

免責事項：このセッションは英語のセッション**SD468487**をもとに、日本語で行います。以下に、英語のセッションのハンドアウトを添付しております。また、このセッションでは、正式にリリースされていない**API**について説明しますので、この配布資料の内容のは、一部は変更される可能性があります。

CS469611

BIM 360 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**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、**BIM 360**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**SD468487**のハンドアウトを添付しております。

SD468487

BIM 360 API Updates and Beyond

Mikako Harada
Autodesk

Learning Objectives

- Discover Forge APIs that have been added recently for BIM 360
- Find out what new APIs are scheduled to come out around Autodesk University time frame
- Discover what kind of enhancements are being made to existing APIs
- Discuss plans for future development beyond the Autodesk University time frame

Description

In this class, we will present the current status of the APIs for BIM 360 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

Mikako Harada works as a Senior Manager for Developer Technical Services team at Autodesk. She provides API (Application Programming Interface) technical support for AEC products, including Revit, BIM 360 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 at Engineering Design Research Center in Carnegie Mellon University (CMU), and 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](#).

Prerequisites

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

Agenda

- Autodesk Construction Cloud Overview
- BIM 360 & API Status and Updates
- Assets API ^{*1}
- Relationship API
- In Pipeline

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

Autodesk Construction Cloud

Last year at AU, Autodesk introduced Autodesk Construction Cloud, and talked about Autodesk's vision for building a powerful and complete portfolio of construction management products. [Please refer to product briefing sessions for the update on product side.](#)

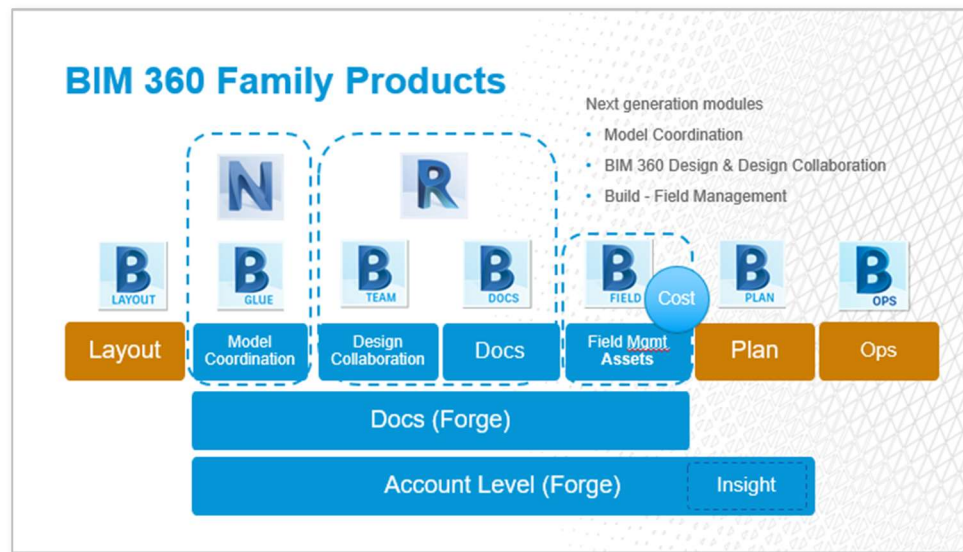
(cf. <https://construction.autodesk.com/products>)

BIM 360 and API Status and Updates

As many of you are aware, BIM 360 is continuously evolving. Let's first look at where we are with BIM 360 family products today. We have many branded as BIM 360 xxx. Some are standalone products. Some are modules built on top another. Some are bundled for purchasing. Some are Forge. Some are not Forge. It will be helpful to clarify. Currently, from the product users' perspective, we have the following products under BIM 360 branding:

- BIM 360 Glue
- BIM 360 Field
- BIM 360 Layout
- BIM 360 Plan
- BIM 360 Docs (and Docs based modules)
- BIM 360 Team (No new subscription as of April 2018.)
- BIM 360 Ops
- BIM 360 Design

In addition, we have several modules built on top of BIM 360 Docs. The figure below depicts the structure of BIM 360 family products and modules as of this writing:



BIM 360 Family Products and Modules

In addition, we have so-called “next-gen” or “next generation” modules which are built on-top of BIM 360 Docs:

- Model Coordination
- Design and Design Collaboration
- Field Management

Model Coordination is a feature module that detect clashes among models from different disciplines. It is positioned as a successor of BIM 360 Glue; the functionality is similar to BIM 360 Glues. But it uses a newer technology and is built on top of Docs, taking full advantage of having models stored in Docs as data at the center for other modules.

Design provides a suite of functionalities that ties Revit and BIM 360 Docs. It includes Revit Cloud Worksharing (RCW), which allows multi-disciplinary teams to work together during the modeling process on Revit, and **Design Collaboration** module that is built on top of Docs. Revit 2018.3 and earlier versions of Revit uses BIM 360 Team and Collaboration for Revit (C4R).

There are two versions of **Field Management**: BIM 360 Field (a.k.a., Field classic), and Field Management module built on top of Docs (a.k.a., “next-gen”). They are sold together as a bundle under the name of **BIM 360 Build**. For our audience, i.e., developer community, it’s important to understand that those two are separate products. **Cost** module is offered as Add-on for BIM 360 Build. **Assets** module is the latest addition to Build.

In this session, we will be talking about Assets API. We will come back to this topic shortly.

