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SD500068

Autodesk Construction Cloud API アップデートと今後の予定

原田美佳子
Autodesk

セッションの目標

- 最近追加された Autodesk Construction Cloud に関連する Forge API について説明します。
- AU の時期にあわせてリリースされる予定の新しい API についてご紹介します。
- 既存の API にどのような拡張が行われているかについて説明します。
- 将来の開発計画についてお話しします。

概要

このクラスでは、Autodesk Construction Cloud の API の現状、最近追加された API と近い将来にリリースされる予定の API について説明します。

講演者

原田美佳子 米国カーネギーメロン大学で博士号を習得。ゼネラルモーターズ人工知能認知システムグループ、スイス連邦工科大学研究員を経て、現在米国オートデスク Forge AEC マネージャーとして世界中のパートナーを支援する役割に従事。詳細 は **blog** を参照:

<https://fieldofviewblog.wordpress.com/>

以下は、英語のセッション **CS500022** のハンドアウトを添付しております。

CS500022

Autodesk Construction Cloud API Updates and Beyond

Mikako Harada
Autodesk

Learning Objectives

- Discover Forge APIs that have recently been added for Construction Cloud products
- Discover which new APIs are scheduled to come out around the Autodesk University (AU) time frame
- Learn about the enhancements that are being made to existing APIs
- Discuss plans for future development beyond the AU time frame

Description

In this class, we will present the current status of the APIs for Construction Cloud software, discussing the APIs that have recently been added and those that we expect to release in near future.

Disclaimer: This class talks about APIs that have not been officially released. Some portion of contents in this handout may be subject to change.

Speaker(s)

Mikako Harada works as Senior Manager for Developer Technical Services team at Autodesk. She provides API (Application Programming Interface) technical support for AEC products, including Revit, BIM 360, Autodesk Construction Cloud and Forge. Prior to joining Autodesk, she worked as a researcher for the Swiss Federal Institute of Technology (ETH) in Zurich. While at ETH, she worked with projects involving the development of web-based collaborative environment with the Swiss building industry and web-based visualization projects for business data archive systems. She was also a researcher for Engineering Design Research Center at Carnegie Mellon University (CMU), and for Artificial Intelligence Cognitive Systems group at General Motors Technical Center. Her interest is in the areas of interactive techniques, optimization and layout synthesis. More on her [blog](#).

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Prerequisites

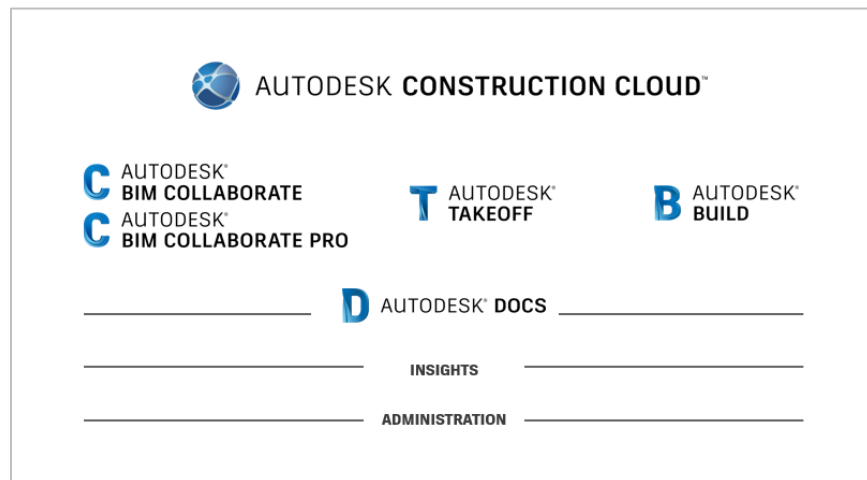
This class assumes you have the basic understanding of Web services and REST API, and you are familiar with BIM 360 and/or Autodesk Construction Cloud products. Experience with existing Forge API, such as Document Management, Model Derivatives and Viewer, will be a plus to understand the discussion in detail, but not necessary for decision makers.

Agenda

- Autodesk Construction Cloud Overview
- API Status and Updates
- Takeoff API ^{*1}
- Property Indexing v2 API ^{*1}
- Relationships API
- In Pipeline

^{*1}) As of this writing, Takeoff API and Property Indexing v2 API are not officially released. We hope to see them released near future.

Autodesk Construction Cloud



The last year at AU, Autodesk announced Autodesk Construction Cloud unified products. They were released earlier this year. There are five (5) products:

- **Autodesk BIM Collaborate and Pro** – this is for design workflow. Pro version includes Revit Cloud Worksharing, Collaboration for Civil 3D and Plant 3D.
- **Autodesk Takeoff** – this is for 2D & 3D quantification.
- **Autodesk Build** – this is for project and field management. This brings together the best of BIM 360 and PlanGrid into a single product.

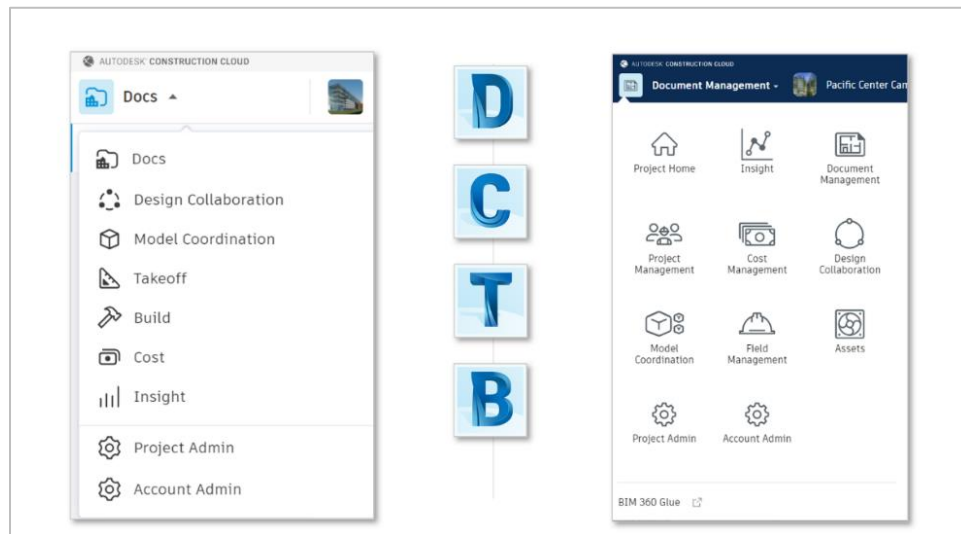
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The above share Autodesk Docs as the common foundation layers:

- **Autodesk Docs** – this is for document management or Common Data Environment. The common layer also includes **Insights** for Analytics and Data extraction, and **Admin** or Administration module.

We will call Autodesk Construction Cloud as ACC for the remaining of this document.

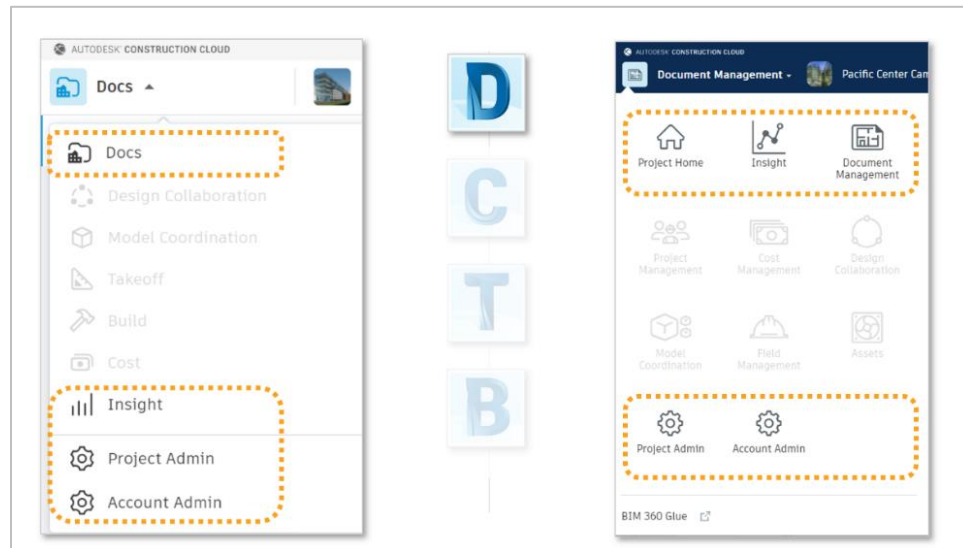
Products/Subscription and Modules



The above picture shows a list of available modules as of August 2020, side by side: ACC on the left with light colored header, and BIM 360 on the right with dark colored header. ACC unified products are branded as new. But you see tools that you are already familiar with through BIM 360. In fact, ACC subscription includes BIM 360. You can create both ACC and BIM 360 project.

