Bringing SharePoint and BIM360 Together

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About the speaker

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Solution Architect & Lead Developer

ProjectReady

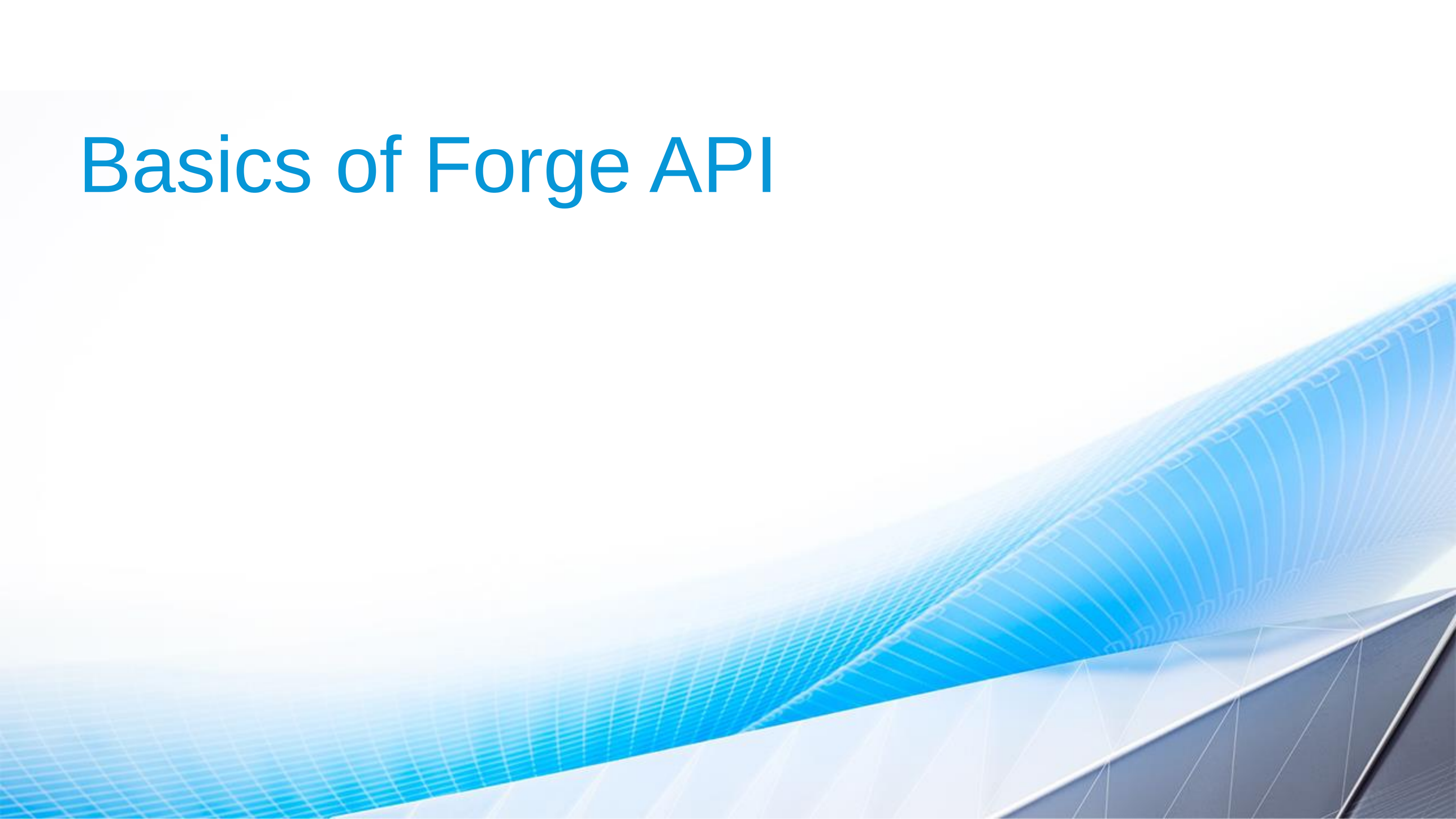
I am the lead developer of the ProjectReady solution for project management and document control in the architecture, engineering, and construction industries.

I have 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.

