CS225223
# Bringing SharePoint and BIM360 Together

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ProjectReady Central

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## Learning Objectives

- Basics of Forge API
- Basics of SharePoint
- Provisioning a BIM Project
- Move BIM360 Documents to SharePoint
- Extracting BIM 360 Docs Metadata to SharePoint

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## Description

In this session we will review the path and journey from .Net to Forge and the tools and techniques that were used in the development of ProjectReady, our product that integrates SharePoint with BIM 360.

In the age of the cloud and digital disruption, the information and documents you need to manage are increasingly all over the Enterprise – driving content chaos. This creates a need to manage content across different systems. ProjectReady does this by bringing the content from SharePoint's O365 and BIM 360 Docs together.

The key concepts being explored in this document include:
- Forge API Basics
- SharePoint Basics
- BIM 360 Docs Account Management
- Moving BIM 360 Docs to SharePoint
- Upload Documents to BIM 360 Docs
- Extracting Metadata from BIM 360 Docs

# Speaker

**Shaili Modi**

Shaili is the product development manager at award-winning solution provider Gig Werks and the lead developer and designer of the ProjectReady Central solution for project management and document control in the architecture, engineering, and construction industries. Shaili has worked in the industry for over 7 years with deep expertise ranging across multiple cloud platforms including SharePoint, Office 365 and Nintex. Additionally, Shaili has worked closely over the past year with team at Autodesk to build solutions connecting Autodesk to other platforms and business processes driving unique value available from ProjectReady Central.
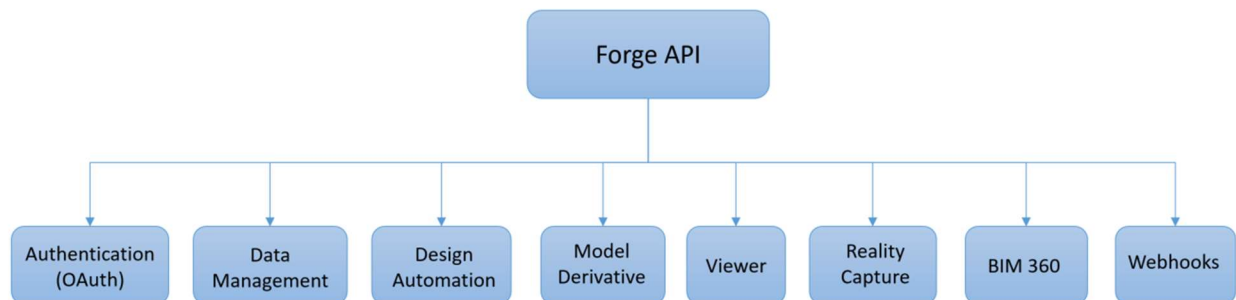
**smodi@project-ready.com**
New York, US
Solution Architect
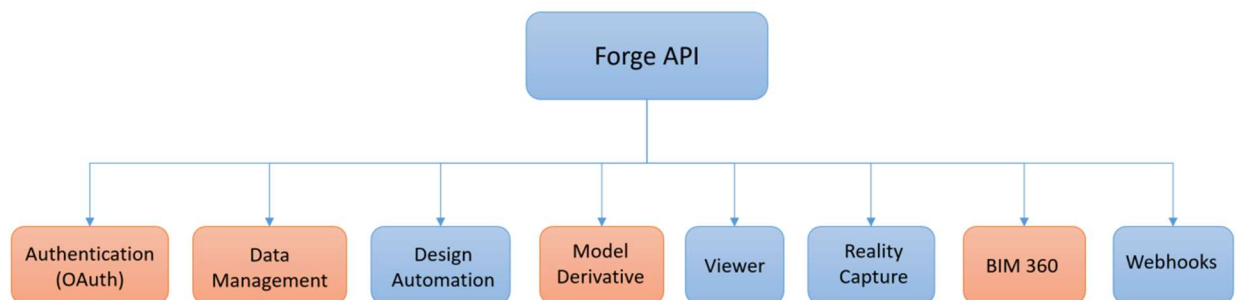ProjectReady, Gig Werks
Software Development

## Forge API Basics

Forge is Autodesk's application program interface (API) platform as well as a community of developers who uses those APIs. Although Forge is intended for Autodesk customers as well as third party developers to be able to use Autodesk's web services, Autodesk also uses Forge for the development of the cloud-based services offered.

