



# Autodesk Construction Cloud & Model Properties API

Forge Data Days

原田 美佳子, Senior Manager AEC Developer Technical Services

小笠原 龍司, Developer Advocate

The presentations today may contain forward-looking statements about our strategies, products, future results, performance or achievements, financial, operational and otherwise, including statements about our strategic priorities, business model transition, and guidance for the fiscal year 2023 and beyond; our long term financial and operational goals; our M&A strategy; and our capital allocation initiatives. These statements reflect management's current expectations, estimates and assumptions based on the information currently available to us. These forward-looking statements are not guarantees of future performance and involve significant risks, uncertainties and other factors that may cause our actual results, performance or achievements to be materially different from results, performance or achievements expressed or implied by the forward-looking statements contained in these presentations, such as a failure to successfully integrate acquired businesses; developments in the COVID-19 pandemic and the resulting impact on our business and operations; general market, political, economic, and business conditions; complete transitions to new business model and markets; failure of the construction industry to grow as anticipated; failure to develop new products; failure to successfully expand adoption of our products; and failure of product changes to have the desired benefits.

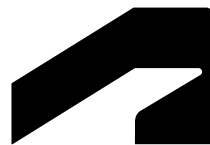
A discussion of factors that may affect future results is contained in our most recent Form 10-K and Form 10-Q filings available at [www.sec.gov](http://www.sec.gov), including descriptions of the risk factors that may impact us and the forward-looking statements made in these presentations. The forward-looking statements made in these presentations are being made as of the time and date of their live presentation. If these presentations are reviewed after the time and date of their live presentation, even if subsequently made available by us, on our website or otherwise, these presentations may not contain current or accurate information. We disclaim any obligation to update or revise any forward-looking statement based on new information, future events or otherwise.

Statements regarding planned or future development efforts for our products and services are not intended to be a promise or guarantee of future availability of products, services, or features but merely reflect our current plans and based on factors currently known to us. Purchasing decisions should not be made based upon reliance on these statements.

PLEASE NOTE: Data Days content is proprietary. Do Not Copy, Post or Distribute.

# アジェンダ

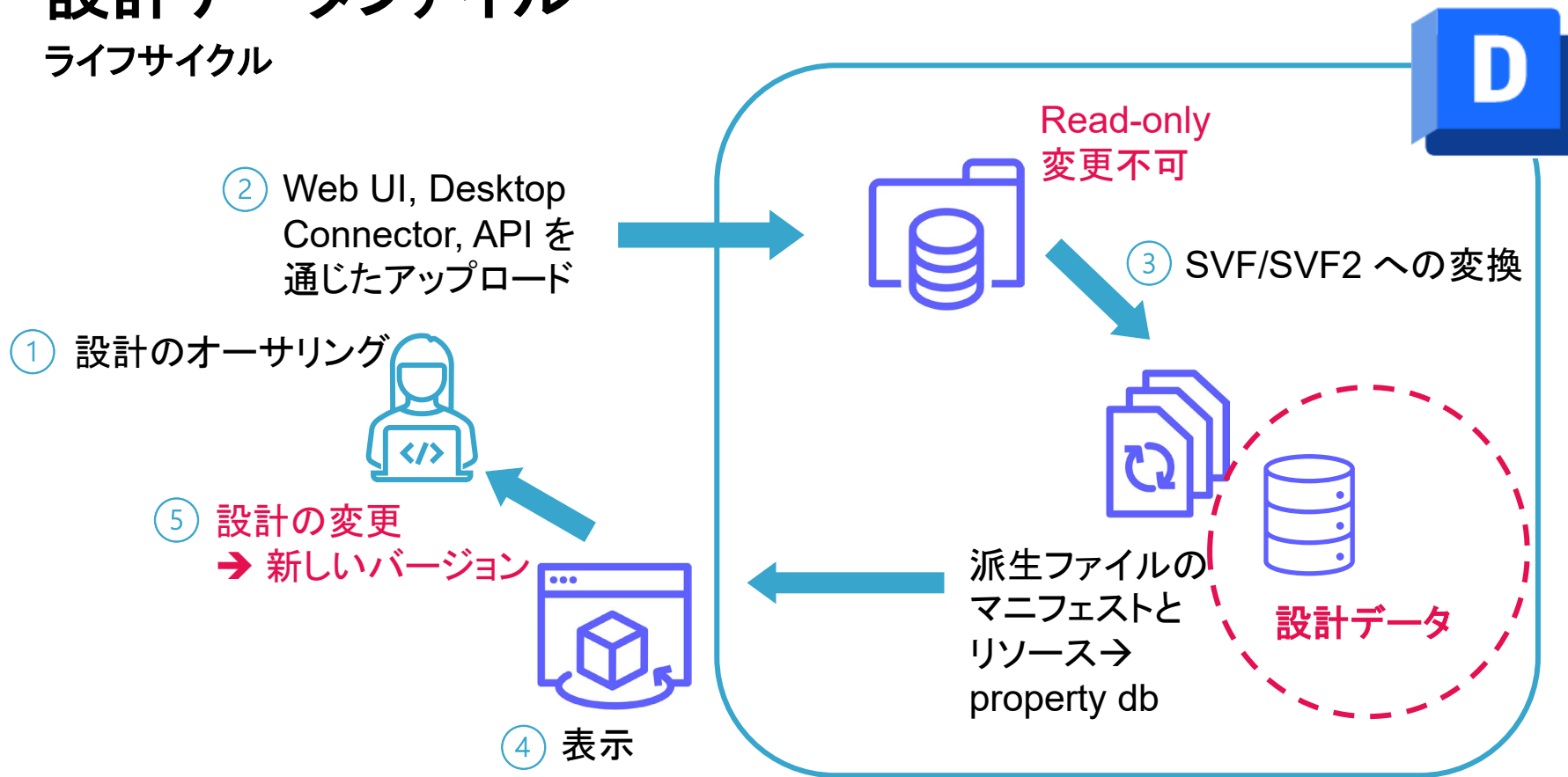
- Model Property API
- Data Connector API
- 今後の予定