Learning Objectives

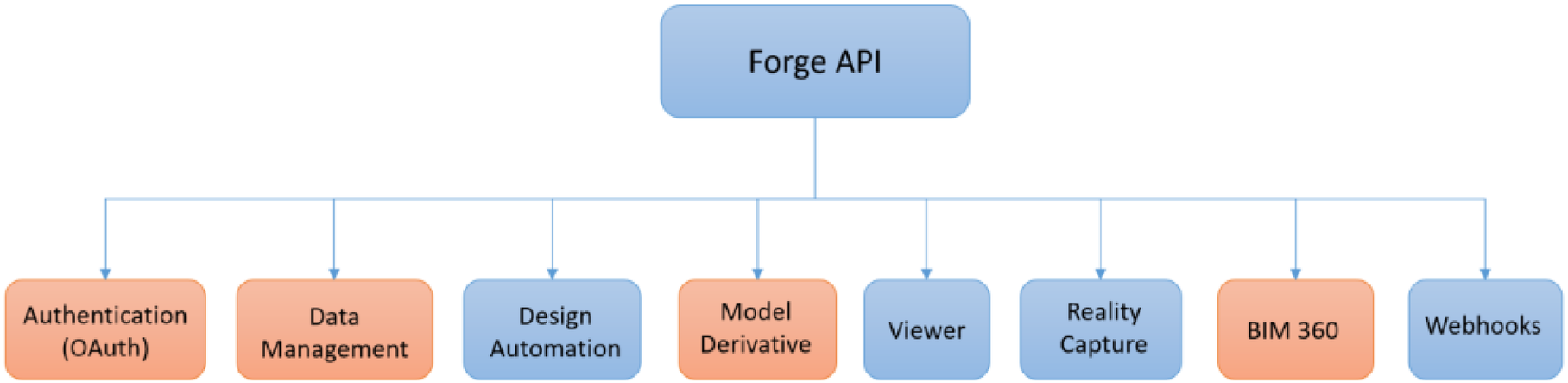
- Basics of Forge API
- Basics of SharePoint
- Provisioning a BIM Project
- Move BIM 360 Docs Documents to SharePoint
- Extracting BIM 360 Docs Metadata

Basics of Forge API



Forge API

FORGE IS AUTODESK'S APPLICATION PROGRAM INTERFACE (API) PLATFORM AS WELL AS A COMMUNITY OF DEVELOPERS WHO USES THOSE APIS TO CONNECT TO AUTODESK'S SERVICES

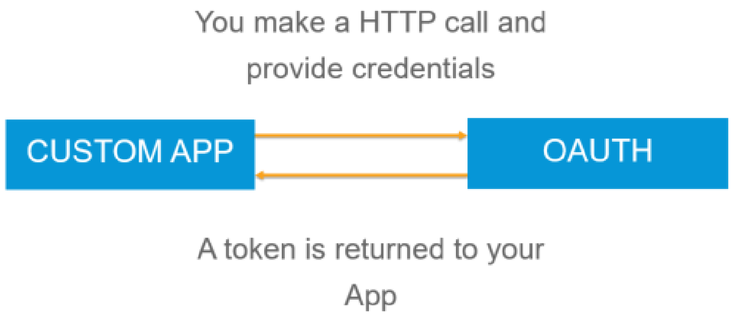


Forge API Groups

AUTHENTICATION (OAUTH)