Forge enables companies to leverage design and engineering data to develop custom software applications and connected workflows for manufacturing, media/entertainment, architecture, engineering, and construction.

At a high-level Forge is defined by 8 groups of APIs:



For today's session we are going to focus on the below groups:



### Authentication (OAuth)

Authentication for Forge is based on the industry standard OAuth, specifically OAuth2 that provides for token-based authentication and authorization.
The basic flow for using OAuth is:
- You make a HTTP call to an OAuth REST endpoint and provide credentials.
- A token is returned to your app.

- In making subsequent HTTP calls to various APIs on the platform, you include the token in a request header.

You can use OAuth with a two-legged or a three-legged authentication process.

Two-legged authentication

- o To accomplish two-legged authentication on the Forge Platform requires that you use the "Client Credentials" grant type. This means that your app directly communicates with the Forge Platform for authentication and accessing resources. If it's a web app, the end user is not directly aware of any of these server-to-server communications, as none of it is passed through the web browser.

Three-legged authentication

- o To accomplish three-legged authentication and authorization on the Forge Platform, the authorization code grant type can be adopted. To use a web app as an example, this means that your app redirects the end user to an Autodesk login and authorization flow, and an authorization code is returned to your app (via a query parameter in the callback). Your app then exchanges that authorization code for a token by communicating with the Forge authentication server directly. While other grant types are possible (that enable other flows), they are less secure and thus highly discouraged.
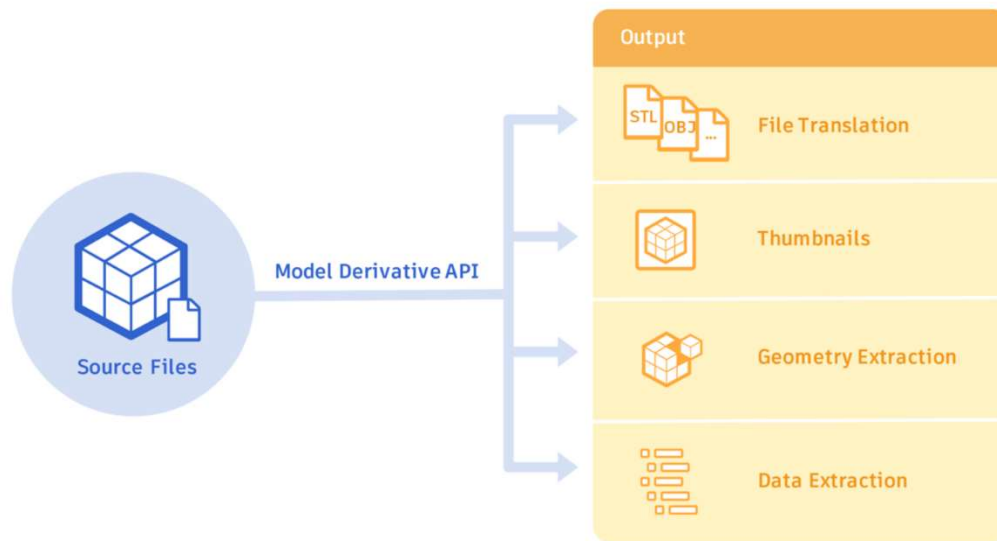
## Data Management

The Data Management API gives you a unified and consistent way to access your data. Specifically, for BIM 360 Docs, it is used to keep teams on-trach with the latest construction drawings, documents and models. This API allows you to Download and Upload files. Coupling this with the Model Derivative API, you can accomplish a number of workflows

## Model Derivative

The Model Derivative API enables users to represent and share their designs in different formats, as well as to extract valuable metadata

Model derivative API includes Metadata Extraction, Geometry Extraction as well as File Translation.

In this session, we are going to be looking at Metadata Extraction.

## BIM 360 Account Admin API

The BIM 360 Account Admin API automates setting up projects, assigning project admins, and managing member and partner company directories. You can also synchronize data with external systems.

The BIM 360 API allows automation of project creation workflows and populating project profiles programmatically, thereby reducing manual data entry and improving data quality. Using the BIM 360 API, you can bring in project information from external systems, such as enterprise resource planning (ERP) or financial systems, and make it consistent across BIM 360 services and the rest of your construction ecosystem.