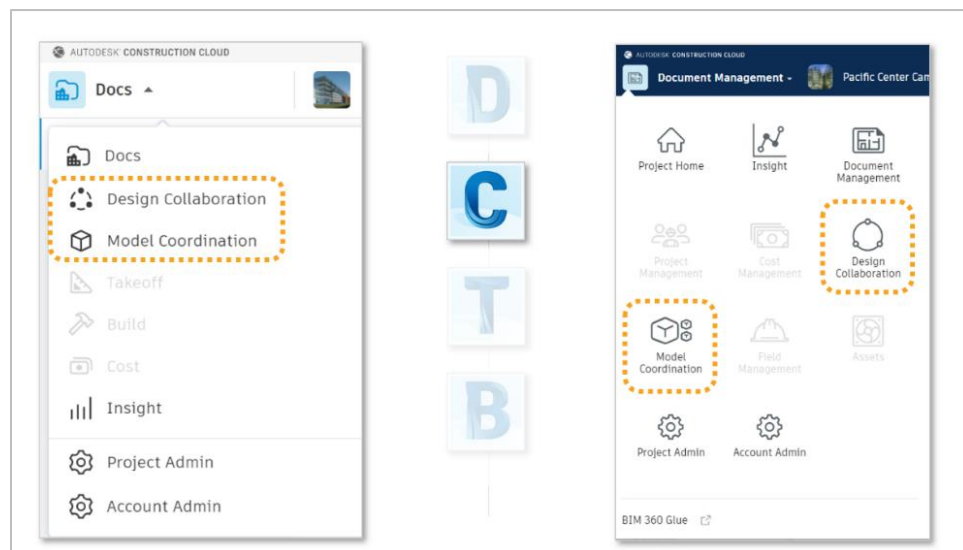
Let's quickly look at what modules are included in each product. Later, we will talk about APIs enhancements by modules.

Autodesk/BIM 360 Docs



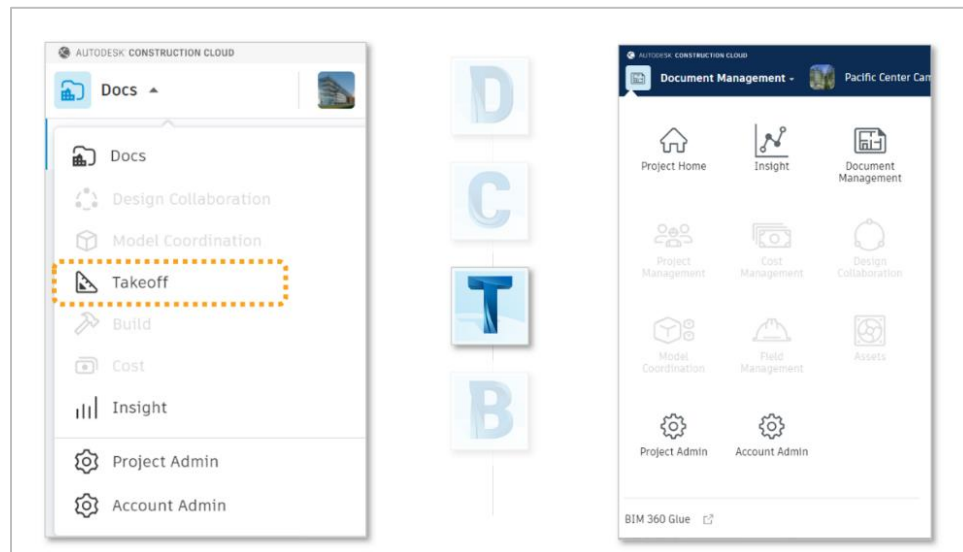
The picture above highlights the modules included in Autodesk Docs, which is a common environment for all products. As mentioned earlier, it includes Docs, i.e., document management, Insight, and Project & Account Admin.

Autodesk BIM Collaborate/BIM 360 Design & Coordinate



Autodesk BIM Collaborate (the picture above) includes Design Collaboration and Model Coordination.

Autodesk Takeoff



Autodesk Takeoff (above) is available only in ACC.

Autodesk/BIM 360 Build



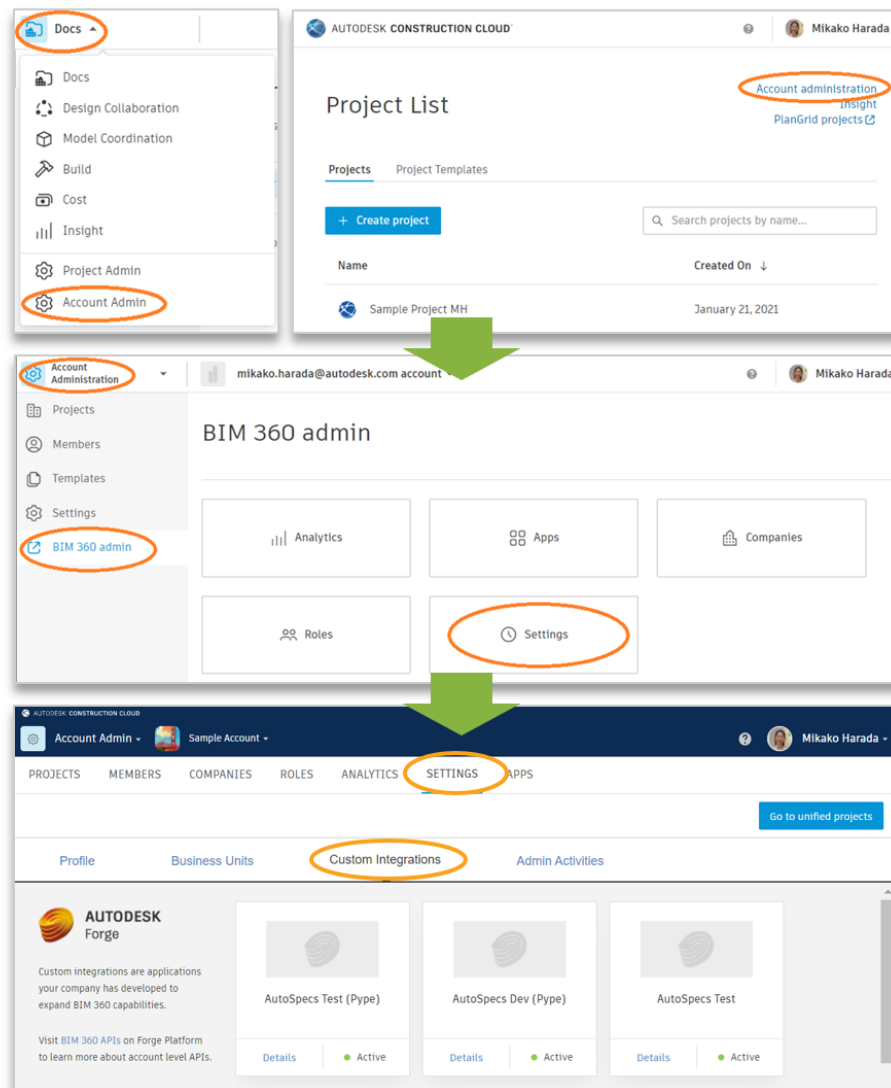
Autodesk Build (above left) combines Project Management, Field Management and Assets, and puts them together under Build. In BIM 360, Cost was a separate “add-on”. Autodesk Build includes Cost by default.