BIM 360 and API – Forge vs. non-Forge

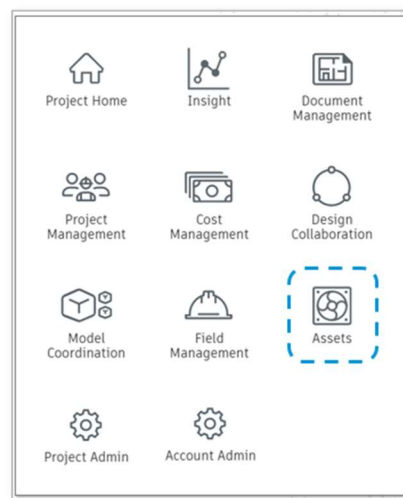
When we talk about API with BIM 360, one thing to note is that not every BIM 360 product is based on Forge. Not every product has API. Following lists the status of API:

- BIM 360 Docs (+ anything built on top) – [Forge API](#)
- BIM 360 Team – [Forge API](#). (No new subscription as of April 2018.)
- BIM 360 Glue – not Forge API except Admin functionality
- BIM 360 Field – not Forge API except Admin functionality
- BIM 360 Layout – not Forge API except Admin functionality
- BIM 360 Plan – no API
- BIM 360 Ops – no API

Any APIs which are built on top of Docs, including Issues, Model Coordination and Cost, are Forge. Glue and Field have API, but they are not built with Forge.

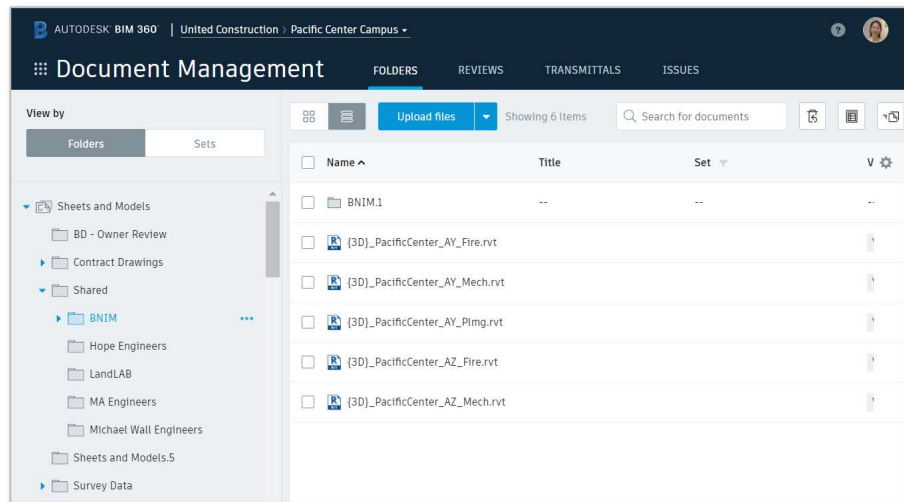
BIM 360 Modules

Currently BIM 360 Docs based BIM 360 has eleven modules, with Assets being the latest addition.



We will quickly go over each module, pointing to changes in API.

Document Management



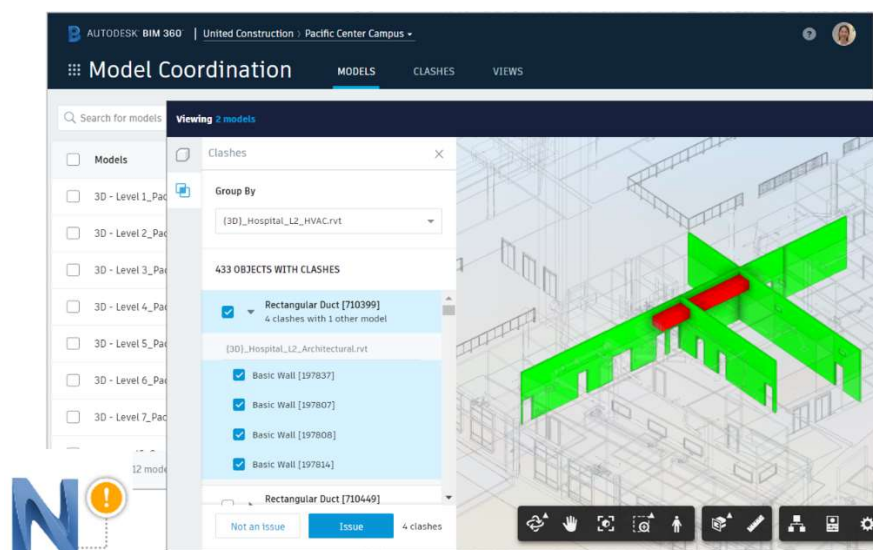
Document Management module allows users to manage 2D drawings/sheets and 3D models, and other project documents. This module is built on top of **Forge Data Management API**. You can use it to access files stored.

Recently, we have exposed API for two features:

- [read/write Folder permissions](#)
- [read/write custom attribute values](#)

Both are highly demanded feature. We are happy to see these finally made it. Note that API for defining Custom Attribute is still to come. I hope the definition will follow shortly.