# SharePoint Basics

**SharePoint was created to manage your documents at your company.**

If you have a large organization (like a construction company or commercial real estate firm) and you're managing your documents without a system like SharePoint Online (in Office365), your documents are probably unorganized, in a variety of systems, and difficult to find.

What will be your answer to the below questions:
- Do you have a large organization and have difficulty finding documents across a variety of systems?
- Do you have issues with ensuring the consistency of documents?
- Do you need help to protect documents from unauthorized access?

- Are you managing your entire company from a spreadsheet?

If your answer is "Yes" to most of the questions, not having a document management system or the collaboration tools to keep everything organized and secure will end up costing you in the long run.

What you need is a document management system that will place your files in a hierarchy. Microsoft Office 365 has a built-in document management system… it's called SharePoint Online.

SharePoint is the ideal Document management system for MS Office assests with the below features:

- Store, organize, and locate documents.
- Ensure the consistency of documents.
- Manage metadata for documents.
- Help protect documents from unauthorized access or use.
- Ensure consistent business processes (workflows) for how documents are handled.
- Security: If you are managing by email, then chances are good that you're blasting your company with sensitive information. Management by email is not only cumbersome and ineffective, it's also not secure. From a security perspective, it's a lot safer to leave important documents behind a firewall where employees can get it when they need it, instead of sending it through email.
- Single Sign-On: SharePoint is also great at giving you access to all the apps you need with one sign-on. Instead of continuously signing into different systems and software, SharePoint is your single sign-on.
- Version History: Again… if you're managing by email, there is a better way! Another thing that SharePoint can really help with is version history. Sometimes in corporate environments, a document will be emailed back and forth and it gets difficult to determine which the most up-to-date version is. With SharePoint, you can check out documents, have employees edit them, and then check them back into SharePoint.
- Automation: According to Microsoft, a SharePoint workflow is like an automated flowchart that takes a lot of the labor, guesswork, and randomness out of standard work processes. SharePoint can ensure employees have the appropriate approval to access and edit the document, removing the guesswork from employees.
- Easy Team Collaboration: It's easy to work on projects when the documents your team needs are in one place. Microsoft even says that SharePoint lets you "Collaborate effortlessly and securely with team members inside and outside your organization, across PCs, Macs, and mobile devices."

# Tools and Tips for SharePoint Online

## Tip #1 – Office365 Online

Our number one recommendation for automation is to move from Microsoft Office on the desktop and shift to using Office365 version of Office that works on a web browser or mobile device. Here are some things that are possible with Office365 online:

- Co-Author – you can have many simultaneous users working in the same spreadsheet or document. This allows for parallel workflows not sequential routing of documents and versions.
- Entire team or company can be reading off one spreadsheet or document
- Works in a Browser/App/Device
- Anywhere access
- Collaboration with teams and reviewers can post notes, write comments, or share information
- Example – finance can send out the updated actual data with the old forecast. Everyone in the company can review it and update their numbers in one spreadsheet

## Tip #2 - DO YOU OWN OFFICE365?

To begin with, if you are already using Office 365 Business or Enterprise SKUs then you already have SharePoint Online. Therefore, utilizing it saves you a great deal of license, hardware, maintenance and upgrade costs.
Here is how you check:

- Go to http://office.com
- Login with your company user name and password you use at work
- If you can login, you have office365! If you cannot, you can ask your IT department to purchase it for you. It costs about the same as the old desktop office license
- Do you see Excel or SharePoint on the list of Apps like shown here? If so ,you'll want Excel and SharePoint for the rest of this User Guide

## Tip #3 – Power BI

- BI = Business Intelligence – and it is a type of software automation tool that helps people understanding the Score Board information and what it means
- Analytics help you to analyze the data, ask it "what if" questions, or to spot trends and outlier costs
- Solve problems using data by researching the detail behind the numbers
- Works on mobile devices, is usually dynamically updated and is secure so only the right people see the right data
- Drill down, roll up, slice and dice data in new ways not possible before, at the click of a button or filter
- BI tools are built on Excel, SharePoint and other systems of record

## Bringing SharePoint and BIM 360 Docs together

As we manage data across multiple repositories we need a consistent structure and navigation to all projects whether they are in SharePoint or BIM 360.