BIM 360 and ACC API Status and Updates

Next, let's take a look at the latest status of BIM 360 and ACC APIs, including recent updates.

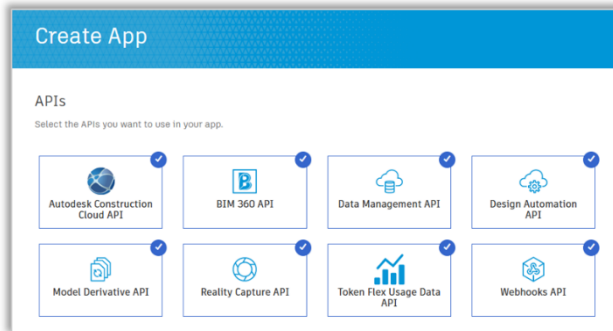
API Access with ACC Products

Accessing API with ACC products is the same as BIM 360. In fact, at the time of this writing, you will need to go to BIM 360 Account Admin UI → Settings, to provision your apps. To get to the BIM 360 UI from ACC, you first go to Account Admin, either through the project listing page or at the bottom of module listing. Once in Account Admin, choose “BIM 360 Admin” and “Settings.” It will bring you the familiar BIM 360 Settings page. (image below).



Custom integrations tab should be active by default for any new accounts for both BIM 360 and ACC. No more need to contact Autodesk to activate API access!












API Types to Choose for ACC and BIM 360



New API type “ACC” is added to Dev portal (picture above). If you are using BIM 360/ACC compatible API, you can continue using BIM 360 API type. If you are using ACC specific API, you will need to choose ACC. i.e.,


- BIM 360 only, → then include “BIM 360 API”
- BIM 360 and/or ACC, but you only use compatible APIs, → include “BIM 360 API”
- BIM 360 and/or ACC, and you want to use the full range of APIs, → include “BIM 360 API” and “Autodesk Construction Cloud API”
- ACC only and you only use ACC specific APIs, → include “Autodesk Construction Cloud API”

The table below depict these choices.

Product(s) to Support	Proxy to Use
BIM 360 	BIM 360 API 
BIM 360/ACC Use compatible API's only  	BIM 360 API 
BIM 360/ACC. Use full range of API's  	BIM 360 API & ACC API  
ACC Use ACC Specific API's only 	ACC API 

API Changes in ACC at Glance

API Changes




Changes

- Issues
- Admin
- Checklists

Partial Changes

- Docs specific API: single-page pdf, plans/sheets, permissions.
- RFI – no attachment



No Changes

- Cost
- Assets
- Data Connector
- Model Coordination

*) some provide /construction/ in base url in place of /bim360/

The above shows a big picture version API change in ACC. Main changes you may want to be aware are with issues, admin and checklists.

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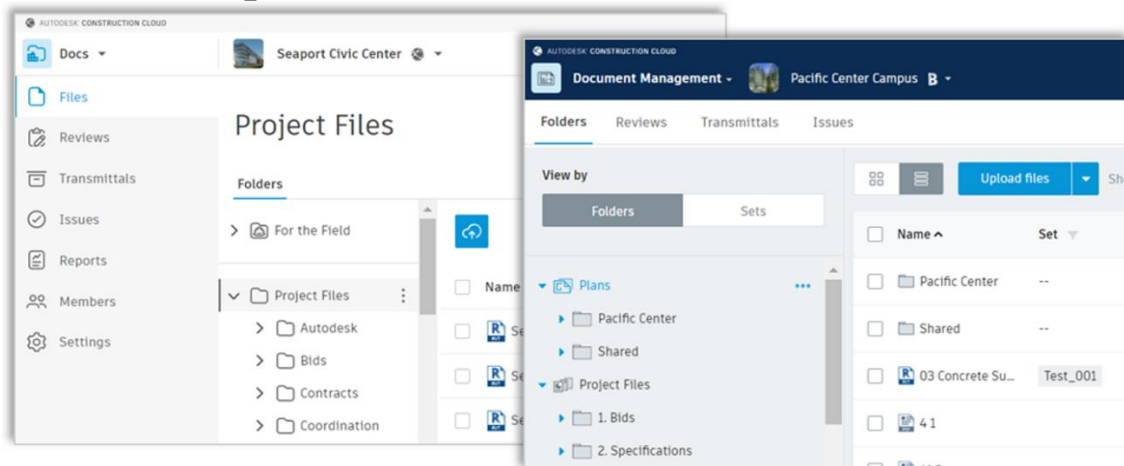
Data Management API that is common across Autodesk products has no change. However, Docs specific API are also different. RFI API is mostly compatible except attachment.

Cost, Assets, Data Connector and Model Coordination API are unchanged and compatible with ACC. They may provide a new set of endpoints where `/bim360/` is replaced with `/construction/`. But both versions point to the same implementation in the backend. (In future, as we start seeing difference in the product feature, we may see the difference in API as well.)

API Statuses by Modules

Next, we will quickly go over each module, pointing to changes and enhancements in API.

Document Management



There is no change in Data Management API that is common across Autodesk products. However, there are a few Docs specific APIs which require attention because of feature changes.

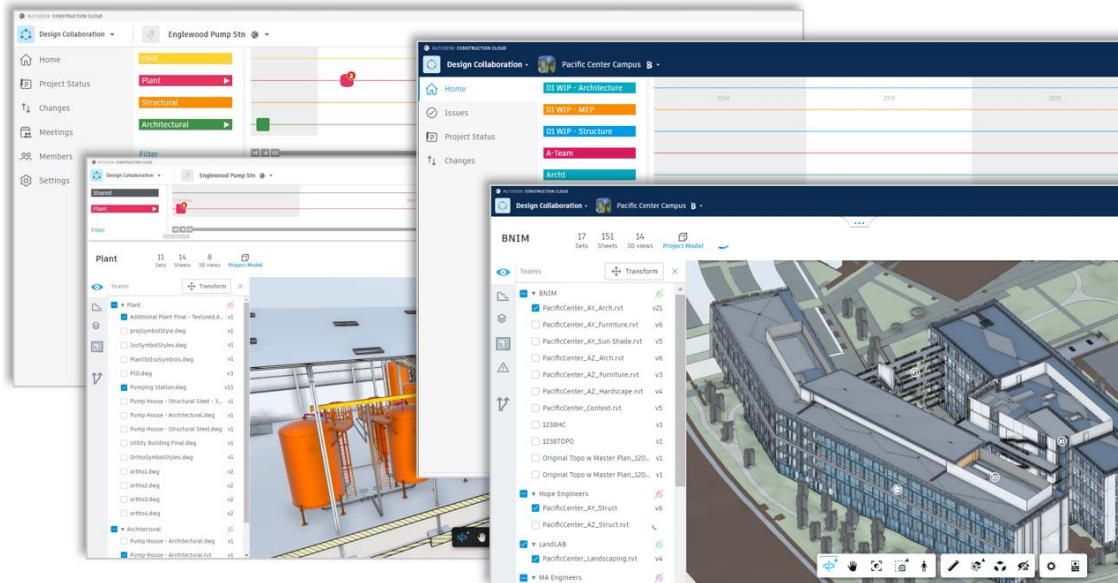
- There is no “Plans” folder in ACC. Single page pdf extraction or “pdf export” API is not applicable in ACC.
- **Permissions** – there is a slight change how the permission is set in ACC. API endpoint itself is the same. But you may need to use different keywords or combination to set permissions. You can find the documentation about it [here](#).
- **Custom attribute** - there is a behavior change to the projects after March 23, 2021. API we have is based on old behavior. We will need to have it updated.

To distinguish if the project is ACC or BIM 360, you can use Document Management API, GET projects. In response, check:

```
projectType under data[].attributes.extention.data.
```

Important! [CreateFolder command](#) will be deprecated by Jan 2022. If you are using CreateFolder command, please use [POST project/folders](#) instead.