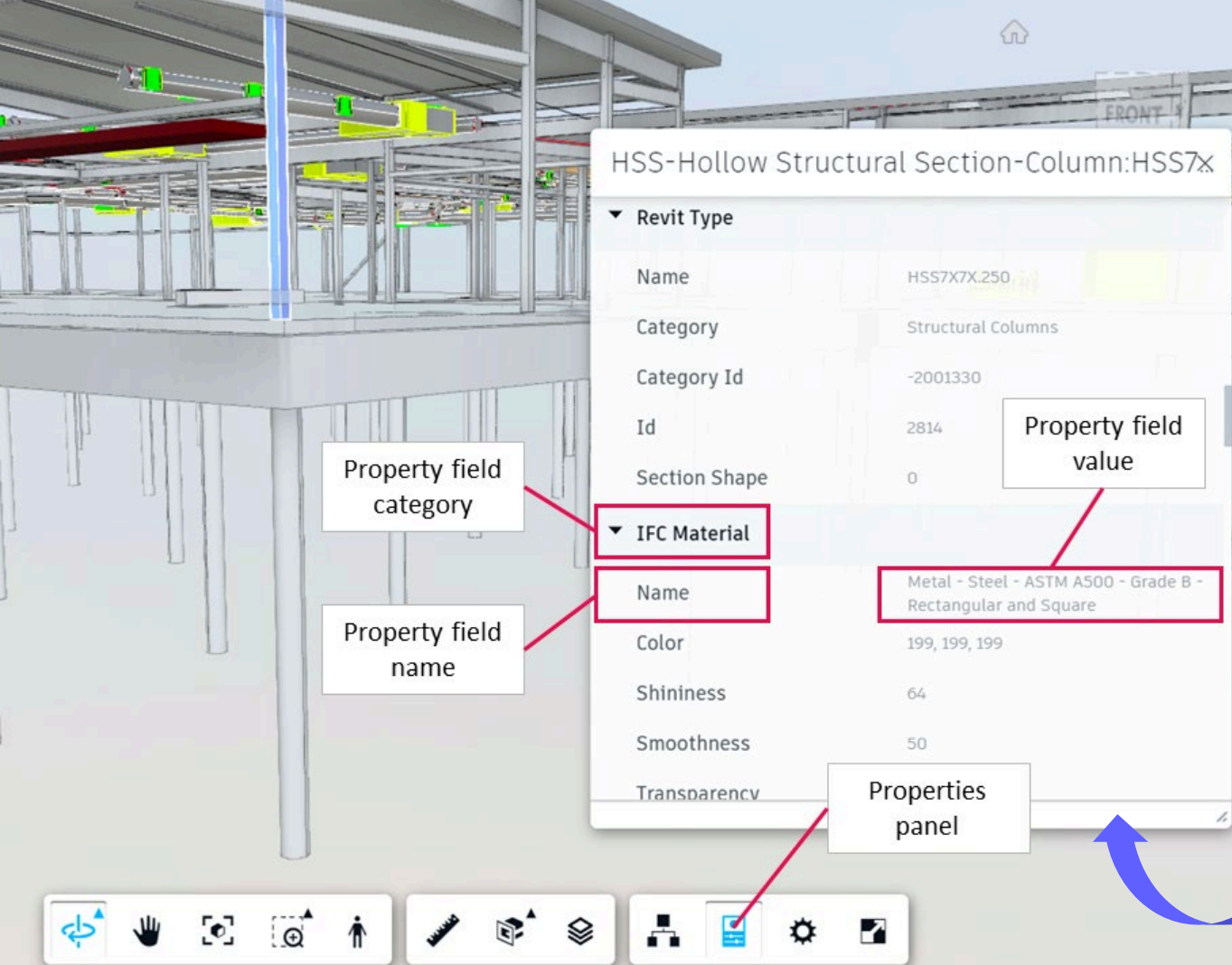


# **Model Properties API**

# 設計データファイル

## ライフサイクル





## SVF2 モデルプロパティの分類 (BIM)

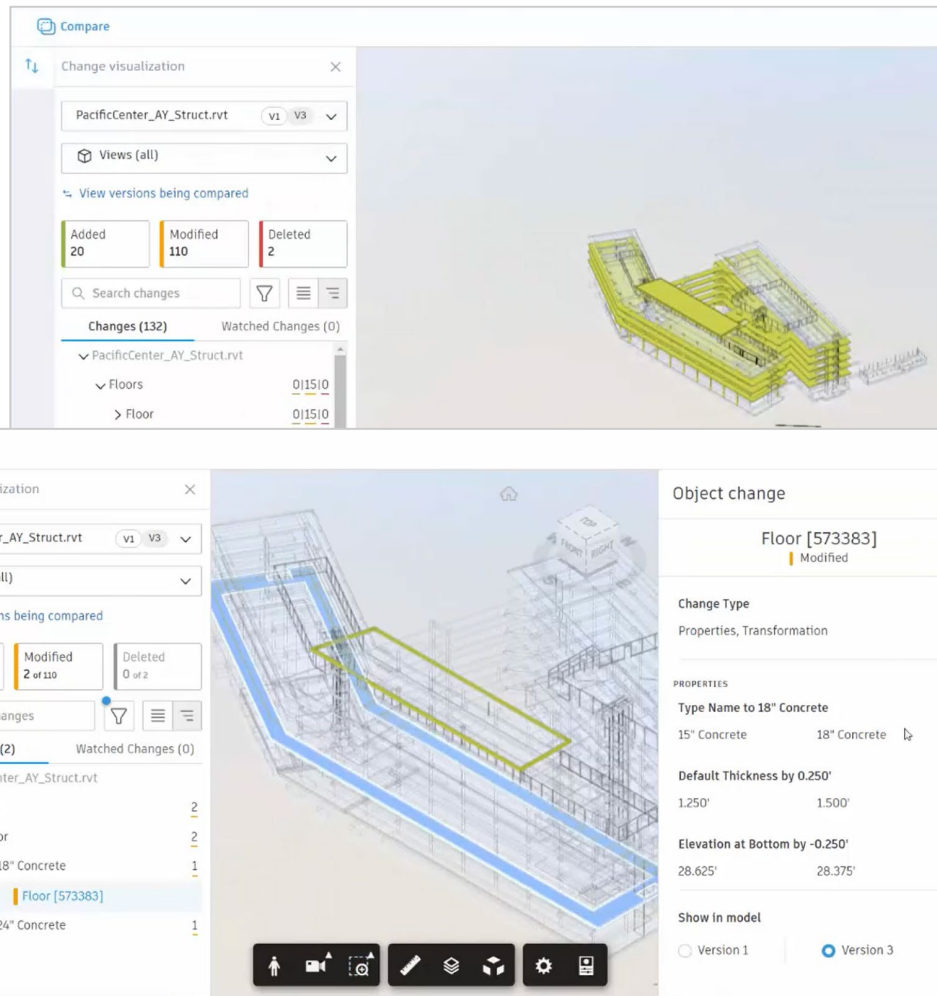
- カテゴリ
- 名前
- 型 (e.g., string, double)
- (オプション) 測定単位



propertyDb

# Model Properties API

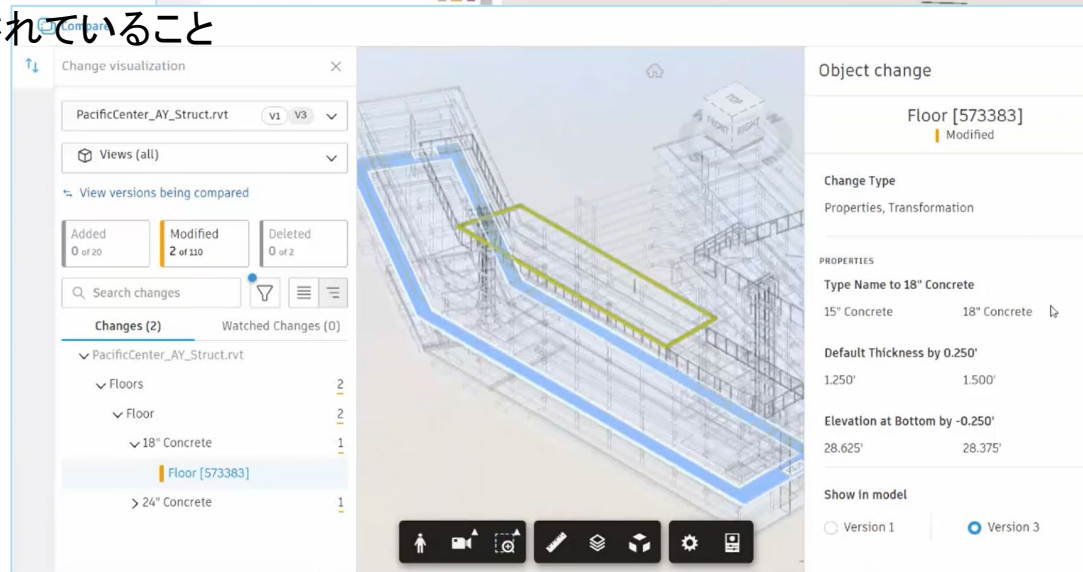
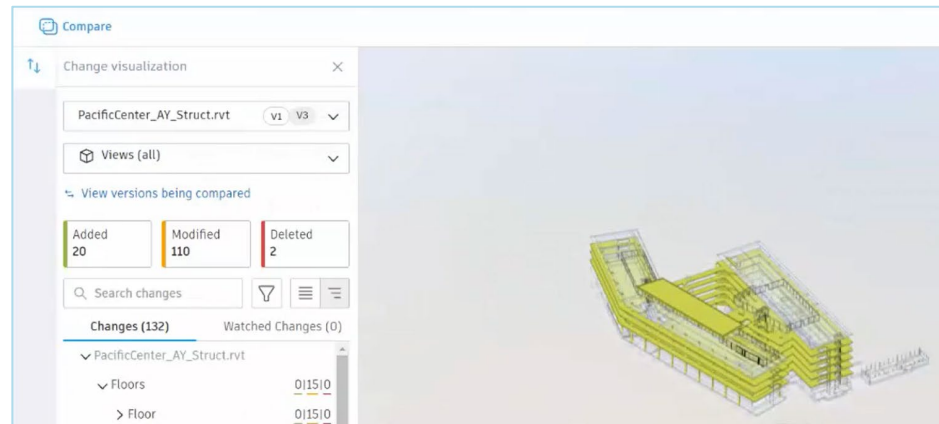
- 2022年2月リリース
- Autodesk/BIM 360 Docs 製品で動作。US と EMEA
- Model Derivative サービスで生成される PropertyDb に対して(svf2 変換後に)実行
  - **Index** – svf2 のプロパティ(+ バウンディングボックス)をクエリ, フィルタリング
  - **Diff** – Index + 2つのバージョンの比較
- 製品の機能でも利用されています。
  - Design Collaboration での変更内容の分析
- 今後のリリース予定
  - アセット – モデルとの統合
  - Model Coordination – 干渉チェック後のモデル分類



# Model Properties API

サポートされているファイル形式

- **Index** – Model Derivative サービス/SVF2変換でサポートされているファイル
- **Diff** - 一意に識別可能な要素 ID が付与されていること
  - **RVT**
  - **DWG**
  - **NWC**: 下記の製品から出力されたもの
    - Revit と AutoCAD ベースのバーチャル製品
  - **IFC**: 下記の製品から出力されたもの
    - AutoCAD Architecture, MEP, Civil 3D 2018+
    - ARCHCAD
    - Revit
    - MagiCAD for Revit
    - Tekla Structures







# サンプル アプリケーション

Model Properties API

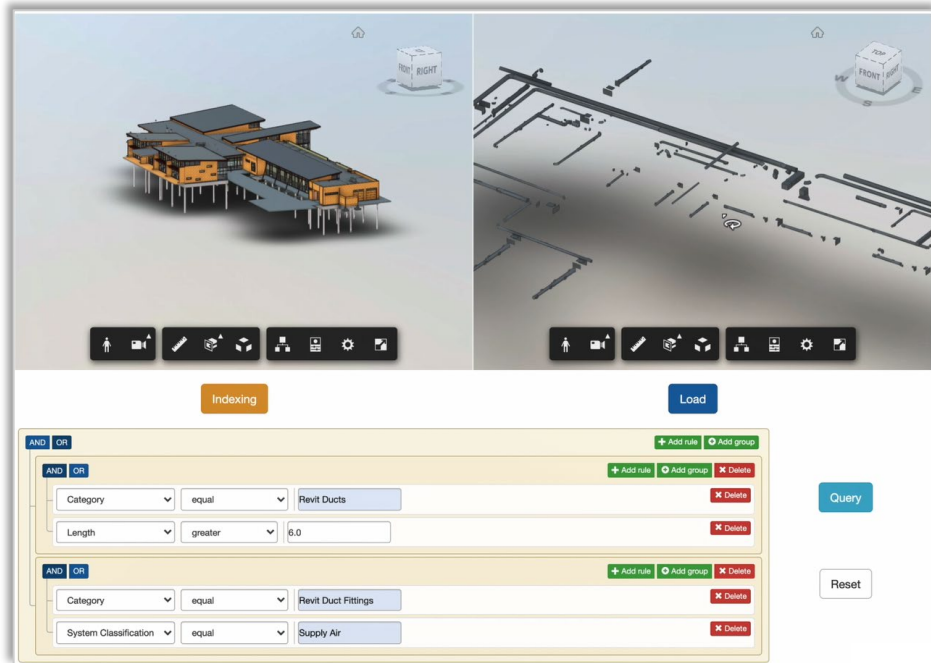
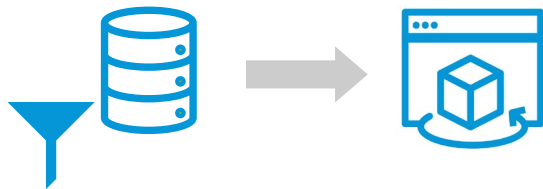
# 要素のフィルタリングとモデルの部分ロード

## インデックス

**概要:** 要素をプロパティでフィルタリングします。プロパティは、長さや高さなどの幾何学的な情報も含まれます。フィルタ条件は二項演算の形式で表現され、AND / ORで組み合わせることができます。結果はForge Viewerで可視化されます。