Model Coordination

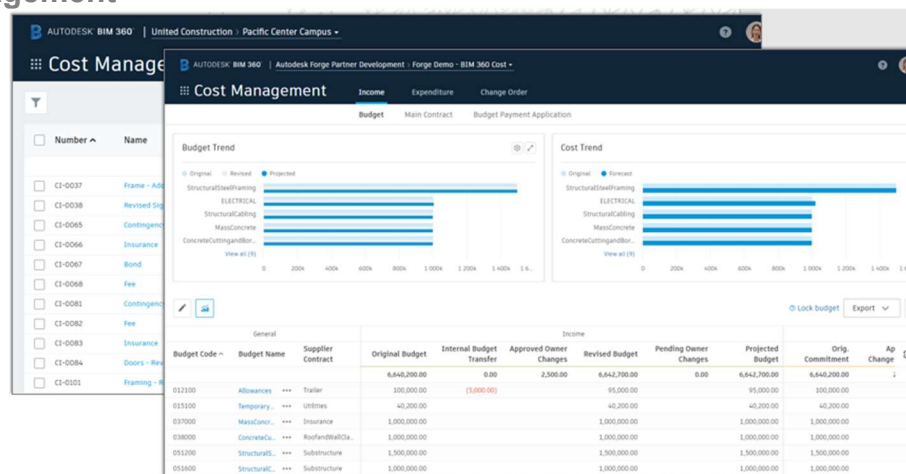


Model Coordination is all about clashes. It provides a coordination space to detect and review clashes among your project models. Recently, we released tighter integration with Navisworks, allowing Navisworks to open a model in Model Coordination. We also updated integration with Issues in BIM 360.

API for Model Coordination was introduced last year. It is now officially out of beta now. As the product now supports Project Files folder, API has been updated to support it as well. They also released **Relationship API**, which represents links between two items that reside in different modules. We will come back to this topic and explain later.

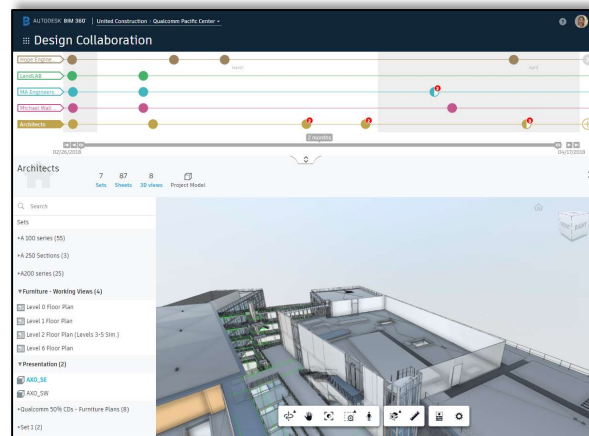
Cf. <https://blogs.autodesk.com/bim360-release-notes/2020/09/22/navisworks-issues-integration-september-2020-release-notes/>

Cost Management



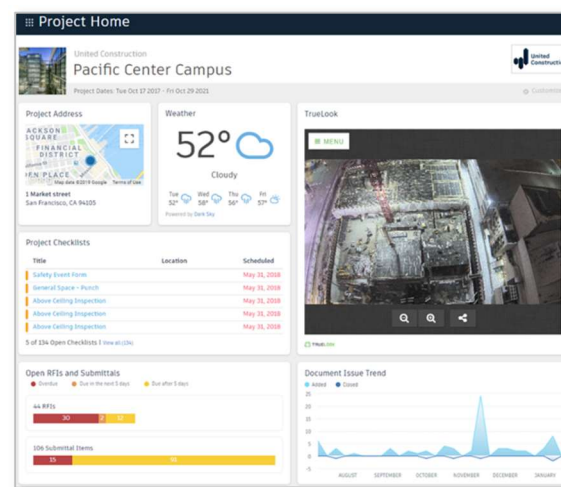
Cost Management allows you to manage the cost and budget changes to your project. Recently we have exposed **API for Budget Code template**. We have also added a capability to **create/update/search external relationships**. Both are based on feedbacks from our integration partners.

Design Collaboration



Design Collaboration has no API directly added to this module unfortunately. But some of the functionality developed to support Design is exposed through Model Derivatives and Viewer, such as Master View and Level extensions (if you are familiar with Viewer). We have updated [webhook samples](#) that demonstrates integration with slack to include Revit Cloud Worksharing as we hear our customers are interested in integrating with chat capabilities. We have high priority item for Revit and Design Automation to support Cloud Worksharing. No API is expected soon. But let us know what workflow you would like to with API.

Project Home

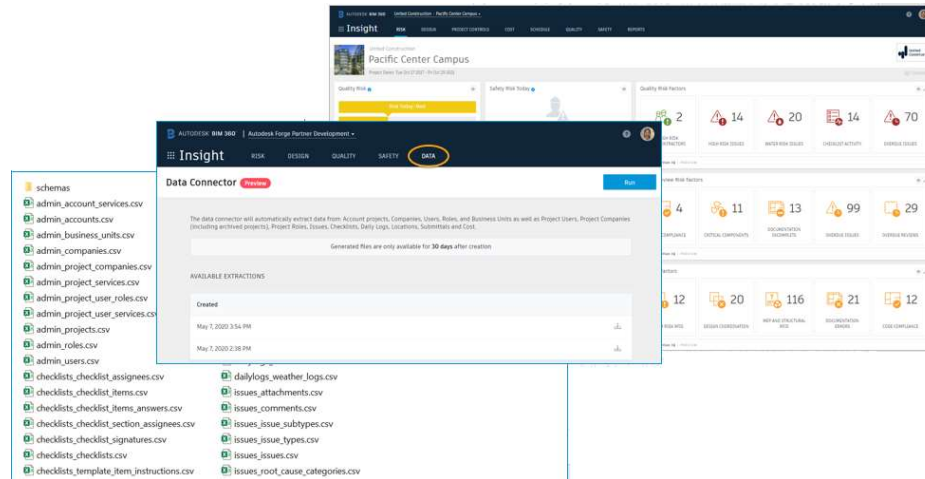


Project Home is your BIM 360 landing page and dashboard which displays a single view of your project. Currently, no API for Project home. But partners can add their apps to the Partner Card Library. If you are interested in adding your app to the Partner Card library, please e-mail to: bim360partnercard@Autodesk.com.

