter and select models by location (or similar) and save as a View. Setting a View to Published will make this available to other Model Coordination and Navisworks users. These will provide focus for collaborative review and eventual sign-off.

4. **Team Self Checking**
   a. Leverage Model Coordination's automated aggregation and clash detection for Design and Trade Teams to check their own model quality and review against model data shared by other Teams. Supported formats include RVT, DWG and IFC (from Revit, ArchiCAD and Tekla).
   b. Use any pre-defined Views in Model Coordination to filter and focus review content.
   c. Assign and track work to be done with unified Issues in Model Coordination.

5. **Formal Coordination**
   a. Open Models in Navisworks via the Coordination tab. Choose your Account, Project and Coordination Space.
   b. Open all models, a custom selection, or via a View pre-defined in Model Coordination (see 3a).
   c. Use any Navisworks tools to create Search Sets, Viewpoints, 4D Simulations and specific Clash Tests, including clearance tests, etc.

   Note: Clash data is not shared between Model Coordination and Navisworks; however Issues are unified.

   d. Create unified BIM 360 Issues for any observed constructability problems or clashes, marking clashes as Reviewed Status, for example, and adding Clash Test and Number details to the Issue for reference. Screenshots will be captured against the issue, including markups.
   e. Save your Navisworks session as an NWF, which can be stored in a relevant folder in BIM 360 Docs, using Desktop Connector.

   Note: Additional file formats including Point Clouds can be Appended in Navisworks with the models from Model Coordination, however you will only be able to create Issues against those models opened from Model Coordination. Appending other file formats via Desktop Connector will enable clashing against these in Navisworks, however the NWF will only open correctly for the user saving the NWF file. NWF files shared with other Navisworks users will only resolve models opened from Model Coordination (see below).

6. **Review Issues and Update Models**
   a. Review assigned issues in any connected-issues client, including BIM 360 Docs, Design Collaboration, Model Coordination, or the Revit Issue Add-in Beta.
   b. Add Issue Comments to send and track any communication with project members.
   c. Update models in authoring apps, uploading/saving new versions to BIM 360 Docs.
   d. Update Issue Status to Answered to alert the issue owner that it has been fixed.

7. **Share, Open and Update NWF**
   a. Any Navisworks user with permission to view the BIM 360 Docs folder(s) and Model Coordination can open the NWF and it will resolve the referenced models (originally opened from Model Coordination), loading the latest versions managed in BIM 360 Docs.
   b. Re-run clash tests for Navisworks to update the results, including identifying any new clashes and setting the Resolved Status for those clashes which have been fixed.
   c. Review Answered Issues and set to Closed.

8. **Dashboards and Reports**
   a. At any time, go to the BIM 360 Insights module to access Coordination Issue Dashboards to see who has open and closed issues.
   b. Create and schedule detailed issues reports from BIM 360 Insights, including screenshots of issues generated from either Navisworks or Model Coordination.