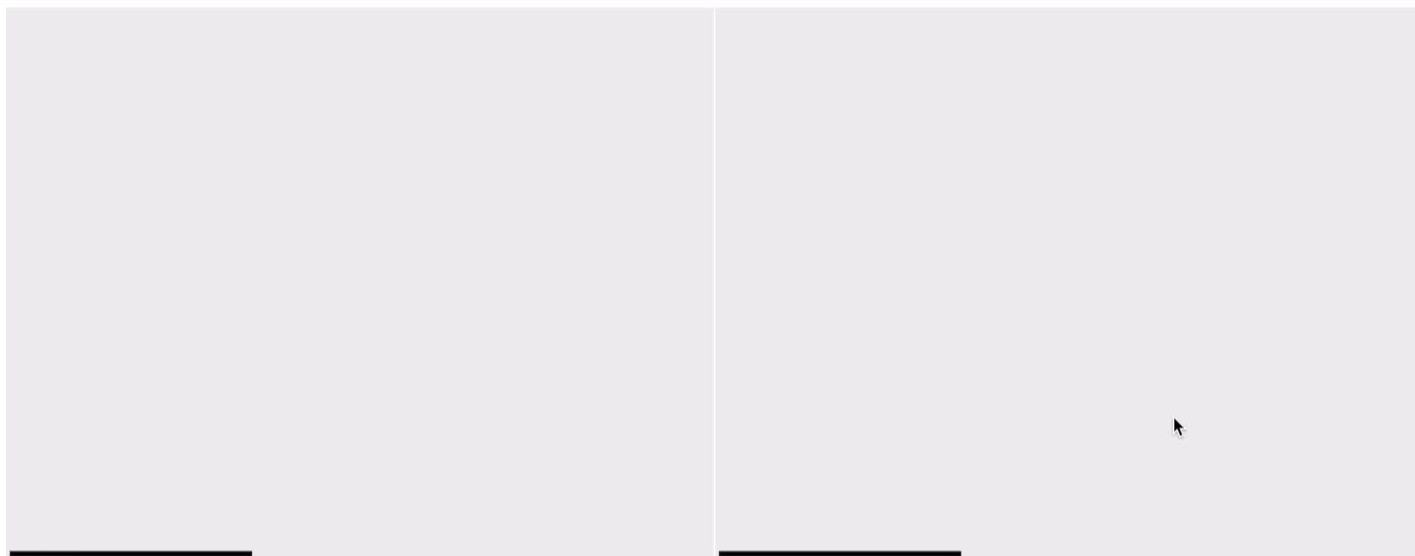
ソースコード: GitHub サンプル

開発者: Xiaodong Liang, Autodesk



Xiaodong Liang

- Forge Sandbox MH Indexing
  - Pacific Center Hospital v2
    - Xiaodong Tes & Patch
      - Xiaodong-test-MC
        - Plans
        - Project Files
  - xiaodong-new -project
    - Plans
    - Project Files
      - C4R
      - Indexing
        - Audubon-Merged.nwd
        - Audubon\_Architecture-2022-Root.rvt
          - v1: 8/17/2021, 2:40:11 PM by Xiaodong Liang
        - Audubon\_Mechanical-2022.rvt
        - Audubon\_Structure-2022.rvt
        - BIM 360 Sample Assembly.rvt
      - Name Standards
      - Project Files.1
      - Project Files.4
      - non-C4R
      - Audubon\_Architecture.rvt
      - Audubon\_Mechanical.rvt
      - Audubon\_Structure.rvt
      - Audubon\_Structure\_assembly.rvt
      - STEEL\_TEST.nwd
      - rac\_advanced\_sample\_project - Floor Plan - 01 - Entry
      - rac\_advanced\_sample\_project.rvt
        - v1: 8/8/2021, 11:14:22 PM by Xiaodong Liang
      - rac\_basic\_sample\_project.rvt
      - rme\_basic\_sample\_project.nwd
- xiaodong-old-project
- xiaodong-test-asset

- Developer Advocacy Support
- AU ACC TakeOff Sample Project
  - For the Field
  - Project Files
    - Shared
    - Zhong
    - Consumed


Indexing

Load

AND OR

Level

equal

dummy

+ Add rule + Add group X Delete

AND OR

Category

equal

+ Add rule + Add group X Delete

Right Arrow

equal

☐ False ☒ True

X Delete

Free Size

less

0.11

X Delete

Query

Reset

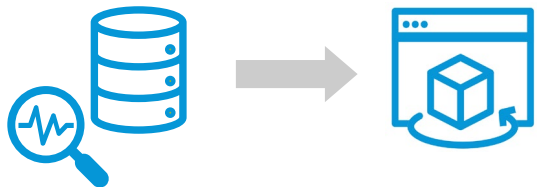
# 2つのバージョンの比較

## 差分比較

**概要:** モデルの2つのバージョンを比較し、違いをForge Viewer上で可視化します。  
ジオメトリとプロパティの違いを抽出します。  
要素は、追加、削除、変更に分類されます。

ソースコード: GitHub サンプル

開発者: Xiaodong Liang, Autodesk



**Added Items (25)**

name	category	level	RC	Free
Round Elbow [1187817]	Revit Duct Fittings	Arch-FIRST FLOOR	Duct Fittings	16"ø
Round Elbow [1187825]	Revit Duct Fittings	Arch-FIRST FLOOR	Duct Fittings	16"ø
Round Elbow [1187827]	Revit Duct Fittings	Arch-FIRST FLOOR	Duct Fittings	16"ø

**Removed Items (30)**

name	category	level	RC	Free
Round Elbow [853203]	Revit Duct Fittings	Arch-FIRST FLOOR	Duct Fittings	4"ø
Round Elbow [914477]	Revit Duct Fittings	Arch-FIRST FLOOR	Duct Fittings	4"ø
Round Elbow [914480]	Revit Duct Fittings	Arch-FIRST FLOOR	Duct Fittings	4"ø

**Changed Items (284)**

name	geometry changed?	property ch
Round Elbow [839567]	yes	yes
Round Elbow [839569]	yes	yes
Round Elbow [839571]	yes	yes

Xiaodong Liang

Autodesk Forge Partner Development

- Daimler POC Project
- Endymion
- Flow Test
- Forge Concert Hall
- Forge Infraworks
- Pacific Center Hospital v2
- Xiaodong Tes & Patch
- Xiaodong-test-MC
- xiaodong-new -project
  - Plans
  - Project Files
    - C4R
    - Name Standards
    - Project Files.1
    - Audubon\_Architecture.rvt
    - Audubon\_Mechanical.rvt
      - v1: 8/4/2021, 7:16:41 PM by Xiaodong
      - v2: 8/4/2021, 7:20:54 PM by Xiaodong
      - v3: 8/7/2021, 5:28:32 PM by Xiaodong
    - Audubon\_Structure.rvt
      - v1: 5/27/2021, 8:27:30 PM by Xiaodong
      - v2: 8/9/2021, 3:43:06 PM by Xiaodong
    - STEEL\_TEST.nwd
    - rac\_advanced\_sample\_project.rvt
      - v1: 8/8/2021, 11:14:22 PM by Xiaodong
    - rac\_basic\_sample\_project.rvt
      - v1: 8/9/2021, 11:57:47 AM by Xiaodong
      - v2: 8/9/2021, 12:02:38 PM by Xiaodong
      - v3: 8/9/2021, 12:38:16 PM by Xiaodong
    - rme\_basic\_sample\_project.nwd
  - xiaodong-old-project
  - xiaodong-test-project

☐ All Added

☐ All Removed

☐ All Changed

Added Items

name	category	level	RC	Free Size	Si
No matching records found					

Removed Items

name	category	level	RC	Free Size	Si
No matching records found					

Changed Items

name	geometry changed?	property change
No matching records found		

# Takeoff / Costでの変更の解析

積算における差分解析アプリケーション

**概要:** 積算の項目の変更を特定し、モデルの現在と以前のバージョンを比較し、Forge Viewerで違いを可視化します。Cost モジュールで予算のデータを更新します。

ソースコード: GitHub sample

開発者: Zhong Wu, Autodesk



**Income**

Budget Main Contract Budget Payment Application

Budget Code	Budget Name	Qty	Unit	Unit Cost	Amount	Internal Budget Transfer	Main Contract	Linked to Main Contract SOV
01651.600	Glass	6	nr	230.00	1,380.00	0.00	No	No
09716.997	Window	8	nr	553.00	4,424.00		No	No
14259.806	Door	2	nr	836.00	1,672.00		No	No
68081.172	Floor	88	m2	136.00	11,968.00		No	No

**Price Book (\$/B)**

Type	Quantity	Unit Price(\$)	Unit
Door	836	nr	
Floor	136	m2	
Glass	230	nr	
Window	442	m2	
Window	553	nr	

**Takeoff Package Budget**

Element	Quantity	Unit	Unit Price(\$)	Amount(\$)
Door	5.00	nr	836	\$4,180.00
Floor	88.07	m2	136	\$11,977.18
Glass	5.00	nr	230	\$1,150.00
Wall	343.14	m2	447	\$152,442.25
Window	8.00	nr	553	\$4,424.00

**Cost Estimation of Takeoff Items for the latest version**

Name	Current	Latest	Quantity	Unit	Cost(\$)	Diff(\$)
Basic Wall [245032]	45.78	49.83	4.05(m2)		1891.38	276
Basic Wall [245042]	0.00	48.33	48.33(m2)		2156.11	442
Single Window [110365]	1	0	-1(n)		-553.00	597
Single Window [110371]	1	0	-1(n)		-553.00	6047



Chrome

File

Edit

View

History

Bookmarks

Profiles

Tab

Window

Help

Autodesk Takeoff

ACC Takeoff to Cost Sample

Income - Autodesk Cost

+

acc.autodesk.com/takeoff/packages/projects/2f38ddca-0bb2-4907-9047-85add2ba658a?contentSpaceId=9c2233f3-bc88-4e28-9123-46de0f969241&projectScopeId=107&lineageId=urn%3Aadsk.wipprod%3Adm.lineage%3AwMYOC69YS...