For more information:

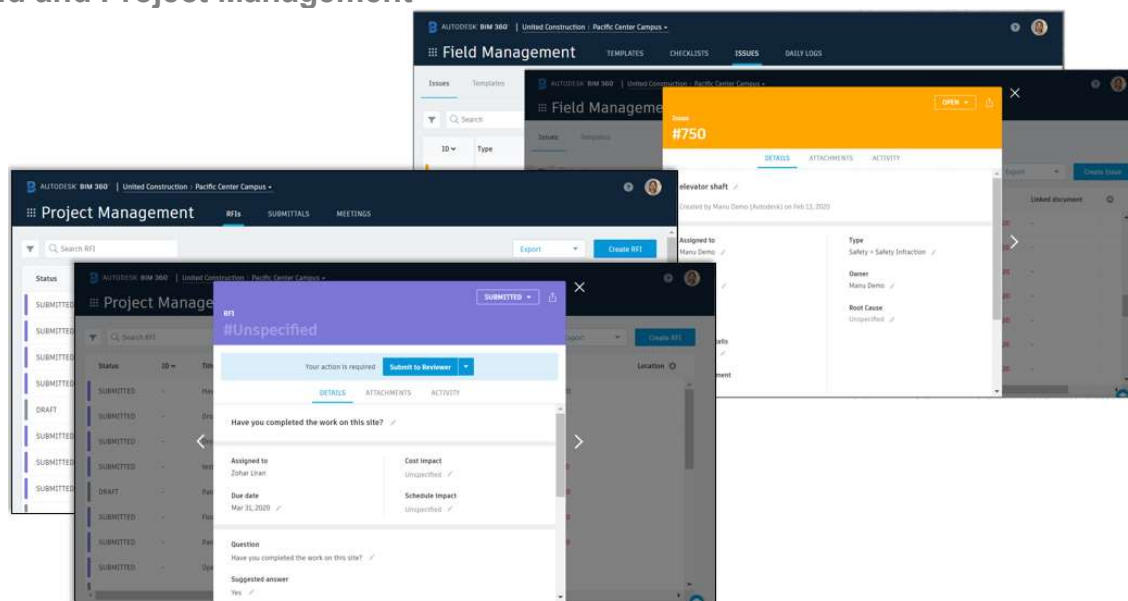
<https://fieldofviewblog.wordpress.com/2019/06/07/bim-360-project-home-card-library-and-partner-apps/>

Insight



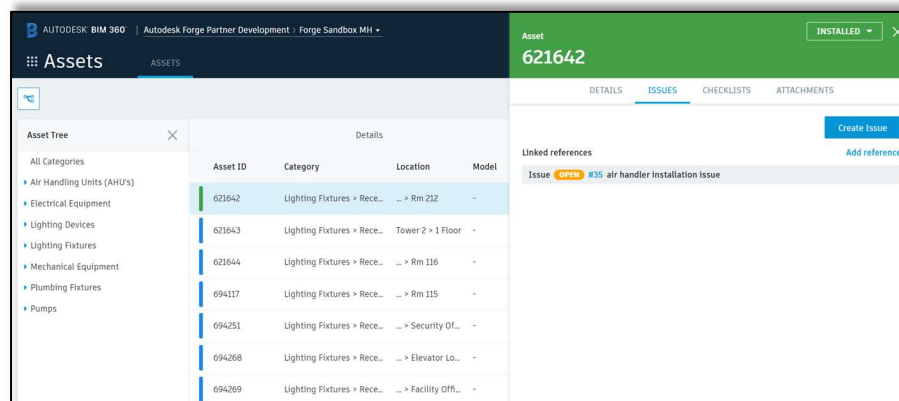
Insight page allows project owners and managers to viewer unified project-level data and analytics to gain predictive insights. Currently, there is no API. But I want to point out that there is **Data Connector** functionality which allows you to download many data in csv format. Good news is, API for Data Connector is in the roadmap. For more information about Data Connector, please refer to this blog post: <https://connect.bim360.autodesk.com/project-data-business-intelligence>

Field and Project Management



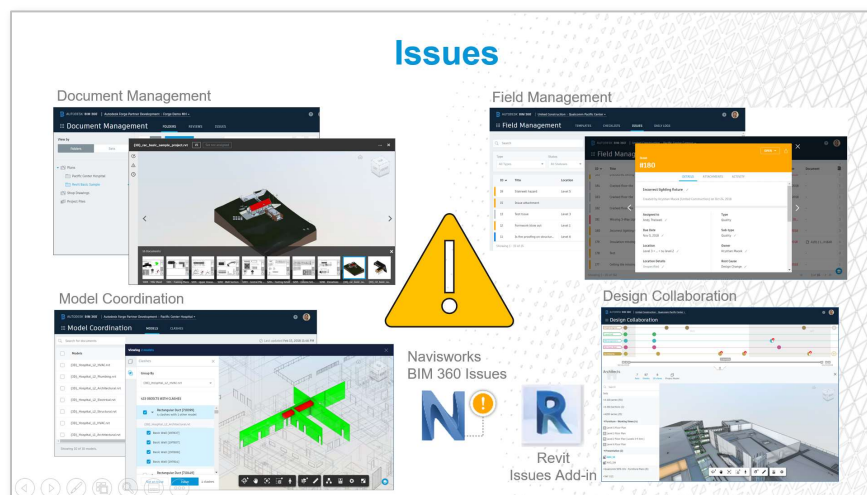
In Field Management and Project Management area, we released the **updated version of RFI API** in June.