This consistency across systems can be achieved by provisioning the different repositories.
Using ProjectReady as an example we will see how we can create a BIM 360 Docs Project as well as a SharePoint Project from one interface.
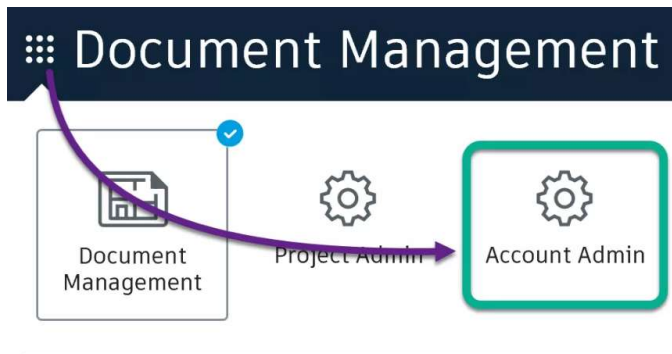By automating the creation of these project sites, ProjectReady ensures best practices information architecture & security built to scale.

## BIM 360 Account Management

The BIM 360 Account Admin API automates setting up projects, assigning project admins, and managing member and partner company directories. You can also synchronize data with external systems.
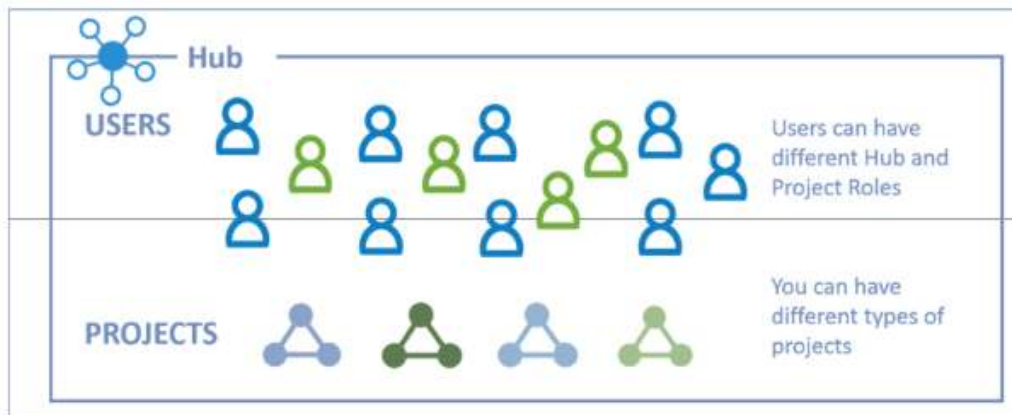
To go to BIM 360 Docs - https://docs.b360.autodesk.com/

From BIM 360 Docs, here is how you can go to the Account Admin Area if you have access to the area.



For anyone new to the BIM 360 Projects, below is a reference of the different categories for BIM 360 projects.

| Category | Description |
|---|---|
| Account (Hub) | The host organization that owns BIM 360 projects. |
| Project | The primary organizing construct within which people work and content is managed in BIM 360. |
| User | Members participating in your BIM 360 account. |

## BIM 360 – Create Project

The BIM 360 API allows automation of project creation workflows and populating project profiles programmatically, thereby reducing manual data entry and improving data quality. Using the BIM 360 API, you can bring in project information from external systems, such as enterprise resource planning (ERP) or financial systems, and make it consistent across BIM 360 services and the rest of your construction ecosystem.

**POST** projects

Create a new BIM 360 project in a specific BIM 360 account.