Update

Living Room

rac\_basic\_sample\_project.rvt (V1)

Takeoff Types

Search

+

5 takeoff types

B - Shell

Door

Glass

Wall

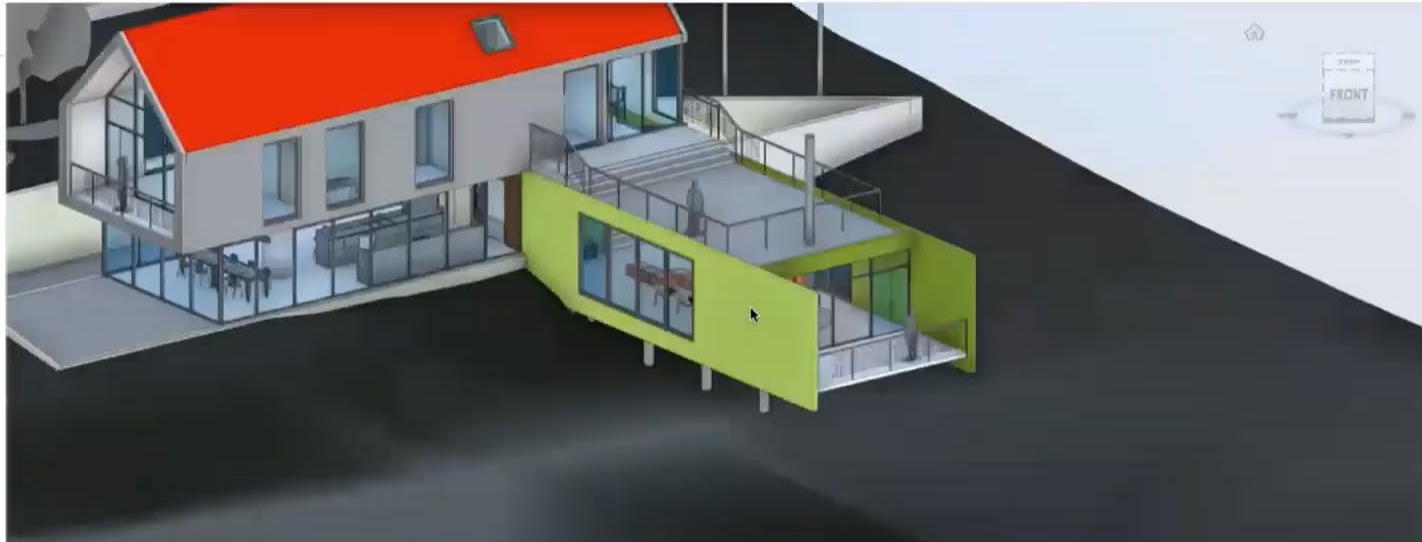
Window

C - Interiors

Floor

26 EA

116.53 M2



FRONT

Navigation icons: pan, rotate, zoom, etc.

Inventory

Group by Takeoff type

Export

×

Name ^	Count	Quantity	Unit	Classification	Document
Door	2	2 EA	B2050.10 - Exterior Entrance Doors	A102	
Floor	1	88.05 M2	C2030.45 - Wood Flooring	A102	
Glass	6	6 EA	B2020.30 - Exterior Window Wall	rac_basic_sample_proj...	
Wall	4	116.53 M2	B2010.20 - Exterior Wall Construction	rac_basic_sample_proj...	
Window	8	8 EA	B2020.20 - Exterior Fixed Windows	A102	

Wall

Quantity

Unit

Area (M2)

Document

61.11	M2	61.11	rac_basic_sample_project.rvt
42.75	M2	42.75	rac_basic_sample_project.rvt
9.37	M2	9.37	rac_basic_sample_project.rvt
3.30	M2	3.3	rac_basic_sample_project.rvt

Item count: 4

Chrome

File

Edit

View

History

Bookmarks

Profiles

Tab

Window

Help

ACC Takeoff to Cost Sample

Packages - Autodesk Takeoff

acc.autodesk.com/takeoff/packages/projects/2f38ddca-0bb2-4907-9047-85add2ba658a

Update

AUTODESK

Construction Cloud

Takeoff

Home

Packages

Sheets & Models

Files

Members

Settings

AU ACC TakeOff Sample Project

Zhong Wu

Packages

Work in progress

Apr 27, 2022

Create package

Save snapshot

Export all

Search

<input type="checkbox"/> Name ^	Updated by	Last updated
<input type="checkbox"/> 3rd Concrete	Zhong Wu	Dec 30, 2021 12:33 PM
<input type="checkbox"/> Living Room Sample <div>Updates</div>	Zhong Wu	Apr 27, 2022 8:09 PM
<input type="checkbox"/> Sample Package <div>Updates</div>	Zhong Wu	Feb 25, 2022 11:48 AM
<input type="checkbox"/> Windows Level 1	Mikako Harada	Jan 19, 2022 5:30 AM
<input type="checkbox"/> Windows Level 2 <div>Updates</div>	Zhong Wu	Aug 4, 2021 8:32 AM

Showing 1 - 5 of 5





# 仕組みの解説

Model Properties API

# Model Properties API の仕組み

## 基本的なワークフロー

Model Derivative



**DM/Docs**

UI, Desktop Connector  
または API を通じてファイ  
ルを Docs にアップロード

**Model  
Derivative**

ファイルは svf/svf2 に  
変換されます。

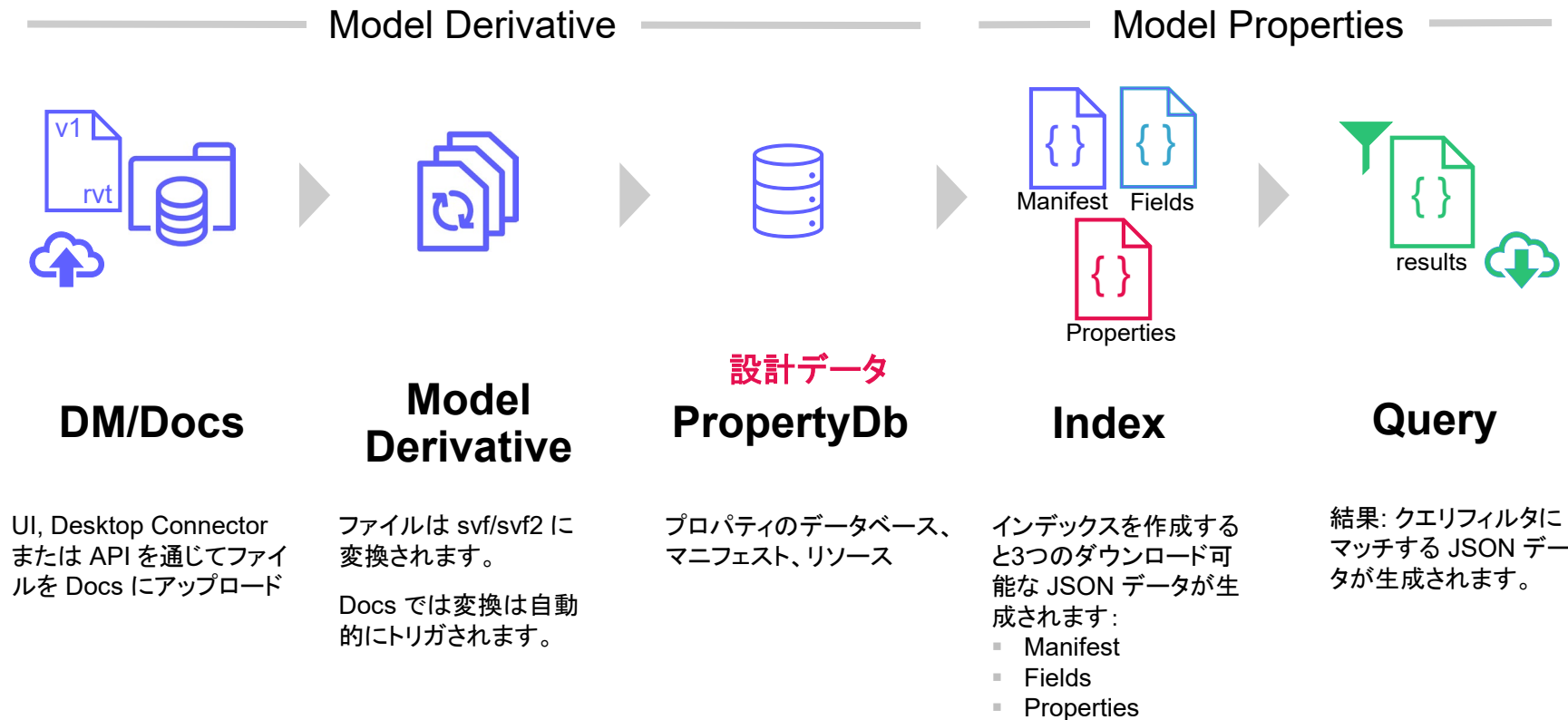
Docs では変換は自動  
的にトリガされます。

**設計データ  
PropertyDb**

プロパティのデータベース、  
マニフェスト、リソース

# Model Properties API の仕組み

## 基本的なワークフロー



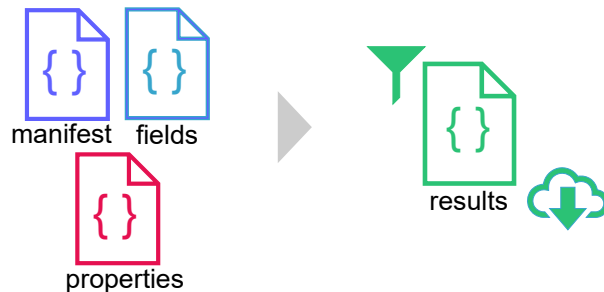
# Model Properties API の仕組み

生成されるリソース

リソース	型	説明
<a href="#">manifest</a>	JSON	シードファイルの詳細と、インデックス行の生成に使用される svf2 propertyDb の情報を含む、インデックスまたはクエリのためのマニフェスト
<a href="#">fields</a>	NDJSON	インデックスやクエリのために抽出された一意のフィールド(プロパティタイプ)のセット
<a href="#">properties</a>	NDJSON	インデックス化したオブジェクトプロパティの実際のデータ
<a href="#">results</a>	NDJSON	クエリを実行した結果のオブジェクトプロパティ。