Assets



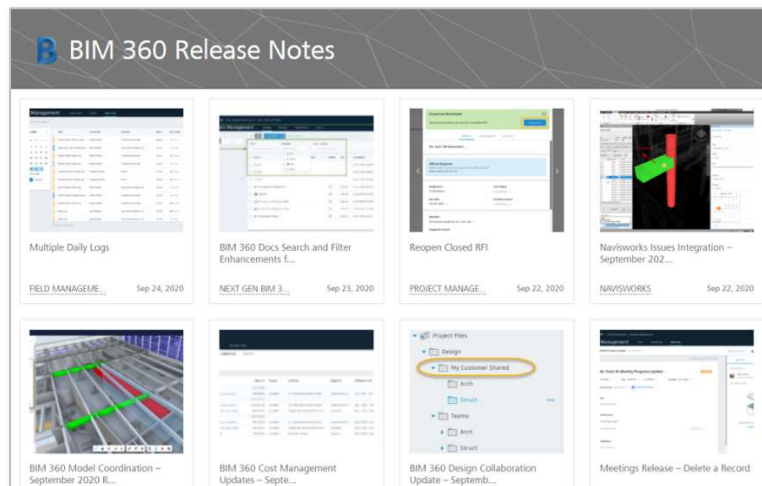
Assets module is the latest member of BIM 360 family product. It was added earlier this year. Assets module provides the tools to track all of your project's assets and equipment from design to handover. Personally, I'm excited about this feature as BIM enthusiast. This is the feature that has high potential to carrying out the idea of BIM, from design to construction, and to operation and maintenance, entire building life cycles. Another good news is, we are hoping to release API next year. We will show potential uses of API later this is document.

Issues



Finally, there is a shared component. Issue is used by various products within Autodesk beyond Field Management. It is used in Document Management, Model Coordination, and Design

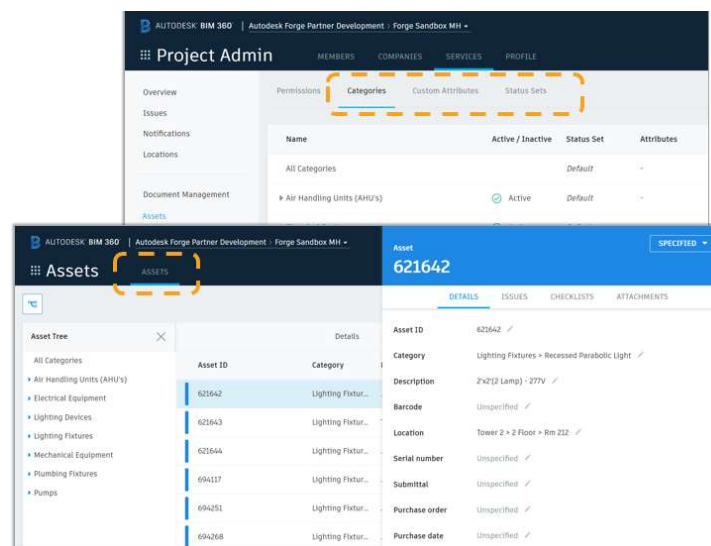
Collaboration, Navisworks, and more recently to Revit as an addin. API is the same. Issues are categorized by type and sub-types.



For more information about the product features, please refer to BIM 360 Release Notes and product help:

- <https://blogs.autodesk.com/bim360-release-notes/2020/>
- <https://help.autodesk.com/view/BIM360D/ENU/>