Provides token-based authentication and authorization

- Two-legged Authentication
- Three-legged Authentication



DATA MANAGEMENT

Provides a unified and consistent way to access your data

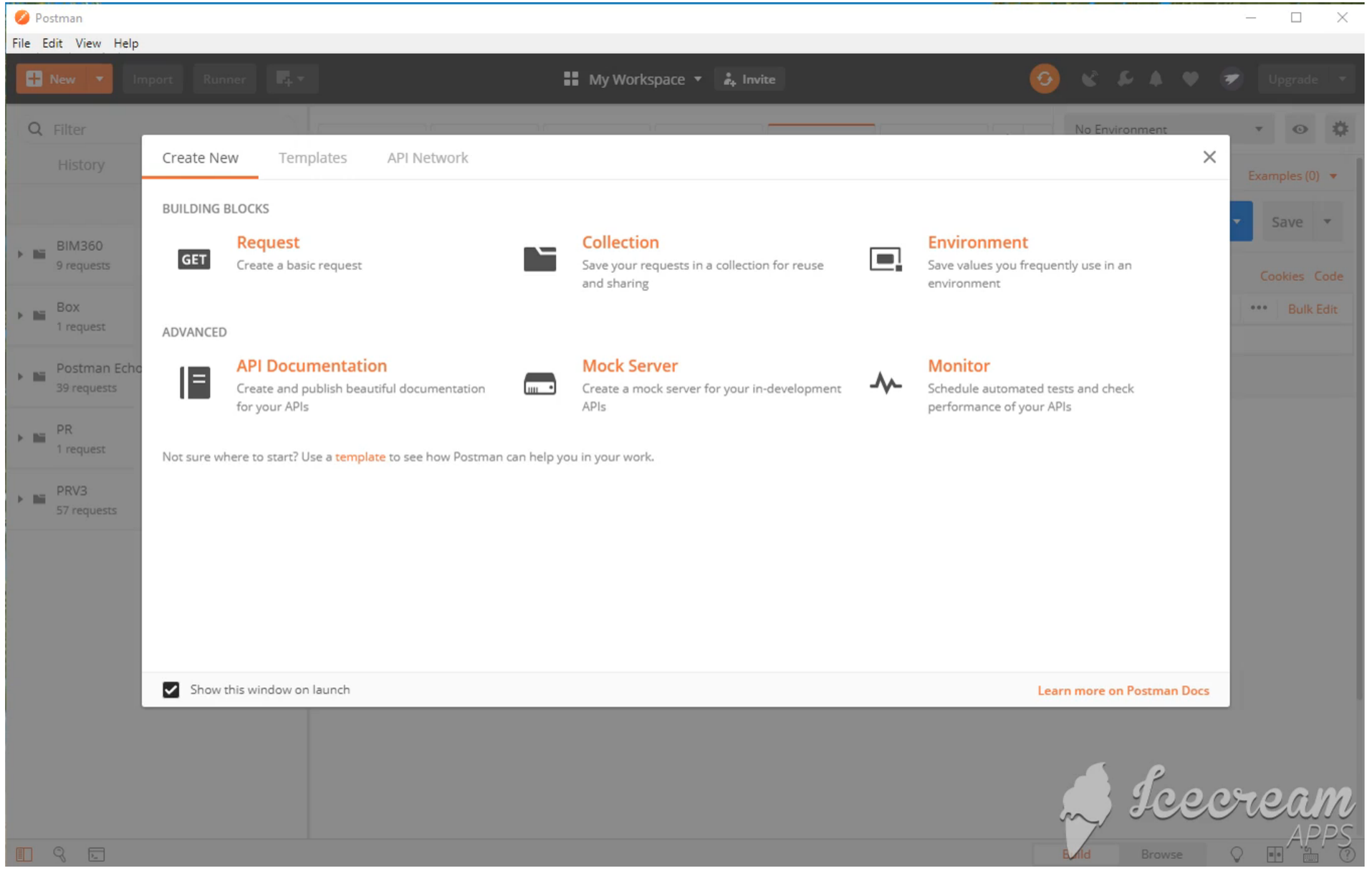
MODEL DERIVATIVE

Provides ability to extract valuable metadata

BIM 360 ACCOUNT ADMIN

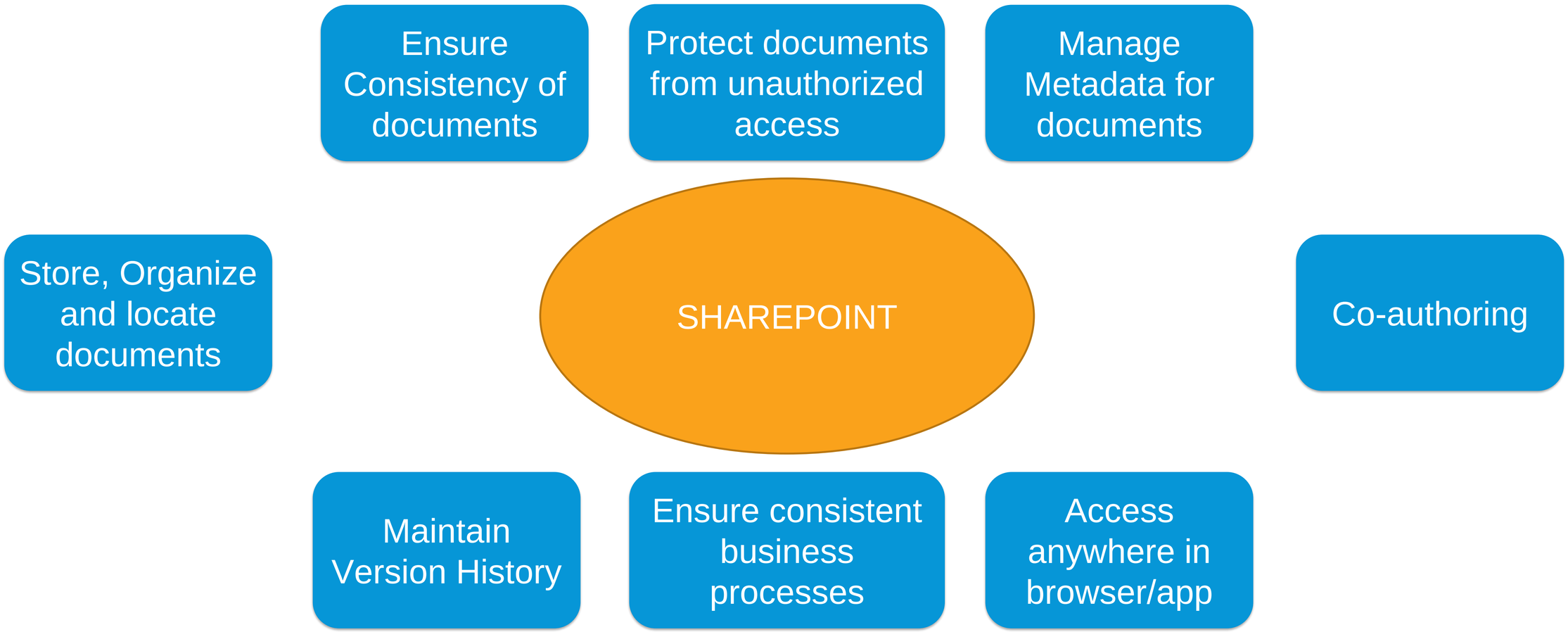
Provides ability to set up projects, assign project admins, manage members