NDJSON = new-line delimited JSON(改行区切りの JSON)

## Model Properties



### Index

インデックスを作成すると3つのダウンロード可能な JSON データが生成されます:





- Manifest
- Fields
- Properties

### Query

結果: クエリフィルタにマッチする JSON データが生成されます。

# Model Properties API の仕組み





## Index エンドポイント

	エンドポイント	
Index	POST	<b>indexes:batch-status</b>
	GET	indexes/:indexId
	GET	indexes/:indexId/ <b>manifest</b> 
	GET	indexes/:indexId/ <b>fields</b> 
	GET	indexes/:indexId/ <b>properties</b> 
Query	POST	indexes/:indexId/ <b>queries</b>
	GET	indexes/:indexId/queries/:queryId
	GET	indexes/:indexId/queries/:queryId/ <b>properties</b> 

- 8 つのエンドポイント

# Model Properties API の仕組み

## Index 作成のエンドポイント

	エンドポイント	
Index	POST	<b>indexes:batch-status</b>
	GET	<b>indexes/:indexId</b>
	GET	<b>indexes/:indexId/manifest</b> 
	GET	<b>indexes/:indexId/fields</b> 
	GET	<b>indexes/:indexId/properties</b> 
Query	POST	<b>indexes/:indexId/queries</b>
	GET	<b>indexes/:indexId/queries/:queryId</b>
	GET	<b>indexes/:indexId/queries/:queryId/properties</b> 

- 基本的な Index の作成 – “遅延実行”
  - 初回 – インデックス作成ジョブを開始して結果をキャッシュします。
  - 2回目以降 – キャッシュを利用。
  - キャッシュは最後に使用した日から30日間保持されます。
- 進捗状況のポーリング
  - state: PROCESSING, FINISHED, FAILED
- レスポンスの JSON は同一です。
- stats: オブジェクトの数
- ダウンロード可能な3つのjson.gzリソースの作成
  - Manifest, fields, properties

## 例: インデックスの作成 – POST indexes:batch-status

```
curl --request POST 'https://developer.api.autodesk.com/construction/index/v2/projects/f83c ...  
--header 'Authorization: Bearer ****' \  
--header 'Content-Type: application/json' \  
--data-raw '{  
  "versions": [  
    {  
      "versionUrn": "urn:adsk.wipprod:fs.file:vf.DyTWutcvTcOLUNUARxcTzQ?version=4"  
    }  
  ]  
'
```

/indexes:batch-status'

リクエスト

```
[  
  {  
    "projectId": "f83cef12-deef-4771-9feb-4f85643e3c46",  
    "indexId": "qTmPiKJZ7siqkxkTNpWGANw",  
    "type": "INDEX",  
    "state": "PROCESSING",  
    "selfUrl": "https://developer.api.autodesk.com/construction/index/v2/projects/f83cef12-deef-4771-9feb-4f8564",  
    "versionUrn": [  
      "urn:adsk.wipprod:fs.file:vf.DyTWutcvTcOLUNUARxcTzQ?version=4"  
    ],  
    "updatedAt": "2021-08-19T08:21:13.8771187+00:00",  
    "retrvAt": "2021-08-27T14:28:28.8382067+00:00",  
    "stats": null,  
    "manifestUrl": null,  
    "fieldsUrl": null,  
    "propertiesUrl": null  
  }  
]
```

レスポンス

## 例:進捗状況のポーリング - GET indexes/:indexId

```
curl --request GET 'https://developer.api.autodesk.com/construction/index/v2/projects/... /indexes/qTmPiKJZ7siqkTNpWGANw'  
--header 'Authorization: Bearer ****'
```

リクエスト





レスポンス

```
{  
  "projectId": "f83cef12-deef-4771-9feb-4f85643e3c46",  
  "indexId": "qTmPiKJZ7siqkTNpWGANw",  
  "type": "INDEX",  
  "state": "FINISHED",  
  "selfUrl": "https://developer.api.autodesk.com/construction/index/v2/proje... /indexes/qTmPiKJZ7siqkTNpWGANw",  
  "versionUrns": [  
    "urn:adsk.wipprod:fs.file:vf.DyTWutcvTcOLUNUARxcTzQ?version=4"  
  ],  
  "updatedAt": "2021-08-19T08:21:13.8771187+00:00",  
  "retryAt": "2021-08-27T14:31:55.1444684+00:00",  
  "stats": {  
    "objects": 33097  
  },  
  "manifestUrl": "https://developer.api.autodesk.com/construction/index/v2/pro... 46/indexes/qTmPiKJZ7siqkTNpWGANw/manifest",  
  "fieldsUrl": "https://developer.api.autodesk.com/construction/index/v2/proje... /indexes/qTmPiKJZ7siqkTNpWGANw/fields",  
  "propertiesUrl": "https://developer.api.autodesk.com/construction/index/v2/p... 3c46/indexes/qTmPiKJZ7siqkTNpWGANw/properties"  
}
```



# Model Properties API の仕組み

## Index ダウンロードのエンドポイント

	エンドポイント	
Index	POST	<b>indexes:batch-status</b>
	GET	indexes/:indexId
	GET	indexes/:indexId/ <b>manifest</b> 
	GET	indexes/:indexId/ <b>fields</b> 
	GET	indexes/:indexId/ <b>properties</b> 
Query	POST	indexes/:indexId/ <b>queries</b>
	GET	indexes/:indexId/queries/:queryId
	GET	indexes/:indexId/queries/:queryId/ <b>properties</b> 

- (オプション) ダウンロード
  - manifest
  - fields
  - Properties

```
{
  "schema": "2.0.0",
  "projectId": "f83cef12-deef-4771-9feb-4f85643e3c46",
  "status": "Succeeded",
  "createdAt": "2021-07-23T08:56:07.0868303+00:00",
  "seedFiles": [
```

## Lineage と Version

```
    {
      "lineageId": "a19f7db",
      "lineageUrn": "urn:adsk.wipprod:dm.lineage:DyTWutcvTcOLUNUARxcTzQ",
      "versionUrn": "urn:adsk.wipprod:fs.file:vf.DyTWutcvTcOLUNUARxcTzQ?version=4",
```

## Manifest (.json)

### SVF2 Prop DB リソース URNs

```
      "databases": [
        {
          "id": "3747dccf",
          "offsets": "urn:adsk.viewing:fs.file:dXJuOmFkc2sud2l ... yc2lvbj04/output/Resource/objects_offs.json.gz",
          "attributes": "urn:adsk.viewing:fs.file:dXJuOmFkc2su ... dmVyc2lvbj04/output/Resource/objects_attrs.json.gz",
          "values": "urn:adsk.viewing:fs.file:dXJuOmFkc2sud2l ... c2lvbj04/output/Resource/objects_vals.json.gz",
          "mapping": "urn:adsk.viewing:fs.file:dXJuOmFkc2sud2l ... yc2lvbj04/output/Resource/objects_avs.json.gz",
          "ids": "urn:adsk.viewing:fs.file:dXJuOmFkc2sud2lwcHJ ... vbj04/output/Resource/objects_ids.json.gz"
        }
      ],
```

## Viewables

```
      "views": [
        {
          "id": "e7fda9d5",
          "urn": "urn:adsk.wipprod:fs.file:vf.DyTWutcvTcOLUNUARxcTzQ?version=4",
          "is3d": true,
          "viewableName": "{3D}",
          "viewableId": "0935d8b2-149b-4a0d-b816-863f0d595a20-000bcd64",
          "viewableGuid": "00cd2da3-fbfa-44a9-7a33-cad0bc4720cb"
        },
        {
          "id": "12fcb372",
          "urn": "urn:adsk.wipprod:fs.file:vf.DyTWutcvTcOLUNUARxcTzQ?version=4",
          "is3d": true,
          "viewableName": "New Construction",
          "viewableId": "c884ae1b-61e7-4f9d-0001-719e20b22d0b-00120bb2",
          "viewableGuid": "4a966c2a-ead6-65c3-4f98-273dd7543047"
        }
      ]
    },
  ],
  "errors": [],
  "stats": {
```

## Index のバイトサイズ と行数

```
    "objects": 33097,
    "contentLength": 1881318
  }
}
```

## Index Fields (json.gz)

```
{ "key": "p153cb174", "category": "__name__", "type": "String", "name": "name", "uom": null }
{ "key": "p74a9a490", "category": "__document__", "type": "String", "name": "schema_name", "uom": null }
{ "key": "p137c14f2", "category": "__document__", "type": "String", "name": "schema_version", "uom": null }
{ "key": "p1490bcea", "category": "__document__", "type": "Boolean", "name": "is_doc_property", "uom": null }
{ "key": "p5eddc473", "category": "__category__", "type": "String", "name": "Category", "uom": null }
{ "key": "p00723fa6", "category": "Identity Data", "type": "String", "name": "Design Option", "uom": null }
{ "key": "pe8094f29", "category": "Other", "type": "String", "name": "Project Issue Date", "uom": null }
{ "key": "p50756a0d", "category": "Other", "type": "String", "name": "Client Name", "uom": null }
{ "key": "p32791eb0", "category": "Other", "type": "String", "name": "Project Address", "uom": null }
{ "key": "pbf75ced9", "category": "Other", "type": "String", "name": "Project Name", "uom": null }
{ "key": "p8213f1ad", "category": "Other", "type": "String", "name": "Project Number", "uom": null }
{ "key": "pa7275c45", "category": "__categoryId__", "type": "Integer", "name": "CategoryId", "uom": null }
{ "key": "p93e93af5", "category": "parent", "type": "DbKey", "name": "parent", "uom": null }
{ "key": "p1d45bc4f", "category": "Dimensions", "type": "Double", "name": "Computation Height", "uom": "ft" }
{ "key": "pe01bd7ef", "category": "Extents", "type": "String", "name": "Scope Box", "uom": null }
{ "key": "p9fffb245", "category": "Materials and Finishes", "type": "Integer", "name": "Color", "uom": null }
{ "key": "p1b3b6224", "category": "Materials and Finishes", "type": "String", "name": "Transparency", "uom": null }
{ "key": "pd9fcab30", "category": "Materials and Finishes", "type": "Boolean", "name": "Glow", "uom": null }
{ "key": "pf62e5a3c", "category": "Structural", "type": "Double", "name": "Structural Framing Length Roundoff", "uom": "ft" }
```