Assets API

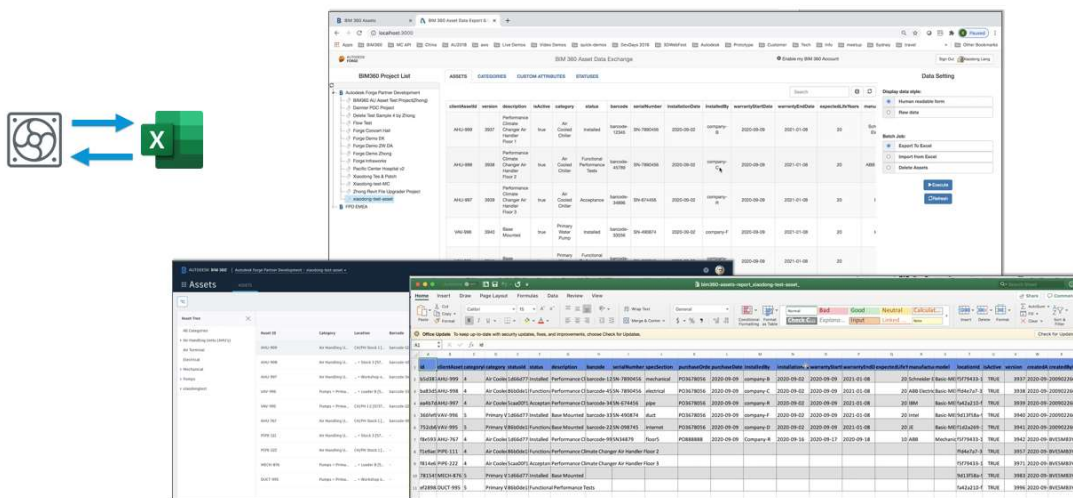


As I mentioned earlier, Asset team is planning to release API for Assets. It is currently in private beta. At this stage, you can read Asset items, which include custom attributes, also settings in the project admin: i.e., custom attributes, categories and status sets. We are hoping to have public release near future. By that time, we hope to have write capabilities. If you are interested

in Asset API and specific workflow in mind, please let us know. Your input will help us prioritize the API to expose first. And it might give us an idea for samples and tutorial documentation.

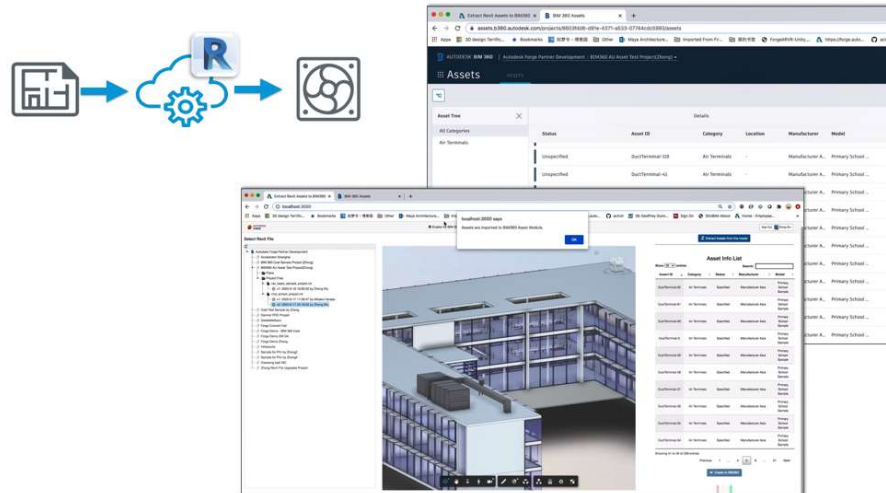
Next, we'd like to show you three sample applications using Assets API. These examples are written by my team and meant for proof of concepts to give you an idea for potential areas for application. We intend to make them as GitHub samples when the API goes public.

Asset API Demo 1: Export/Import to/from Excel



The first sample is to export/import to/from excel file. This application exports all the Assets data in BIM 360 Assets module to a custom web page with links, then to Excel sheet. Modification in Excel is import back to Assets. This sample is to demonstrate the basic read/write access with Assets module.

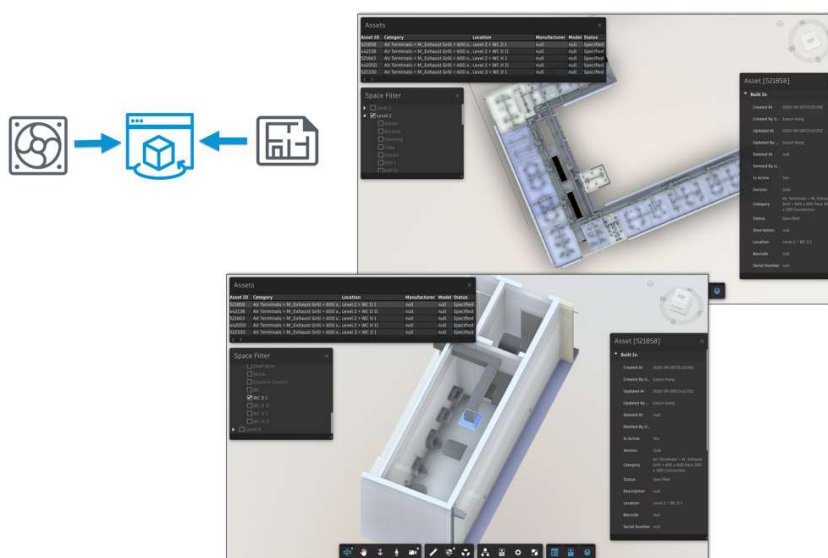
Asset API Demo 2: Set up Assets from a Design Model



The second example demonstrates setting up assets data from a design model. To do it, we use **Design Automation for Revit**. The application extracts assets from a design model stored in BIM 360 Docs, using Design Automation for Revit, and import to Assets module. Optionally we filter/verify assets before importing to Assets module. (We save Revit unique element ids as custom attributes to keep the association between assets to elements in Revit.)

You may be able to do similar thing, using Model Derivative API to extract properties from a model stored in Docs instead of using Design Automation. Using Design Automation will give you more flexibility, for example, extracting MEP systems.

Asset API Demo 3: View Assets in Design Model



The third example is an integration with a viewer. You can view asset data in the model viewer. You can filter assets by level and room. (We use Revit unique element ids saved as custom attributes to keep the association between assets to elements in Revit.).