Design Collaboration

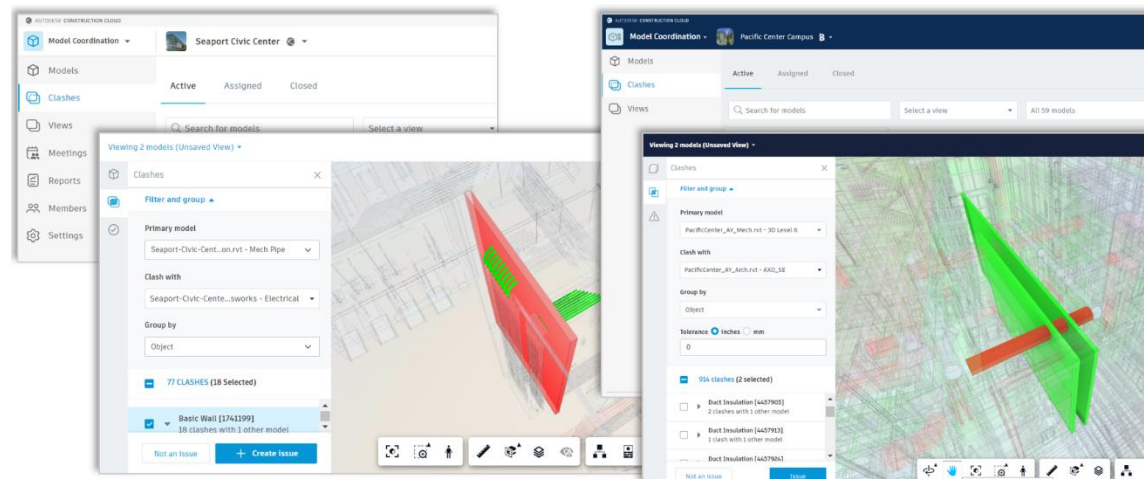


Design Collaboration now supports rvt, dwg and ifc. PRO version supports Revit Cloud Worksharing as well as Civil 3D and Plant 3D cloud model.

There has been very little API that support Design Collaboration feature (except some features that are exposed through in Model Derivative and Viewer). But one API for a feature used in this module is coming soon: i.e., the function to compare two versions. We will come to this later.

Not exactly Forge API, but one related topic is that Revit 2022 has API to initiate cloud model.

Model Coordination



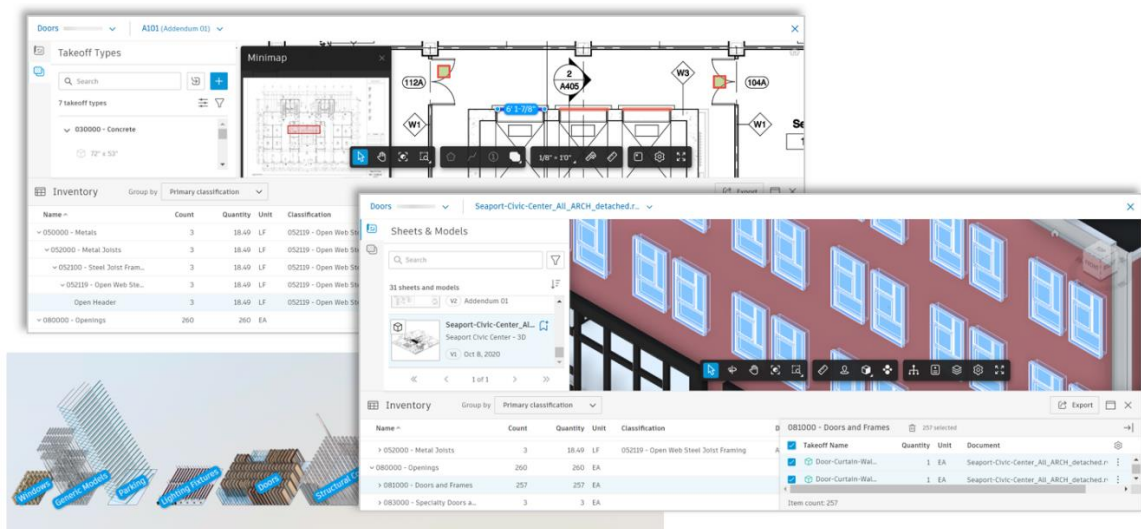
Model Coordination API is compatible with ACC. There is no difference at this time. There is a small change with v1 indexing API (both BIM 360 and ACC); i.e., Indexing v1

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API now run on-demand. Previously, indexing is triggered when files are uploaded and data was kept for 60 days. Now, you can call it as needed. Data can be accessible after 60 days.

The new version of Indexing API (v2) is coming soon. v2 is independent from v1. They can co-exist. The functionality of v2 will be accessible all models in ACC/BIM 360, and not limited to models in Model Coordination. Again, we will come back to this later.

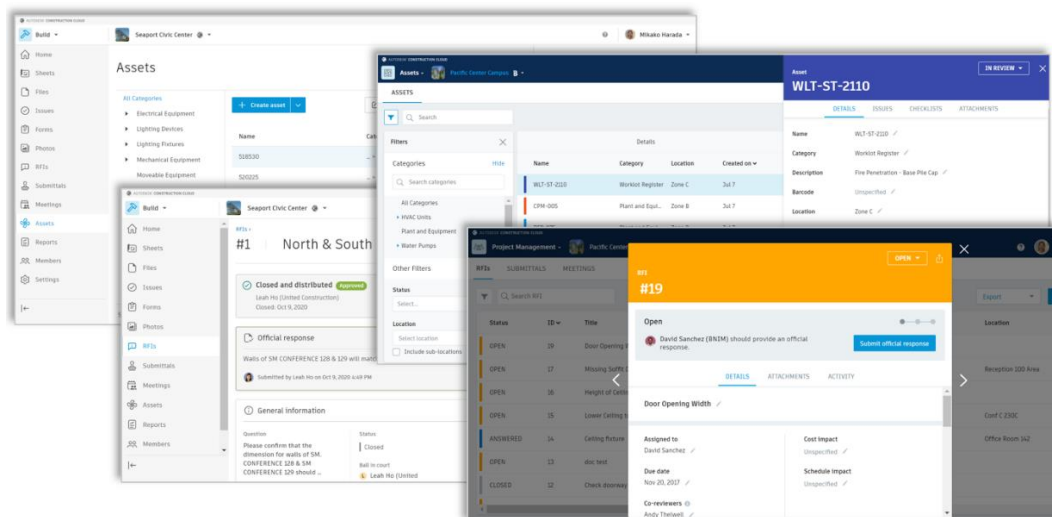
Takeoff



Takeoff is the ACC only feature. It offers a tool for quantification in 2D and 3D.

We are expecting to have API very soon. The scope of the first release is to read inventory data. Hopefully, write will follow soon after the initial release. (Side note: if you are familiar with Forge Viewer, **Form Cluster tool** you see in Takeoff is already available in viewer extension.) We'll come back to the Takeoff API later.