フィールドキー →  
SQL カラム名

カテゴリ

型

名前

UOM  
(Unit of Measurement)

# Basic Properties (json.gz)

```
{  
  "svf2Id": 68,  
  "lineageId": "a19f7db",  
  "externalId": "b5c4b31f-321a-418d-a61a-0c8e326aa154-0003f740",  
  "lmvId": 2388,  
  "databaseId": "3747dccf",  
  "props": {  
    "p00723fa6": "Main Model",  
    "p13b6b3a0": "HSS7X7X.250",  
    "p153cb174": "HSS-Hollow Structural Section-Column [259904]",  
    "p188478f2": 0.485383241976329e0,  
    "p20d8441e": "Structural Columns",  
    "p30db51f9": "HSS-Hollow Structural Section-Column",  
    "p5eddc473": "Revit Structural Columns",  
    "p63ed81bb": "Superstructure",  
    "p6637df3c": "Metal - Steel - ASTM A500 - Grade B - Rectangular and Square",  
    "pbadfe721": "BEARING",  
    ...  
    "pddd761c6": "FOUNDATION PLAN",  
    "pe61a57c3": 0e0,  
    "pee815a7f": "None",  
    "pef87fde6": 0e0,  
    "pf4ca60ab": 583333333333334e-16,  
  },  
  "propsHash": "bcde34b3",  
  "propsIgnored": {  
    "p6a81eafd": 2386,  
    "p93e93af5": 2387  
  },  
  "geomHash": "TCC2Cc9tv04EVazM7308BQ",  
  "bboxMin": {  
    "x": -1413565004170512e-13,  
    "y": -5410244931321833e-14,  
    "z": 10000000002097008e-14  
  },  
  "bboxMax": {  
    "x": -14063352214982766e-14,  
    "y": -53379471045994805e-15,  
    "z": 11101965298365471e-14  
  },  
  "views": [  
    "e7fda9d5",  
    "12fcb372"  
  ]  
}
```

Object ID, Index manifest JSONのキー  
(diff Index の場合は Type と ChangeType )

インデックス フィールド プロパティの値

プロパティのハッシュ値 + ハッシュを計算する  
ときに無視するプロパティ





SVF2 ジオメトリハッシュ

Viewable オブジェクトのバウンディングボックス  
min/max

オブジェクトを含む Viewables  
(Viewables の manifest キー)

# Model Properties API の仕組み

## クエリのエンドポイント

	エンドポイント	
Index	POST	<b>indexes:batch-status</b>
	GET	indexes/:indexId
	GET	indexes/:indexId/ <b>manifest</b> 
	GET	indexes/:indexId/ <b>fields</b> 
	GET	indexes/:indexId/ <b>properties</b> 
Query	POST	indexes/:indexId/ <b>queries</b>
	GET	indexes/:indexId/queries/: <b>queryId</b>
	GET	indexes/:indexId/queries/:queryId/ <b>properties</b> 

- クエリのビルドと実行
  - インデックスクエリは、カスタムJSONスキーマで記述。  
(AWS S3 Select文のフィルタ式に変換されます)
  - カラムを制限することができます。  
(別のヘッダーを持つ)エイリアスの使用も可能。
- 進捗状況のポーリング
  - state: PROCESSING, FINISHED, FAILED

## Index Fields

```
// Forge viewer element display name field
{"key":"p153cb174","category":"__name__","type":"String","name":"name","uom":null}
// Revit category name field
{"key":"p20d8441e","category":"__category__","type":"String","name":"_RC","uom":null}
// Revit family name field
{"key":"p30db51f9","category":"__category__","type":"String","name":"_RFN","uom":null}
// Revit type name field
{"key":"p13b6b3a0","category":"__category__","type":"String","name":"_RFT","uom":null}
```

クエリのサンプル:  
Revit の分類をカスタムの  
カラムで取得

## クエリ

```
{
  "query": {
    "$and": [
      { "$notnull": "s.props.p20d8441e" },
      { "$notnull": "s.props.p30db51f9" },
      { "$notnull": "s.props.p13b6b3a0" },
      { "$gt": [{ "$count": "s.views" }, 0] }
    ]
  },
  "columns": {
    "s.svf2Id": true,
    "lmvName": "s.props.p153cb174",
    "revitCategory": "s.props.p20d8441e",
    "revitFamily": "s.props.p30db51f9",
    "revitType": "s.props.p13b6b3a0",
    "s.views": true
  }
}
```

Revit の分類を示す Row

0 以上のビュー配列





エイリアスを定義したカラム

## 対応する S3 SQL

```
select
  s.svf2Id,
  s.props.p153cb174 as lmvName,
  s.props.p20d8441e as revitCategory,
  s.props.p30db51f9 as revitFamily,
  s.props.p13b6b3a0 as revitType,
  s.views
from S3Object[*] s
where
  s.props.p20d8441e is not null and
  s.props.p30db51f9 is not null and
  s.props.p13b6b3a0 is not null and
  count(s.views) > 0
```

# Model Properties API の仕組み





クエリの結果をダウンロードするエンドポイント

	エンドポイント	
Index	POST	<b>indexes:batch-status</b>
	GET	indexes/:indexId
	GET	indexes/:indexId/ <b>manifest</b> 
	GET	indexes/:indexId/ <b>fields</b> 
	GET	indexes/:indexId/ <b>properties</b> 
Query	POST	indexes/:indexId/ <b>queries</b>
	GET	indexes/:indexId/queries/:queryId
	GET	indexes/:indexId/queries/:queryId/ <b>properties</b> 

- クエリの結果をダウンロード
  - クエリのリクエスト時の queryResultsUrl、またはクエリID を使用して、送信されたクエリ式に一致するインデックス行をダウンロードします。
  - 結果: 改行区切りの NDJSON
  - プロパティインデックス行のサブセット
  - フォーマットは、先に見たプロパティと全く同じです。

# Model Properties API の仕組み

## Diff エンドポイント

	エンドポイント	
Diff	POST	<b>diffs:batch-status</b>
	GET	diffs/:diffId
	GET	diffs/:diffId/manifest 
	GET	diffs/:diffId/fields 
	GET	diffs/:diffId/properties 
Query	POST	diffs/:diffId/queries
	GET	diffs/:diffId/queries/:queryId
	GET	diffs/:diffId/queries/:queryId/properties 

- Diff – Index 作成と同じ手順
- 比較する2つのバージョンの URN を指定:

```
{
  "diffs": [
    {
      "prevVersionUrn": "urn:adsk.w
      "curVersionUrn": "urn:adsk.wi
    }
  ]
}
```

- stats: add, removed, modified



```

{
  "type": "OBJECT_CHANGED",
  "svf2Id": 160,
  "externalId": "552d2a83-4642-4d5c-8e7f-5de799129097-000d047a",
  "lmvId": 2699,
  "lineageId": "2b856593",
  "databaseId": "3d0bd846",
  "props": {
    "p002932a2": 0.0,
    "p01bbdcf2": "Arch-FIRST FLOOR",
    ...
  },
  "views": [
    "f109b687",
    "f24d458"
  ],
  "prev": {
    "lmvId": 2699,
    "lineageId": "b28c3429",
    "databaseId": "936acb06",
    "props": {
      "p1b2aabe1": 10.5
    },
    "propsHash": "ad9828df",
    "propsIgnored": {
      "p6a81eafd": 2545,
      "p93e93af5": 2546
    },
    "geomHash": "4s1yfJZd0hnBu2DdFL4HEw",
    "bboxMin": {
      "x": -1413565004170512e-13,
      "y": -5410244931321833e-14,
      "z": 10000000002097008e-14
    },
    "bboxMax": {
      "x": -14063352214982766e-14,
      "y": -53379471045994805e-15,
      "z": 11101965298365471e-14
    },
    "views": [
      "f109b687",
      "8e525582"
    ]
  }
}

```

Diff のインデックスかどうか判別する Type

現在のインデックス行に保持されている  
前 (prev) のオブジェクト。  
Lineage のマニフェストキーと Viewable ID。

現在の値と異なる値を持つプロパティキー  
の配列

以前のバウンディングボックス、ハッシュ、  
マニフェストの Viewable キー

# Basic インデックス行 vs. Diff インデックス行

インデックス行に含まれるフィールドの一覧

説明	現在のバージョン	前のバージョン
IDs	<code>s.svf2Id</code> <code>s.externalId</code>	
Change type, previous vs. current		<code>s.type</code> <code>s.changeType</code>
lineage version info, SVF2 database URNs	<code>s.lmvId</code> <code>s.lineageId</code> <code>s.databaseId</code>	<code>s.prev.lmvId</code> <code>s.prev.lineageId</code> <code>s.prev.databaseId</code>
Property values	<code>s.props.*</code> <code>s.propsHash</code> <code>s.propsIgnored.*</code>	<code>s.prev.props.*</code> <code>s.prev.propsHash</code> <code>s.prev.propsIgnored.*</code>
Geometry hash and bounding box values IF viewable	<code>s.geomHash</code> <code>s.bboxMin.x</code> <code>s.bboxMin.y</code> <code>s.bboxMin.z</code> <code>s.bboxMax.x</code> <code>s.bboxMax.y</code> <code>s.bboxMax.z</code>	<code>s.prev.geomHash</code> <code>s.prev.bboxMin.x</code> <code>s.prev.bboxMin.y</code> <code>s.prev.bboxMin.z</code> <code>s.prev.bboxMax.x</code> <code>s.prev.bboxMax.y</code> <code>s.prev.bboxMax.z</code>
Viewable keys IF viewable	<code>s.views</code> <code>s.views[i]</code>	<code>s.prev.views</code> <code>s.prev.views[i]</code>