### Resource Information

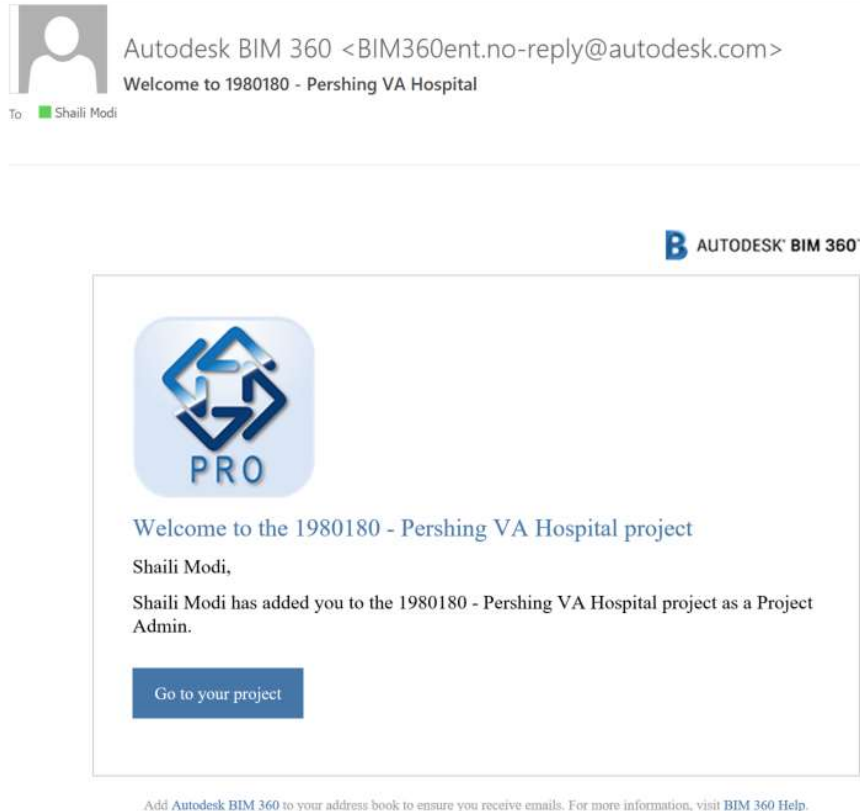| | |
|---|---|
| Method and URI (US) | **POST** https://developer.api.autodesk.com/hq/v1/accounts/:account_id/projects |
| Method and URI (EMEA) | **POST** https://developer.api.autodesk.com/hq/v1/regions/eu/accounts/:account_id/projects |
| Authentication Context | app only |
| Required OAuth Scopes | `account:write` |
| Data Formats | JSON |

You will need the account_id of a specific account to call the Create Project API endpoint.
There are two ways to get the account_id of a BIM 360 account, depending on your permissions in that account:

- If you are the Account Admin, you can log into the BIM 360 enterprise portal and find the account ID under the "Account Settings" tab.
- If you are invited to an account as a Developer, you would have received the account ID while connecting your app to the BIM 360 account.

Remember that when transitioning from a development sandbox to a production BIM 360 account, you need to update the account_id in your API calls to the new production account ID.

Note that on calling this API programmatically the project gets created, but it needs to be activated. You can add one Project Admin at the time of submitting the request.

Once the Project has been successfully created, the Project Admin receives the email notification as below. The user can click the link in the email and Go to the newly created project.



## Create a Project Site in SharePoint

We can create a SharePoint site using CSOM. The highlighted below are the items that can be customized to create the SharePoint project site.