Build



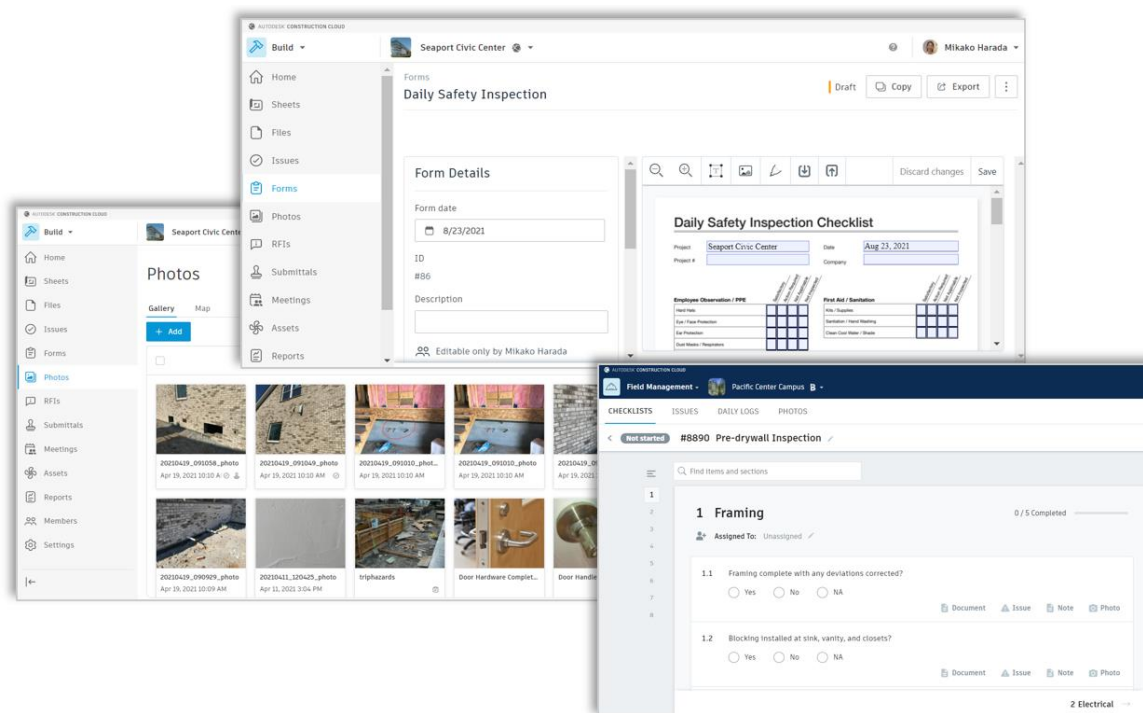
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Autodesk Build includes a collection of sub modules: Sheets, Issues, Forms, Photos, RFIs, Submittals, Meetings, Assets, Reports, and Cost. Build is the product which see the change from BIM 360 most.

Assets API was released in February 2021, and it is currently in public beta. API is compatible with ACC. Small enhancement is expected near future, such as additional query parameters for creating status set and custom attributes (TBD), and providing Error codes (TBD).

RFI API is compatible, except attachments.

Both Assets and RFI APIs provide `/construction/` endpoints with ACC proxy. But functionality wise, they are same and point to the same implementation in the backend.



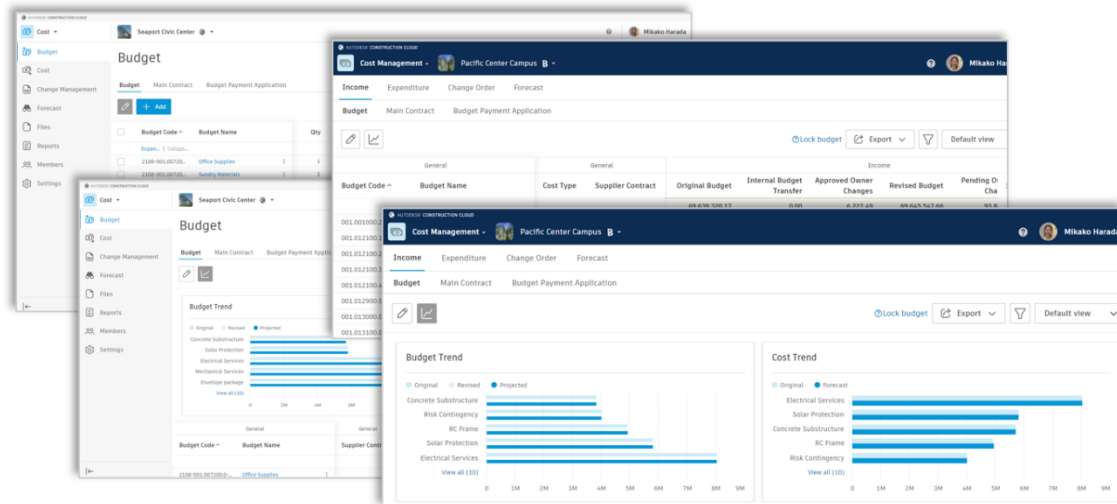
Checklists is BIM 360 only. ACC has no designated checklists module. Instead, it uses Forms. Obviously, it does not maintain compatibility. Checklist API is read only.

Forms is ACC feature. Two types forms: pdf & web forms. You can use forms for checklists and reports. Read API was released in March 2021. Two endpoints: GET form-template and GET forms.

Photos is also ACC feature. Read API was released in June, 2021. Two endpoints: POST photos:filter (to get a list of photos with filter capability) and GET photos/:photoid

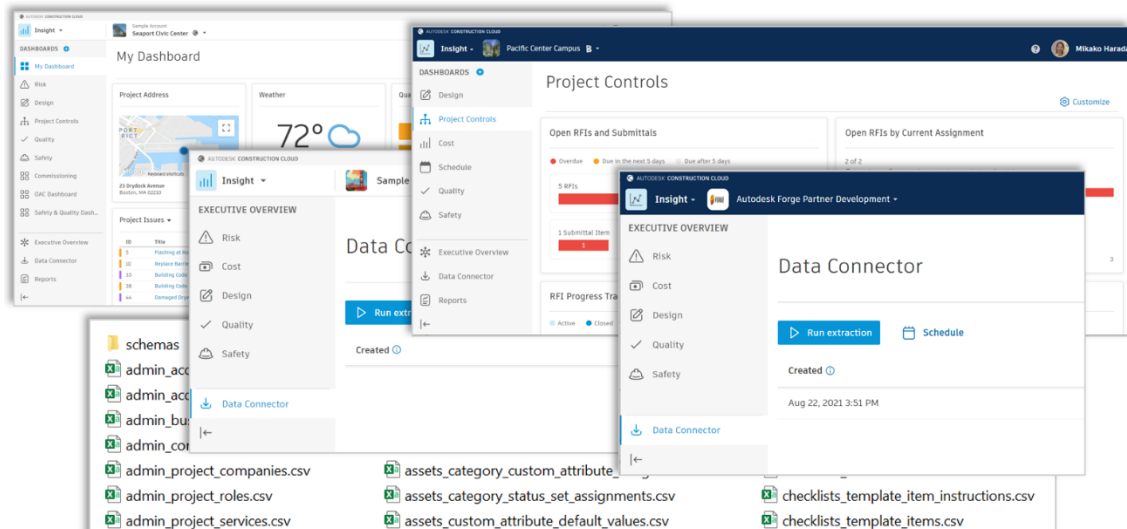
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Cost



Cost API has been released officially. (i.e., out of beta). The API is compatible between BIM 360 and ACC.

Insight

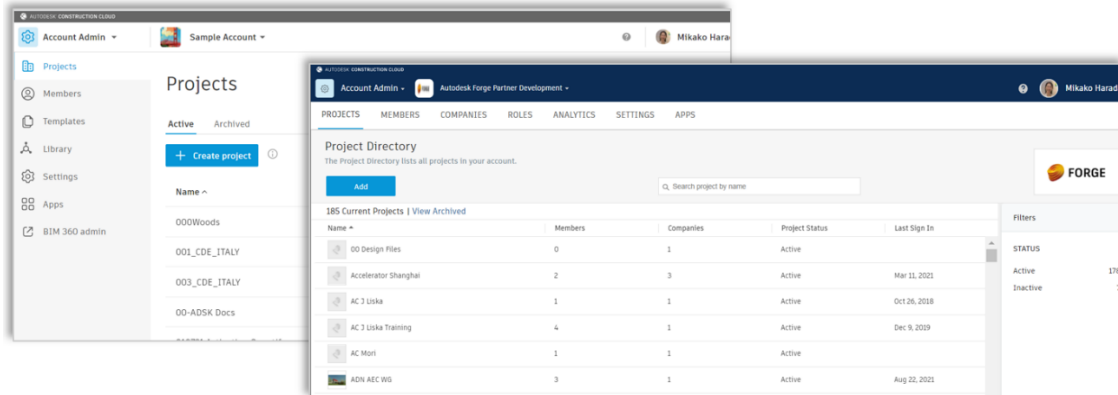


API related to Insight is Data Connector API. It was released in January 2021 as public beta. Data Connector API itself is compatible in ACC and BIM 360. However, Data may vary for the part that the product feature are different, especially ones in Build.