# JSON 抽象構文木 → S3 Select(AWS)

\$not	\$like	\$cat	\$char_length
\$and	\$between	\$coalesce	\$lower
\$or	\$in	\$mod	\$upper
\$gt	\$contains	\$cast	\$count
\$lt	\$isnull	\$nullif	\$sum
\$eq	\$notnull	\$date_add	\$avg
\$le	\$add	\$date_diff	\$min
\$ge	\$sub	\$extract	\$max
	\$mul	\$substring	\$trim
	\$div	\$to_string	\$utcnow
		\$to_timestamp	\$case



# 開発者リソース

Model Properties API

# 開発者リソース

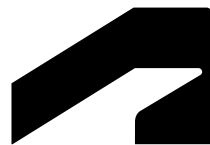
## ドキュメンテーション

- フィールドガイド
  - [Introduction to Model Properties](#)
- Step-by-Step チュートリアル
  - [Index Querying](#)
  - [Tracking Changes](#)
  - [Query Language Reference](#)
- レファレンスガイド
  - [Index](#)
  - [Diff](#)

The screenshot shows the Autodesk Construction Cloud APIs Developer's Guide page. The page has a navigation bar at the top with links for Platform Vision, Solutions, Getting Started, Documentation, Community, Support, and Pricing. The main content area is titled 'Autodesk Construction Cloud APIs' and 'Version 1'. The left sidebar contains a 'Developer's Guide' section with a tree view. The 'Field Guide' section is expanded, showing 'Assets (beta)' and 'Model Properties' (highlighted with an orange box). The 'Step-by-Step Tutorials' section is also expanded, showing 'Getting Started', 'Assets (beta)', 'Forms', 'RFIs (beta)', 'Takeoff', and 'Model Properties' (highlighted with an orange box). The 'Model Properties' section is further expanded, showing 'Index Querying', 'Tracking Changes', and 'Query Language Reference'. The main content area on the right is titled 'Introduction to Model Properties' and 'Model Properties Service'. It contains text about the service, its purpose, and how it works. The text mentions that the service allows callers to build and query indexes built from the BIM models uploaded to Autodesk and BIM 360 Docs. It also mentions that the service allows callers to view the coordinates for objects that are viewable via the Forge viewer, allowing callers to view the queries. The API also allows users to trigger the service to calculate changes (diffs) that have occurred between consecutive versions of a model. To calculate a diff, callers specify a previous and current version, and the service compares these versions, computing changes to their property values and box geometry. The section 'Diff index file type support' mentions that unlike basic property indexing, which only depends on SVF translation, diff indexing depends on the model properties service to compare instances of the same design across consecutive versions of a file, the IDs of these elements must be the same. If the ID of a specific element changes between consecutive versions of the file, the ID is said to be unstable and the diff comparisons by the model properties service. The section also mentions that the file types supported by the index service for diff comparisons currently include 3D RVT, NWC files exported from Revit and AutoCAD verticals, IFC files exported from AutoCAD architecture, 3D 2018 and onwards, ARCHICAD, Revit, MagiCAD for Revit, and Tekla Structures.

# 開発者リソース

- GitHub コードサンプル
  - [Postman Collection](#) (3つの Step-by-Stepチュートリアルに対応)
  - [Model Properties API Walkthrough in PowerShell Core](#) (クエリ言語の理解)
  - [Element Filtering and Partial Model Load](#) (Viewer 統合)
  - [Compare Two Versions](#) (Viewer 統合)
- ブログ記事
  - “BIM 360/ACC Model Properties API”  
<https://forge.autodesk.com/blog/bim-360acc-model-properties-api>
  - キーワード “Model Properties” でページ内検索  
<https://forge.autodesk.com/blog/model-properties-api-vs-model-derivative-api>



# Data Connector API

# Data Connector API

- Insight モジュール, アカウントレベル
- データのダンプが可能。
- パブリック (2021年1月~)
- API 自体は B360/ACC 互換
- データは製品によって異なります。
- Tip: Executive Overview permission
- プロジェクトレベル(Project Admin)



The screenshot shows the Autodesk Construction Cloud Data Connector interface. The top navigation bar includes 'Insight', 'Developer Ad...', and the user 'Mikako Harada'. The left sidebar shows 'EXECUTIVE OVERVIEW' with options for Cost, Design, Quality, and Safety. The main content area displays 'Data Connector' with a 'Processing...' status and a 'Schedule' button. Below this, a table shows the creation time 'May 22, 2022 4:19 PM' and a 'Download' button. A yellow circle highlights the 'Processing...' status.

The screenshot shows the Autodesk Construction Cloud Data Connector interface. The top navigation bar includes 'Insight', 'Developer Ad...', and the user 'Mikako Harada'. The left sidebar shows 'EXECUTIVE OVERVIEW' with options for Cost, Design, and Quality. The main content area displays 'Data Connector' with a 'Run extraction' button and a 'Schedule' button. Below this, a table shows the creation time 'May 22, 2022 4:22 PM' and a 'Download' button. A yellow circle highlights the 'Download' button.

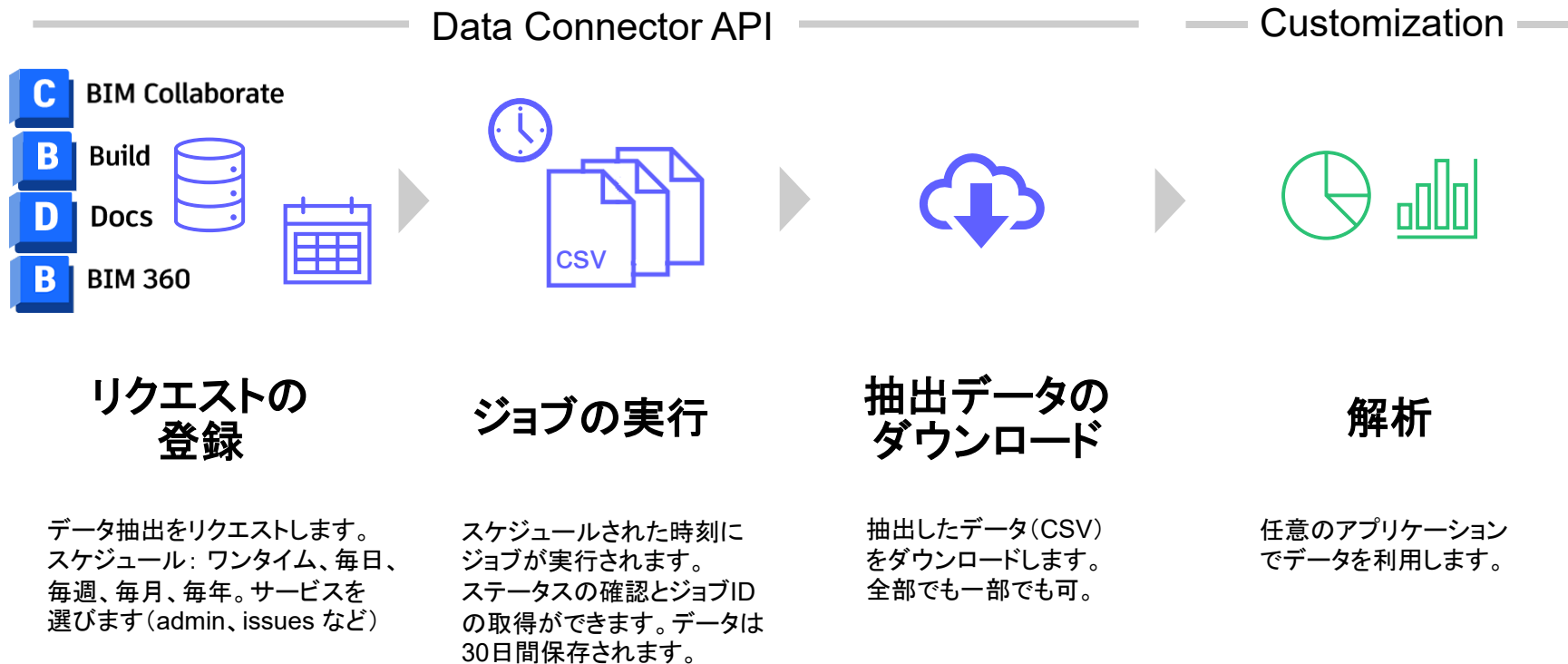
schemas

- admin\_account\_services.csv
- admin\_accounts.csv
- admin\_business\_units.csv
- admin\_companies.csv
- admin\_project\_companies.csv
- admin\_project\_roles.csv
- admin\_project\_services.csv
- admin\_project\_user\_companies.csv
- admin\_project\_user\_roles.csv
- admin\_project\_user\_services.csv
- assets\_asset\_custom\_attribute\_values.csv
- assets\_asset\_permissions.csv
- assets\_asset\_statuses.csv
- assets\_assets.csv
- assets\_categories.csv
- assets\_category\_custom\_attribute\_assignments.csv
- assets\_category\_status\_set\_assignments.csv
- assets\_custom\_attribute\_default\_values.csv
- assets\_custom\_attribute\_selection\_values.csv
- assets\_custom\_attributes.csv
- assets\_status\_sets.csv


- checklists\_checklist\_items.csv
- checklists\_checklist\_items\_answers.csv
- checklists\_checklist\_section\_assignees.csv
- checklists\_checklist\_sections.csv
- checklists\_checklist\_signatures.csv
- checklists\_checklists.csv
- checklists\_template\_item\_instructions.csv
- checklists\_template\_items.csv
- checklists\_template\_items\_answers.csv
- checklists\_template\_sections.csv
- checklists\_template\_signatures.csv



# 基本的なワークフロー




# Data Connector API の仕組み

	エンドポイント	
Requests	POST	<b>requests</b>
	GET	requests
	GET	requests/:requestId
	PATCH	requests/:requestId
	DELETE	requests/:requestId
Jobs	GET	requests/:requestId/ <b>jobs</b>
	GET	jobs/
	GET	jobs/:jobId
	DELETE	jobs/:jobId
Data	GET	jobs/:jobId/ <b>data-listing</b>
	GET	jobs/:jobId/ <b>data/:name</b> 