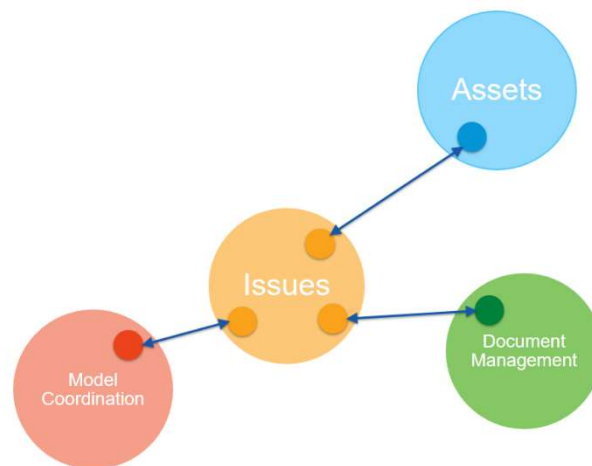
Developer Resource

We are still working on Documentation on Forge developer portal. We will need it to make the API public. Those proof of concept samples we have shown just now will be made available as code samples. We will also intend to provide Postman collection.

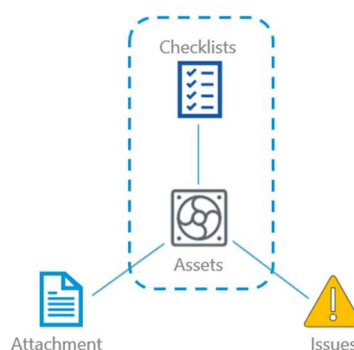
Relationships API

Next, we will look at Relationship API.

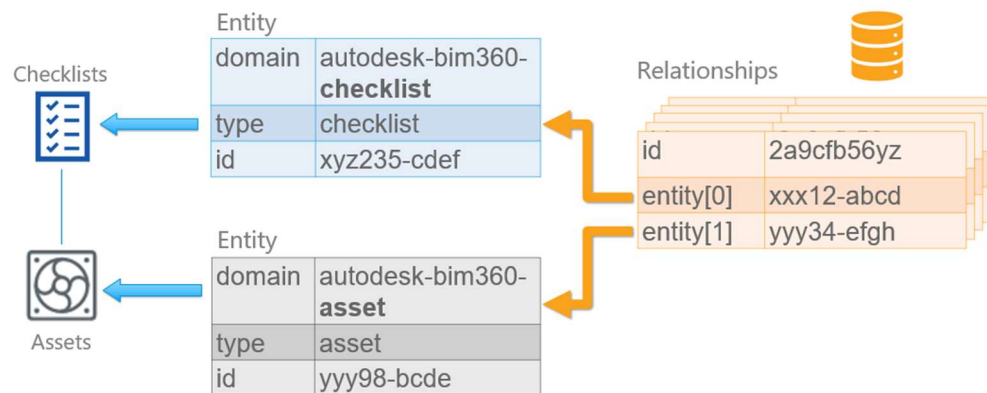
What is Relationship?



Relationship represents a link between items or Entity that reside in different functional components or Domain. The relationship is used in BIM 360 by various modules: e.g., Model Coordination, Assets, Field Management, Cost. More may use it in future. It is read-only. You will need to use domain functions to create. There is no method to create relationship directly. The API is publicly available today.



For example, an Asset may have links to a checklist, issues and an attachment. Checklist and Issues reside in Field Management, and attachments in Document Management. Relationship represents these links between different functional components. Next, let's take a closer look at a relationship between a Checklists and an Asset.



In Relationship Service, an item to link, such as a checklist and an asset, is called Entity and is composed of three properties: domain, type and id. In case of checklist, domain is autodesk-bim360-checklist; type is checklist. It could be checklist template; id is id of checklist id. Similarly, an entity for an Asset is defined. A Relationship simply point to two entities with an id. The Relationship Service keeps track of the instance of relationships created among different domains. As you can see, very simple and clean data structure.

What's powerful about this API is that it provides a way to save and search those relationships independent from the implementation detail of each components.

Relationships Endpoints

Category	Endpoints
Search	GET relationships/:relationshipId
	POST relationships:batch
	GET relationships:search
	POST relationships:intersect
Sync	POST relationships:sync
	POST relationships:syncStatus

The Relationship API provides six (6) endpoints.

Category	Endpoints
Search	GET relationships/:relationshipId
	POST relationships:batch
	GET relationships:search
	POST relationships:intersect
Sync	POST relationships:sync
	POST relationships:syncStatus

Get relationship(s) from id(s)

JSON	<pre> { id : "79835e9e-ab4c-4c43-b480-a7ba54196e6e" createdOn : "2020-10-03T20:53:14.268952+00:00" isReadOnly : true isService : true isDeleted : false entities : [{ createdOn : "2020-10-03T20:53:14.175205+00:00" domain : "autodesk-bim360-checklist" type : "checklist" id : "569859" }, { createdOn : "2020-10-03T20:49:21.651508+00:00" domain : "autodesk-bim360-asset" type : "asset" id : "f972c095-d6b2-4fd3-ae1c-70ef6061c8a1" }] } </pre>
------	--

The first two endpoints is to get relationships from ids. The first one is for single id. The second one, batch, handles multiple ids.