We have two near future enhancements planned. One is to provide schemas in json format. Currently it is in html and is not developer friendly (TBD). The second is extraction per project level (TBD). Currently, Data Connector API only support account level.

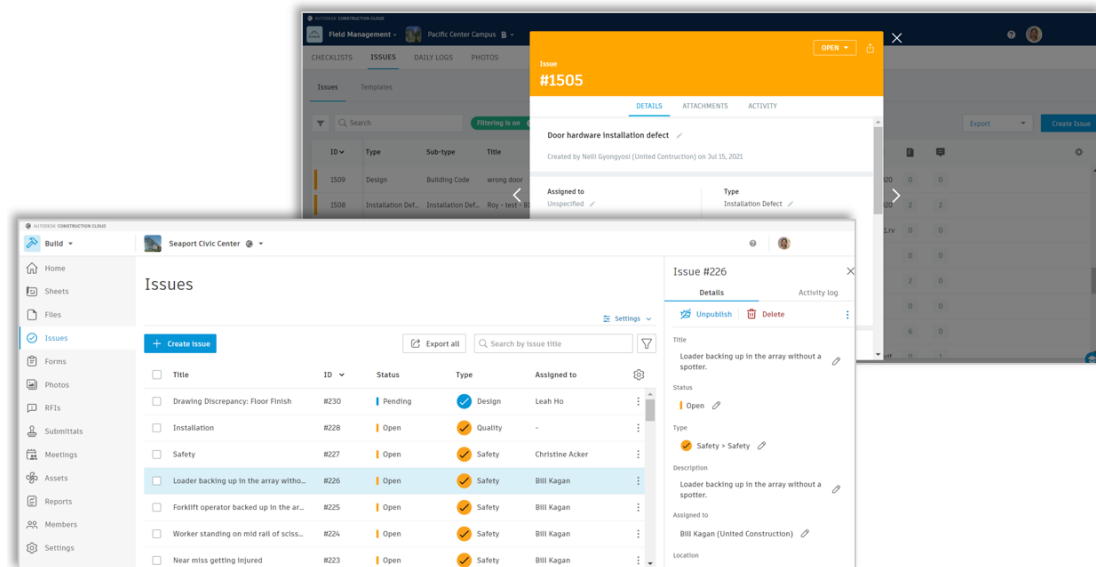
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Admin



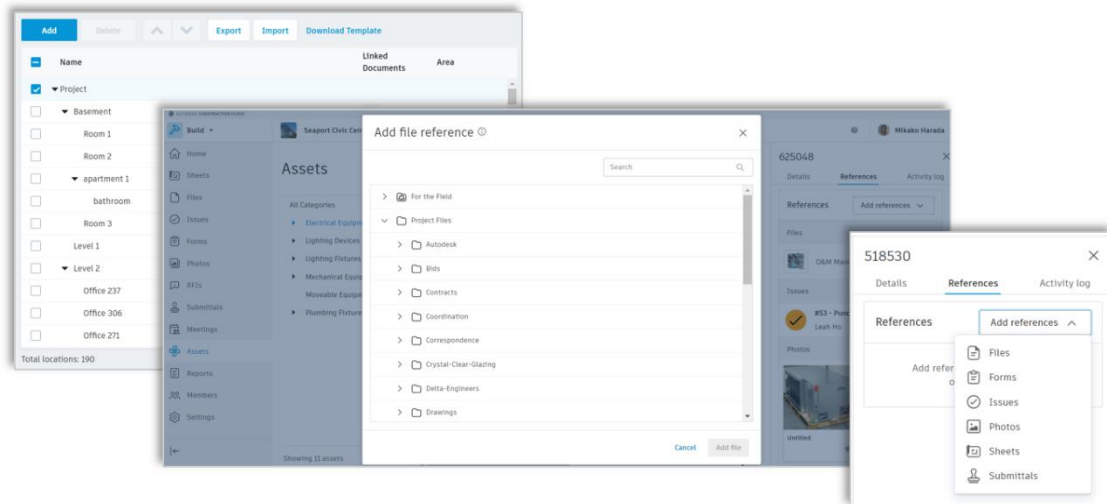
Existing BIM 360 Admin API is only partially compatible in ACC. No API to create ACC project at a moment. Minimum, providing the save level of API as BIM 360 is a high priority area.

Shared Services - Issues



Issue is a shared service. It is used in multiple modules as well as desktop products, such as Docs, Build, Design Collaboration and Model Coordination, Revit and Navisworks. Unfortunately, existing BIM 360 Issues API is not compatible in ACC. We will need to wait for a new set of API to comes out. Issues API is the high priority area.

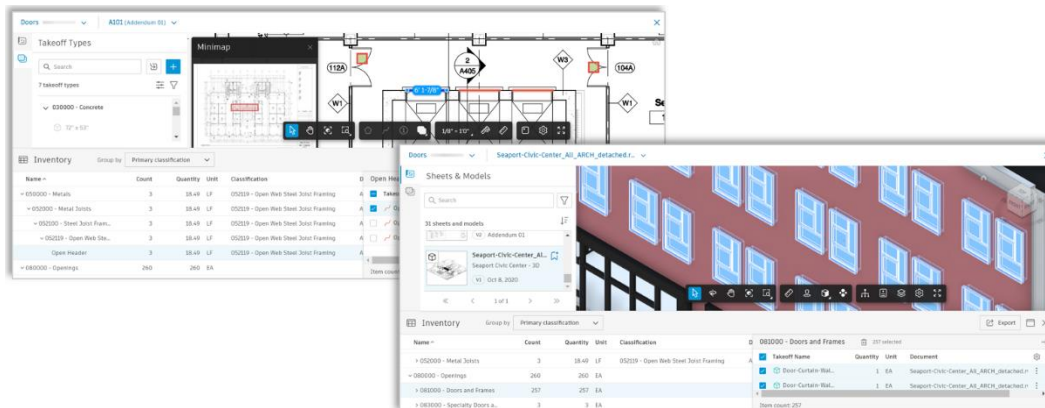
Shared Services – Others



There are other shared services made available.

- **Locations API** (read) was released in July 2021.
- **Relationships API** (write) was released in August. (Read was released last year.) We will come back to this later.
- **Indexing v2 API** which allows flexible filtering and compared versions API are expected to come near future. We will come back to this later.

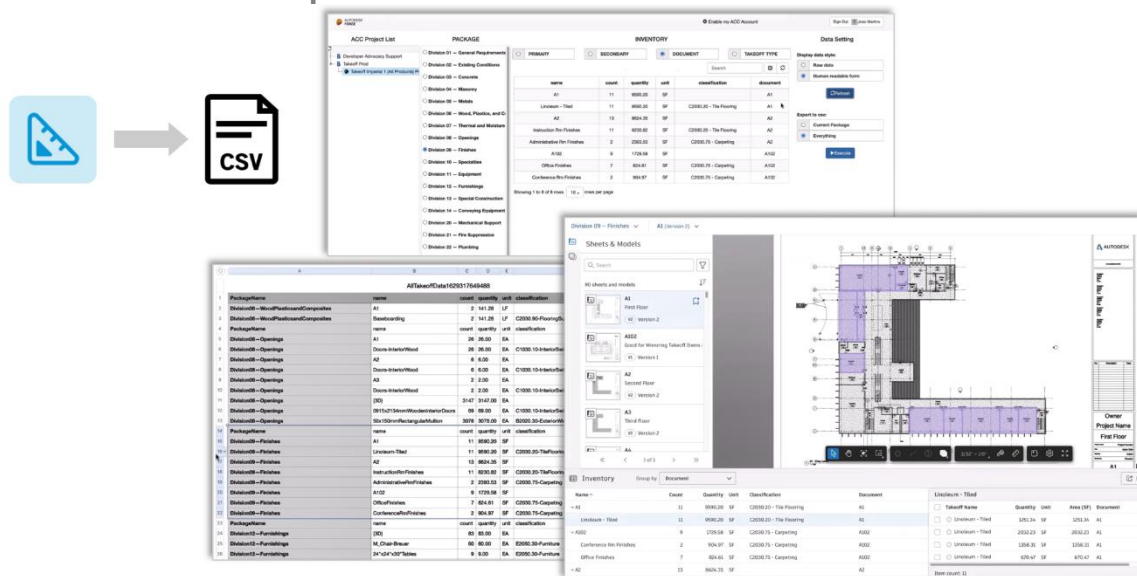
Takeoff API



As I mentioned earlier, Takeoff team is planning to release API, and at the time of this writing it is under review. The scope of initial release is to read Inventory Data: packages, takeoff item/type, measurement system, and content view. They also plan to continue with write, starting with for project setting, such as classification.