*#Add references to SharePoint client assemblies and authenticate to Office 365 site*
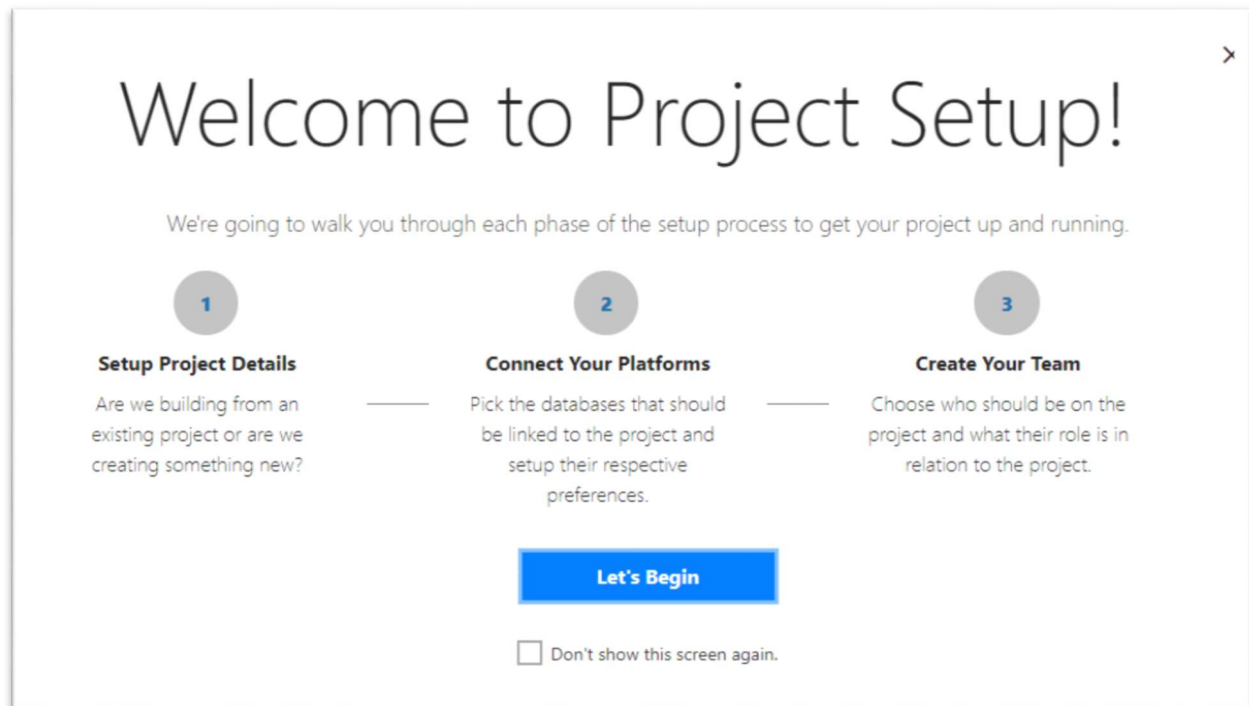*Add-Type -Path "C:\Program Files\Common Files\Microsoft Shared\Web Server Extensions\16\ISAPI\Microsoft.SharePoint.Client.dll"*
*Add-Type -Path "C:\Program Files\Common Files\Microsoft Shared\Web Server Extensions\16\ISAPI\Microsoft.SharePoint.Client.Publishing.dll"*
*Add-Type -Path "C:\Program Files\Common Files\Microsoft Shared\Web Server Extensions\16\ISAPI\Microsoft.SharePoint.Client.Runtime.dll"*

```
$Username = Read-Host -Prompt "Please enter your username"
$Password = Read-Host -Prompt "Please enter your password" -AsSecureString
$Site = "https://site.sharepoint.com"
$Context = New-Object Microsoft.SharePoint.Client.ClientContext($Site)
$Creds = New-Object
Microsoft.SharePoint.Client.SharePointOnlineCredentials($Username,$Password)
$Context.Credentials = $Creds

#Create Site
$WCI = New-Object Microsoft.SharePoint.Client.WebCreationInformation
$WCI.WebTemplate = "Template Name"
$WCI.Description = "Project Site"
$WCI.Title = "Pershing VA Hospital"
$WCI.Url = "1980180"
$WCI.Language = "1033"
$SubWeb = $Context.Web.Webs.Add($WCI)
$Context.ExecuteQuery()
```

## ProjectReady Demo:

## Create Project Interface

**Create Project**                                                                                ×

1 ——————— 2 ——————— 3

### Let's get the basics

Company

| 21st Century Insurance | ▼ |

Project Name

| Pershing VA Hospital |

Currency          Project Budget

| $ - USD ▼ |    | 65000 |

Start Date          End Date

| 08/01/2018 |    | 03/02/2020 |

**Next**

Previous

---

**Create Project**                                                                                ×

1 ——————— 2 ——————— 3

### Which Platforms Do You Want To Connect To?

| Teams | ⬤ Yes |
| Sharepoint | ◯ Yes |
| BIM 360 | ⬤ Yes |
| BOX | ⬤ Yes |

Security settings will have to be configured for each app.

**Next**

Previous

## Create Project

×

① ———— ② ———— ③

### Platform Settings

Select SharePoint Template

Construction Management ▾

Select Microsoft Teams Privacy level

Private - Only team owners can add members ▾

BIM 360 Project Type

Commercial ▾

BIM 360 Project Administrator

Select or enter an option

BOX Admin

Select or enter an option

**Next**

**Previous**

## Create Project

×

① ———— ② ———— ③

### Build Your Project Team

**Build From An Existing Team**

**Create New**

**Previous**

We capture all the required information in the above demo.