Category	Endpoints
Search	GET relationships/:relationshipId
	POST relationships:batch
	GET relationships:search
	POST relationships:intersect
Sync	POST relationships:sync
	POST relationships:syncStatus

Search [rel's](#) that match the given criteria (domain, type, ids, date). e.g.,

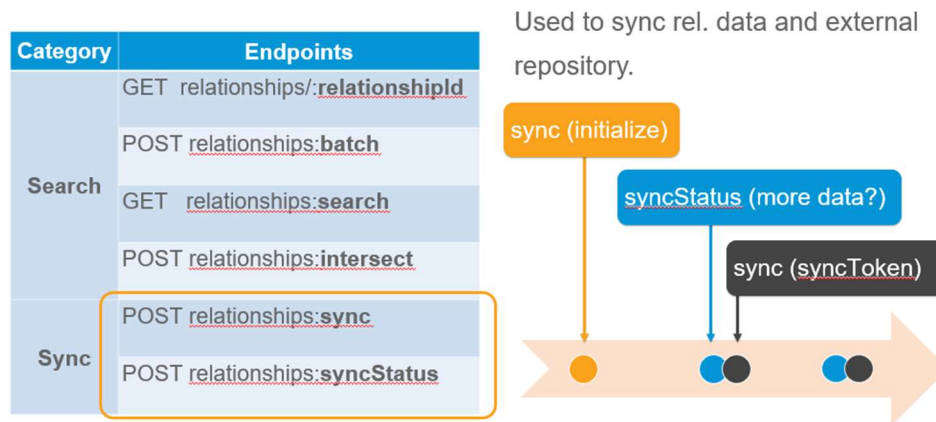
"Give me all the relationships between assets and checklists"

```

GET relationships:/search?
domain=autodesk-bim360-asset
&withDomain=autodesk-bim360-checklist

```

Search and Intersect are used to search relationships that match the given criteria, such as a specific domain, type, id and date created. For example, if you want to get all the relationships between assets and checklists, you can specify parameters as domain equals Autodesk-bim360-asset and withDomain checklist. You can further narrow down by adding type and id. Intersect is another form of search. It accepts multiple relationship entities as a body and returns a list of relationships that matches the given criteria.



Sync or Synchronize relationships. This is used to sync data in relationship services and external repository. syncStatus gives you synchronization status. You can use this to check if there is new data or are any changes available. If more data, you can call sync with a syncToken.

Relationships API: Developer Resource



We have SDK published already. Other languages will be considered if there is a demand.

Nuget

<https://www.nuget.org/packages?q=bim+360+>

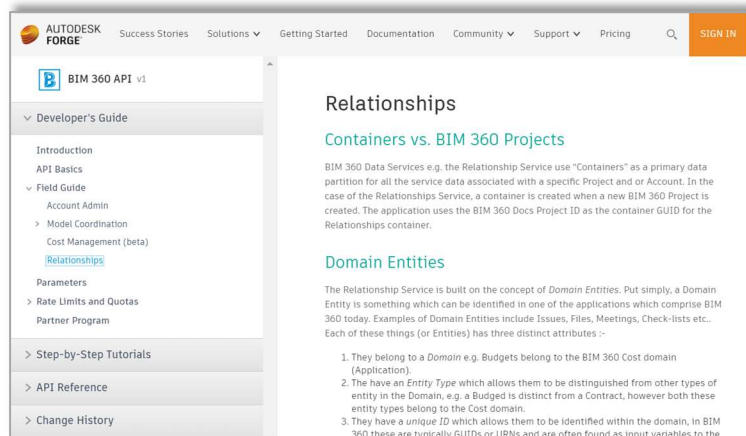
<https://www.nuget.org/packages/Autodesk.Forge.Bim360.Relationship/>

Npm

<https://www.npmjs.com/search?q=BIM%20360%20>

<https://www.npmjs.com/package/forge-bim360-relationship>

Other languages may be considered if there is enough demand. Let us know.



Documentation is on Forge developer portal. Relationship API is a dependency of Assets. That is the main reason for releasing relationship API prior to the release of Asset API. But there are other use cases as well. For example, currently, RFI to Cost PCO is not in RFI API. You may workaround by using Relationship API.

- [Field Guide](#)
- [Tutorial](#)
- [Reference Guide](#)

Summary

In this session, we updated BIM 360 API with the current status and introduced new Relationship APIs and talked about Assets API, which we hope to have near future.

Learn More

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. We also plan to have additional webinars for developers shortly after APIs are released. Stay tuned for further announcement!

Product Help

- [Assets](#)
- [BIM 360](#)

API Documentation

- [BIM 360 API](#) (Note: Assets API ***will be*** under BIM 360 section of documentation when released as public beta)

- [Relationships API](#)
- forge.autodesk.com - [Forge developer portal](#)

Related Forge API Topic from Past AU Classes

- “Release Your Hands: Automate Your BIM 360 Project Setup with Forge”, by Zhong Wu and Mikako Harada. AU 2020 (Expected). (Admin API)
- “Solve Clashes Automatically with Forge, BIM 360, and Revit Design Automation”, by Xiaodong Liang and Mikako Harada. AU 2020 (Expected). (Model Coordination and Revit Design Automation)
- [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. AU 2019. (Model Coordination and Cost API)
- [Moving to Forge and the Cloud with Your Existing .NET Experience](#), by Augusto Goncalves. DevCon 2018.
- [Brining 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>
- 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
 - Twitter: @AutodeskForge @mikako_harada
 - Facebook @AdskForge
 - Videos and slides <https://forge.autodesk.com/api/videos-slides/>
 - Blog: <https://forge.autodesk.com/blog>
 - Personal Blog: <https://fieldofviewblog.wordpress.com/>