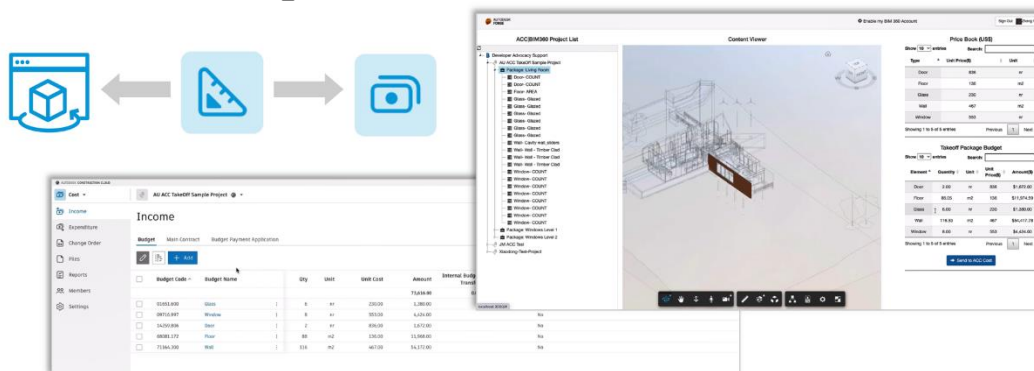
Next, we'd like to show you two sample applications using takeoff API. Both samples are written by our team and meant for code sample posted to GitHub when the API is officially released.

Takeoff API Demo 1: Export to CSV



The first sample is to export takeoff data to csv. This application read inventory data in Takeoff, create a custom web page, and export to csv. This sample is to demonstrate the basic read access with takeoff module.

Takeoff API Demo 2: Integration with Viewer and Cost



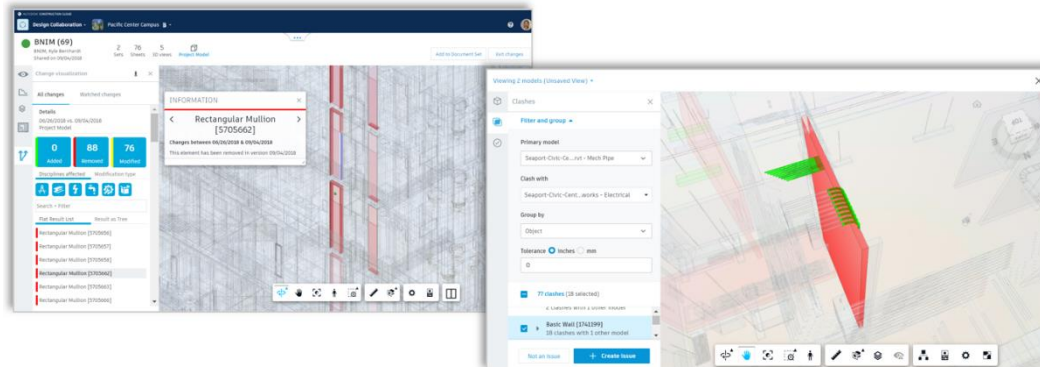
The second example demonstrates integration with Viewer and Cost module. It extracts quantity data from the Takeoff module, calculate and feed to budgets in Cost module. It also shows where the quantity data is from in a design model.

Developer Resource

We are still working on documentation on Forge developer portal. These samples will be made available as GitHub code samples. We will also intend to provide Postman collection.

Next, we will look at Indexing API.

Indexing v2 API



Property indexing v2 API is built on Derivative Services, extends properties data for analysis of BIM models. There two main functions:

- Index – this function allows to query property. It provides great flexibility to query, making it possible for granular control on search.
- “Diff” – you can compare two versions.

This is used in change analysis in Design Collaboration. There are other potential usages in model-based tools such as clash analysis. Both works with models in BIM 360 and ACC.

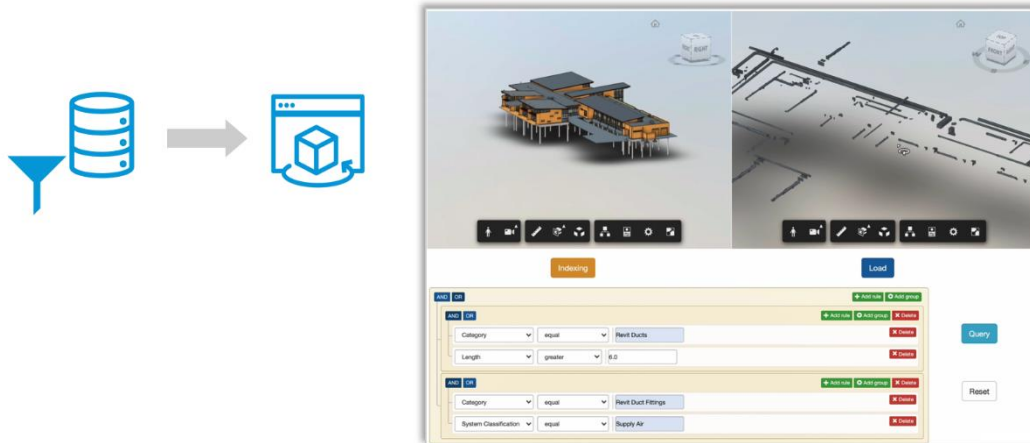
We will show you sample applications demonstrating these two functionalities.

Indexing v2 API Demo 1: Compare Two Versions



The first one is to compare two versions of a model and visualizes the differences in the Forge Viewer. Differences can be in geometries and properties. Elements may be added, modified and removed.

Indexing v2 API Demo 2: Filter Element and Partial Model Load

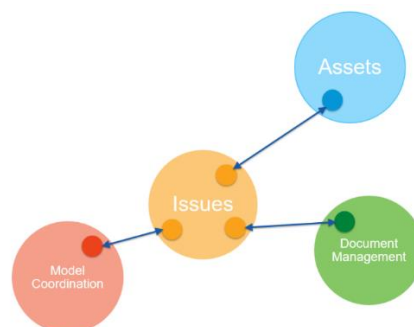


This sample demonstrates Filtering elements by properties, which can be geometric properties such as length and height. A filter condition is defined as a binary expression form and can be combined by AND/OR. The results are visualized in the Forge viewer.

Developer Resources

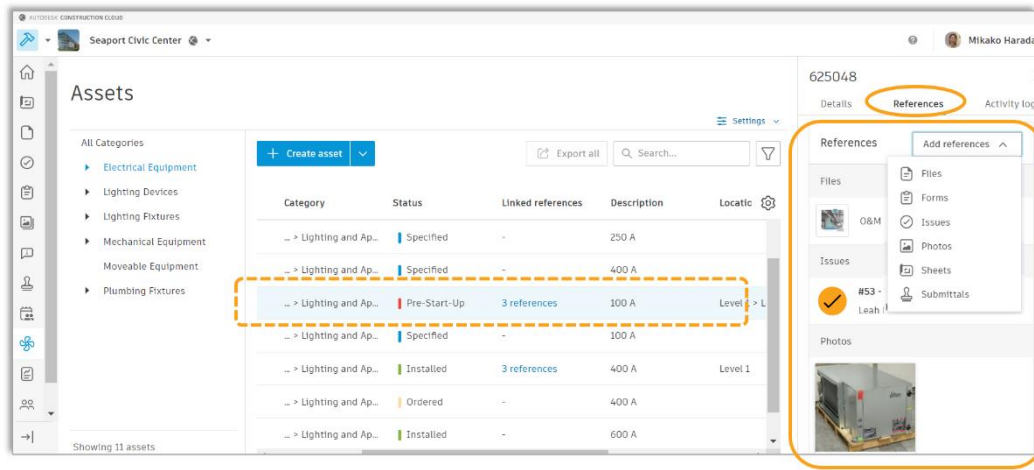
We are still working on documentation on Forge developer portal. These samples will be made available as GitHub code samples. We will also intend to provide Postman collection. We are also discussing the possibility to have a webinar or recording shortly after the API is released as this API may require more detailed explanations (TBD).