Once we have the information, we use BIM360 Account Management APIs to create a Project for BIM 360 Docs and SharePoint's Create Site operation to create a SharePoint site programmatically.

BIM 360 Docs Project:

SharePoint Project:

## Moving BIM 360 Docs to SharePoint

To download documents from BIM 360 docs, we need to follow a series of steps to reach to the document. To follow the hierarchy that we saw before
1. Hubs
1.1. Projects
1.1.1.  Folders-Subfolders
1.1.1.1.        Documents

### Download document from BIM 360

```csharp
public static byte[] Download_v2(string accessToken, string href)
    {
        // Build request
        var client = new RestClient();
        client.BaseUrl = new System.Uri(href);

        // Set resource/end point
        var request = new RestRequest();
        request.Method = Method.GET;

        // Add headers
        request.AddHeader("Authorization", "Bearer " + accessToken);

        // Execute request and get response
        IRestResponse response = client.Execute(request);

        // Save response. This is to see the response for our learning.
        m_lastStatusCode = response.StatusCode;
        byte[] byteData = response.RawBytes;

        //Returns Contents
        return byteData;
    }
```

### Upload the document to SharePoint

```csharp
        //Takes in the response returned by BIM 360 Docs in MemoryStream
        MemoryStream stream = new MemoryStream(response);
        stream.Position = 0;
        //Create a FileCreationInformation object
        FileCreationInformation BIMFile = new FileCreationInformation();
        BIMFile.ContentStream = stream;
        BIMFile.Overwrite = true;
        BIMFile.Url = "https://" + _sharePointUrl.Host + newUrl;
        clientContext.RequestTimeout = -1;
        clientContext.ExecuteQuery();
        //Execute the function to upload to SharePoint
        Microsoft.SharePoint.Client.File uploadedfile =
        packageList.RootFolder.Folders.GetByUrl(getFileNameFromURL(newFolder.ServerRelativeUrl)).Files.
        Add(BIMFile);
        clientContext.ExecuteQuery();
        uploadedfile.ListItemAllFields.ParseAndSetFieldValue(originalDocumentUrl, originalBIM360URL);
```

```
uploadedfile.ListItemAllFields.Update();
clientContext.ExecuteQuery();
```

**ProjectReady Demo:**

Office 365 | BIM 360 | BOX

Successfully authenticated to BIM 360

Select Account    ProjectReady ▼

Select Project    1980180 - Pershing VA Hospital ▼

Select BIM 360 Documents

▼ 📁 Plans
   ▼ 📄 House_Plan
   ▼ 📄 Structural_elements_sec1
   ▼ 📄 Structural_elements_sec2

**Created By:** Gabriella Ramoni
**Created Time:** 5/11/2018 6:37:18 PM
**Modified By:** Gabriella Ramoni
**Modified Time:** 5/11/2018 6:37:18 PM
**Version:** 1

Add to Package

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Select BIM 360 Documents

▼ 📁 Plans
   ▼ 📄 House_Plan
   ▼ 📄 Structural_elements_sec1
   ▼ 📄 Structural_elements_sec2

**Created By:** Gabriella Ramoni
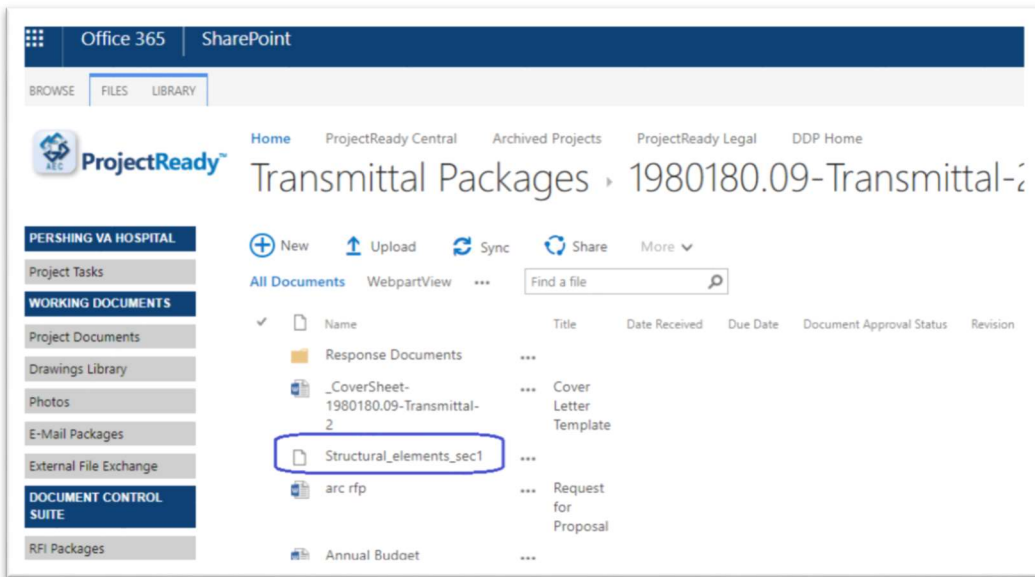**Created Time:** 5/11/2018 6:37:18 PM
**Modified By:** Gabriella Ramoni
**Modified Time:** 5/11/2018 6:37:18 PM
**Version:** 1