- 11 のエンドポイント

# Data Connector API の仕組み

	エンドポイント	
	POST	<b>requests</b>
Requests	GET	requests
	GET	requests/:requestId
	PATCH	requests/:requestId
	DELETE	requests/:requestId
Jobs	GET	requests/:requestId/ <b>jobs</b>
	GET	jobs/
	GET	jobs/:jobId
	DELETE	jobs/:jobId
Data	GET	jobs/:jobId/ <b>data-listing</b>
	GET	jobs/:jobId/ <b>data/:name</b> 


- データ抽出リクエストの作成
  - 認証されたユーザーのみ
  - 抽出のスケジュール
    - ・ ワンタイム
    - ・ インターバル - 毎日、毎週、毎月、毎年
  - サービスグループ
    - ・ admin, assets, checklists, cost, daily logs, issues, locations, meeting minutes, relationships, rfis, submittals, ...
    - ・ さらにサービスが追加されています。
  - (オプション) Callback URL - ジョブが実行された際に呼び出されます。

# Data Connector API の仕組み

	エンドポイント	
	POST	<b>requests</b>
Requests	GET	requests
	GET	requests/:requestId
	PATCH	requests/:requestId
	DELETE	requests/:requestId
Jobs	GET	requests/:requestId/ <b>jobs</b>
	GET	jobs/
	GET	jobs/:jobId
	DELETE	jobs/:jobId
Data	GET	jobs/:jobId/ <b>data-listing</b>
	GET	jobs/:jobId/ <b>data/:name</b> 


- データ抽出リクエストの情報を  
Get/Update/Delete

# Data Connector API の仕組み

	エンドポイント
Requests	POST <b>requests</b>
	GET requests
	GET requests/:requestId
	PATCH requests/:requestId
	DELETE requests/:requestId
Jobs	GET requests/:requestId/ <b>jobs</b>
	GET jobs/ ★ 7/20 追加 !
	GET jobs/:jobId
	DELETE jobs/:jobId
Data	GET jobs/:jobId/ <b>data-listing</b>
	GET jobs/:jobId/ <b>data/:name</b> 

- 実行された抽出ジョブの情報の取得
  - status: queued, running, complete
  - completionStatus: success, failed, cancelled
- Delete

# Data Connector API の仕組み

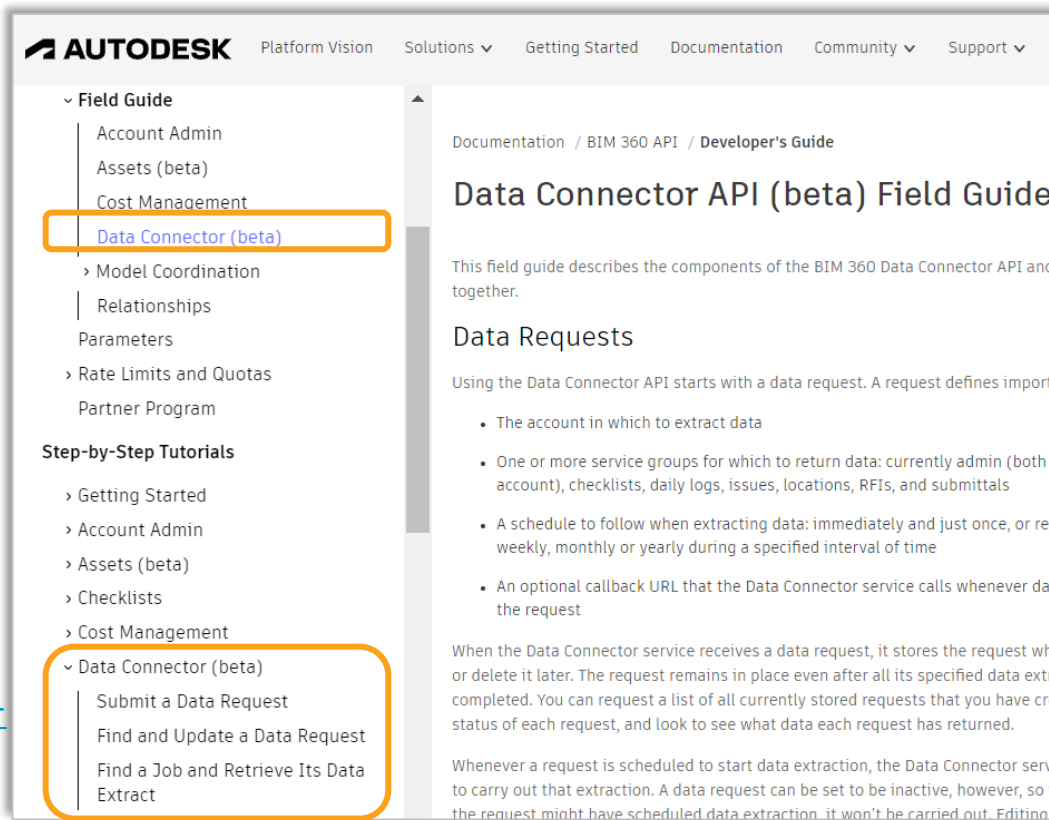
	エンドポイント	
Requests	POST	<b>requests</b>
	GET	requests
	GET	requests/:requestId
	PATCH	requests/:requestId
	DELETE	requests/:requestId
Jobs	GET	requests/:requestId/ <b>jobs</b>
	GET	jobs/
	GET	jobs/:jobId
	DELETE	jobs/:jobId
Data	GET	jobs/:jobId/ <b>data-listing</b>
	GET	jobs/:jobId/ <b>data/:name</b> 

- 抽出したファイル名のリストを取得
  - README.html
  - autodesk\_data\_extract.zip
    - (全ファイルを .zip 圧縮、UI と同じ)
  - meta.csv – ジョブの日時とリージョン
  - .csv files
    - 各データに対して1つ以上のファイル
    - e.g., admin\_companies.csv
  - Schema フォルダ内にスキーマファイル
- ダウンロード: GET signed URL

# 開発者リソース

## Data Connector

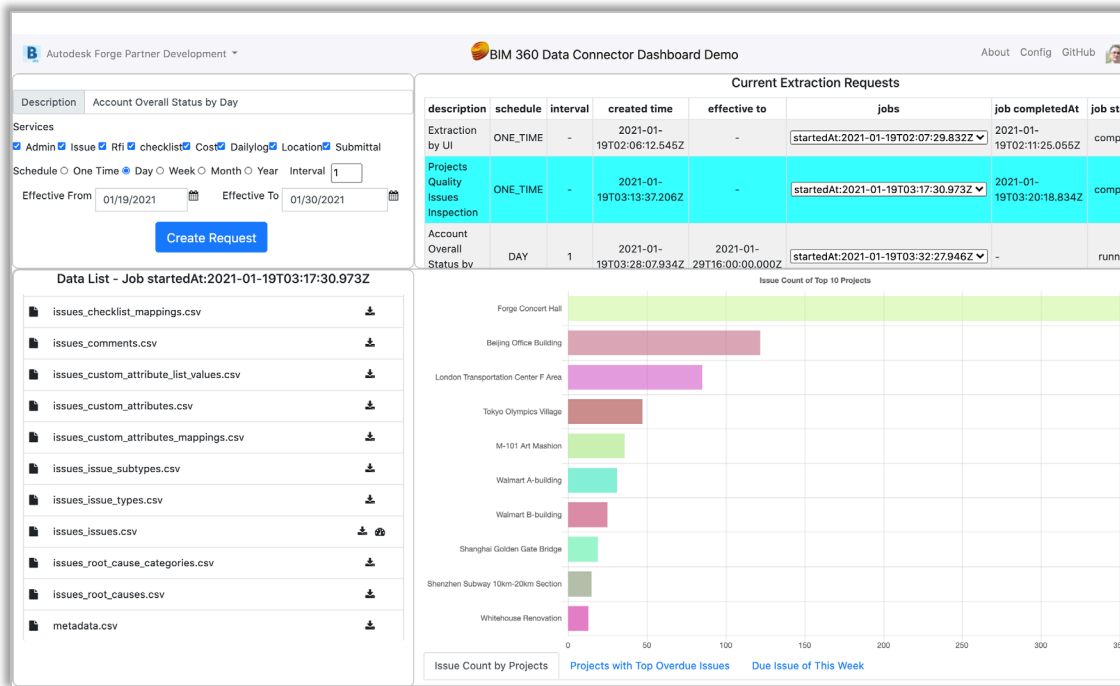
- ドキュメンテーション:
  - [Field Guide](#)
  - [Step-by-Step Tutorials](#)
  - [Reference Guide](#)
- GitHub コードサンプル:
  - [Postman collection](#)
  - [Export/create requests, get jobs, data and make dashboard](#)
- Blog:  
<https://forge.autodesk.com/blog/bim-360-data-connector-api-available-public-beta>



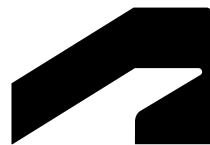
# ダッシュボードサンプル

## Data Connector

- 概要: スケジューリング（左上）、ジョブのリストアップ（右上）、指定したジョブの利用可能なデータのリストアップ（左下）、棒グラフでの指摘事項のカウント数の表示（右下）。
- ソースコード: GitHub サンプル [Export/create requests, get jobs, data and make dashboard](#)
- 開発者: Xiaodong Liang, Autodesk







# 今後の予定

# 今後の予定



## Coming Soon

- Locations write
- Build: シート
- Cost Webhooks
- Forms 取得の改善点  
(割り当てられた担当者の  
会社/役割をサポート)



## デザインレビュー

- Docs: ファイル – pdf 書き出し  
(w/ マークアップ)
- Data Connector – プロジェクト  
レベルのアクセス
- AutoSpec (Pytype)



## 高い優先度

- Admin - プロジェクトの作成、  
ユーザー・会社・役割の追加
  - テンプレート
  - 全てのサービスを有効化
- Issues – ベータ版からパブリッ  
クリリース



# Thank you!



@autodeskforge



Autodesk and the Autodesk logo are registered trademarks or trademarks of Autodesk, Inc., and/or its subsidiaries and/or affiliates in the USA and/or other countries. All other brand names, product names, or trademarks belong to their respective holders. Autodesk reserves the right to alter product and services offerings, and specifications and pricing at any time without notice, and is not responsible for typographical or graphical errors that may appear in this document.

© 2022 Autodesk. All rights reserved.