Relationships API



Last year, we introduced Relationships API. Relationships represent links between items or Entity that reside in different functional components or Domain.

For example, an Asset (shown below) may have reference to checklists/forms, issues and attachments. Checklist and Issues reside in Field Management, and attachments in Document Management. Relationship represents these reference between different functional components.



It is a helper function and is used for similar purpose in BIM 360/ACC by various modules. It was read-only. Now, we can create and delete relationships. The API is publicly available today.

There are three endpoints added to relationships API shown below:

Category	Endpoints
Utilities	POST relationships:writable
Modify	PUT relationships
	POST relationships:delete

- POST relationships:writable – this retrieves compatible entity types to create/delete relationships. We added this as not every entity/domain supports relationships.

Currently following domain/entity types are supported: Asset/asset category, Document/File lineage/version, Issues, Form/form field/form template. Photos. It is expected to be extended overtime.

Note: Assets API may provide workaround for unsupported types for the time being. In future, we should use Relationships API.

- PUT relationships – this is to create relationships.
- POST relationships:delete – this is to soft delete relationships.

Note that the user will need to have a write access to both entities to create a relationship.

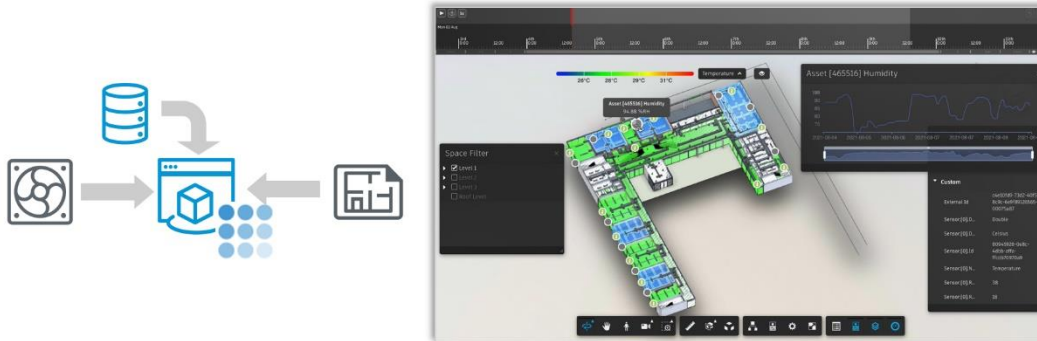
For further information, please refer to the documentation:

- [Tutorial- create relationships](#)
- [Reference Guide](#)

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Now, there is one more example, we would like to show.

Assets and Data Visualization sample



Last sample is an integration with Assets and Data Visualization. This is an extension of [sample "View asset in the model viewer"](#) we provided as a code sample for Assets. This makes use of new ["Data Visualization"](#) extension, a.k.a. Hyperion. We attach sensor information to equipment as custom attributes to keep the association between sensor data location and elements in the model. We will be providing code sample for this shortly.

Summary

In this session, we updated ACC and BIM 360 API with the current statuses, while comparing BIM 360 and ACC, what is changed and what is not between them. We talked about Takeoff API and Indexing API, which we hope to have near future.

For More Information

To learn more, please refer to materials listed below. **Note:** the documentation for the new APIs that have not been released is not available publicly yet as we are still working toward their releases. They will be made available through Forge developer portal (<https://forge.autodesk.com>) and GitHub (<https://github.com/Developer-Autodesk>) when they are released.

Product Help

- <https://help.autodesk.com/view/DOCS/ENU/DOCS> | [COLLAB](#) | [COORD](#) | [TAKEOFF](#) | [BUILD](#)

BIM 360 release note

- <https://blogs.autodesk.com/bim360-release-notes/2021/>

API Documentation

- [BIM 360 API](#)
- [ACC API](#) | [API compatibility table](#) | [changes in Docs](#)
- [Relationships API](#)

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- Excerpt from API Blog about BIM 360/ACC API released this year:
 - [New endpoint: get locations in BIM 360/ACC](#)
 - [Autodesk Build Photos API](#)
 - [Custom attributes projects created before and after March 23, 2021](#)
 - [First Autodesk Construction Cloud \(ACC\) specific API - Forms API](#)
 - [BIM 360 Assets API - public beta is here](#)
 - [BIM 360 Data Connector API - available as public beta](#)
- Recording from the last update
 - [DevDays Online: Autodesk Construction Cloud and API Updates.](#) (March, 2021). includes Data Connector, Assets & Relationships API.

Related Forge API Topic from Past AU Classes

- [SD468487 "BIM 360 API Update and Beyond"](#), by Mikako Harada. AU 2020. (incl. Assets and Relationships API)
- [CS468152 "Release Your Hands: Automate Your BIM 360 Project Setup with Forge"](#), by Zhong Wu and Mikako Harada. AU 2020. (Admin API)
- [BES468450 "Solve Clashes Automatically with Forge, BIM 360, and Revit Design Automation"](#), by Xiaodong Liang, Mikako Harada and Don Whittle. AU 2020. (Model Coordination and Revit Design Automation)
- [CS468447 "Efficient Ways to Visualize and Analyze Data in a BIM 360 Project with Power BI"](#), by Xiaodong Liang. AU 2020. (Power BI)
- [AULON481 "Revit on Forge: Learn How to Run Your Revit Add-in in the Cloud"](#), by Mikako Harada. AU London 2019. (Revit Design Automation)
- [FDC323834 "BIM 360 API Update"](#), by Mikako Harada, Simon Bee and Don Whittle. AU 2019. (Model Coordination and Cost API)
- [Forge DevCon Germany 2019, "BIM 360 API Update"](#), by Mikako Harada, Simon Bee and Don Whittle. AU Germany 2019. (Model Coordination and Cost API. Basic content is same as above. Slightly more detailed in Model Coordination portion.)
- [Moving to Forge and the Cloud with Your Existing .NET Experience](#), by Augusto Goncalves. DevCon 2018.
- [Bringing SharePoint and BIM 360 Together](#), by Shaili Modi. AU 2018.
- [New BIM 360 APIs to Empower Your Design and Construction Workflows](#), by Xiaodong Liang, Mikako Harada and Augusto Goncalves. DevCon 2018. (Issues, RFI, Checklist)
- [Demystifying the BIM 360 and Forge APIs](#), by Mikako Harada. DevCon 2017 (BIM 360 Docs)
- [Integrating Forge Data Management API with Other Storage Providers](#) – DevCon 2017 by Augusto Goncalves

Forge Resource - General

- Web: <https://forge.autodesk.com>
- Learning Resources
 - LearnForge Tutorials: <https://forge.autodesk.com/LearnForge>
 - GitHub: <https://forge.autodesk.com/GitHub>
 - Accelerator: <https://forge.autodesk.com/accelerator>

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- Questions
 - Get Help: <https://forge.autodesk.com/en/support/get-help>
 - Stack Overflow: <https://forge.autodesk.com/Stack>
 - <https://fieldofviewblog.wordpress.com/2016/10/27/where-to-get-help-about-forge/>
- Community
 - Blog: <https://forge.autodesk.com/blog>
 - Twitter: @AutodeskForge @mikako_harada
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