Add to Package

Package Count: 1

| | Name | Document Library | Document URL |
|---|---|---|---|
| ☐ 📄 | Structural_elements_sec1 | BIM 360 Doc | https://developer.api.autodesk.com/oss/v2/buckets/wip.dm.prod/objects/cc6ef7ed-23bc-4411-92c4-662c8644ccc5.rvt;;dXJuOmFkc2sud2lwcHJvZDpmcy5maWxlOnZmLks4aVQwaFpVUmVPX1IkYmVvYnFiN( |

## Upload Documents to BIM 360 Docs

**Upload a Document to BIM 360 Docs from ProjectReady**

- Find the hub, Project and Project Files Folder or a Nested Folder
- Create a storage location
- Upload a file to the storage location
- Create the first version of the uploaded file

Notes
- You can only upload files to the BIM 360 Project Files folder or to a folder nested under the Project Files
- No limit to Docs file sizes in terms of bytes, but there are two limitations:
    - If a document is uploading or processing for longer than 24 hours it will be cancelled.
    - PDF's are currently limited to 500 pages for the Plans folder and 2,000 pages for the Project Files folder.

## Extracting BIM 360 Docs Metadata to SharePoint

Metadata can be extracted from a BIM 360 Docs Source File. It can be exported to an Excel file and can also be sourced to SharePoint.

To extract the metadata below are the steps:
- Encode the source file URN in Base64 format
- Translate the source file into SVF format
- Verify that the translation job is complete
- Retrieve the source file's model view IDs
- Retrieve properties for a selected model view ID.

You can retrieve a list of model view (metadata) IDs for a source file using the GET:urn/metadata endpoint. The metadata ID enables users to select an object tree and properties for a specific model view.

### :urn/metadata

Returns a list of model view (metadata) IDs for a design model. The metadata ID enables end users to select an object tree and properties for a specific model view.

Although most design apps (e.g., Fusion and Inventor) only allow a single model view (object tree and set of properties), some apps (e.g., Revit) allow users to design models with multiple model views (e.g., HVAC, architecture, perspective).

Note that you can only retrieve metadata from an input file that has been translated into an SVF file.

Example Request:

Request

```
curl -X 'GET' \
    -H 'Authorization: Bearer PtnrvrtSRpWwUi3407QhgvqdUVKL' \
    -v 'https://developer.api.autodesk.com/modelderivative/v2/designdata/dXJuOmFkc2sub2JqZWN0czpvcy5vYmplY3Q6bW9kZWxkZXJpdmF0aXZlL0E1LnppcA,
```

Response

```
Status Code: 200 OK
Last-Modified: Fri. 13 May 2016 08:49:06 GMT
x-ads-app-identifier=platform-viewing-2016.05.03.1102.2f6bfbf-production
x-ads-startup-time: Fri May 13 08:49:06 UTC 2016
x-ads-duration: 3 ms
{
  "data": {
    "type": "metadata",
    "metadata": [
      {
        "name": "Scene",
        "role": "3d",
        "guid": "4f981e94-8241-4eaf-b08b-cd337c6b8b1f",
      },
      {
        "name": "Sheet: A101",
        "role": "2d",
        "guid": "8e7c6bca-cfd1-290e-4b16-f3670169bb71"
      }
    ]
  }
}
```

Show Less

## Please feel free to contact us for any further information.

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