Demo – Forge API



Basics of SharePoint

SHAREPOINT WAS CREATED TO MANAGE YOUR DOCUMENTS AT YOUR COMPANY



SharePoint Tools and Tips

TIP #1 – USE OFFICE 365 ONLINE

First recommendation for automation will be 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.

TIP #2 – DO YOU OWN OFFICE 365?

If you are already using Office 365 Business c
Online.

TIP #3 – DO YOU KNOW ABOUT POWER

BI = Business Intelligence. Power BI will help
possible before at the click of a button or filter.

SharePoint API Basics

SHAREPOINT API'S USE THE CSOM / REST STRUCTURE

Developers can interact remotely with SharePoint data by using any technology that supports REST web requests. This means that developers can perform **Create**, **Read**, **Update**, and **Delete** (CRUD) operations using REST web technologies

HOW SHAREPOINT'S REST SERVICE WORKS

Example:

REST endpoint:

http://server/site/_api/lists/getbytitle('listname')

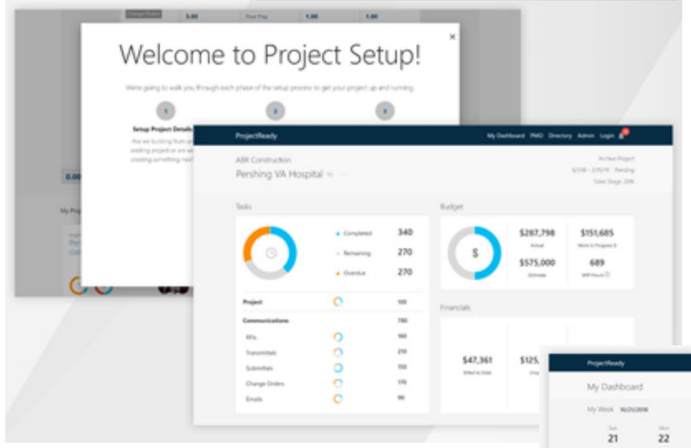
https://www.nuget.org/packages/Microsoft.SharePointOnline.CSOM

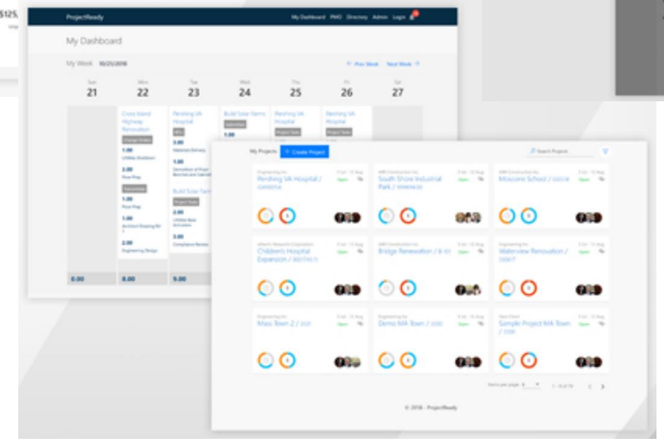
Bringing SharePoint and BIM 360 Docs together

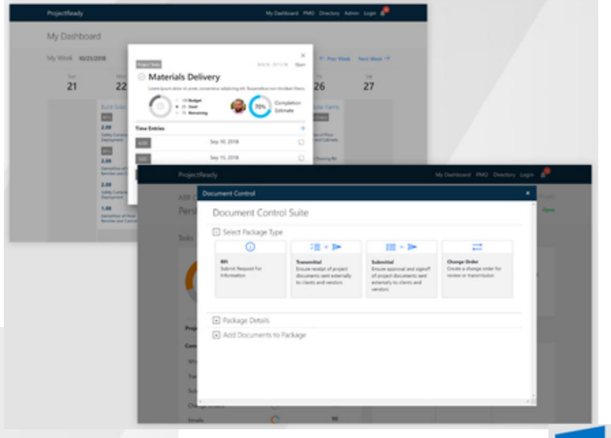
- Collaborative Project Site Creation
- Moving BIM 360 Docs to SharePoint
- Uploading documents to BIM 360 Docs

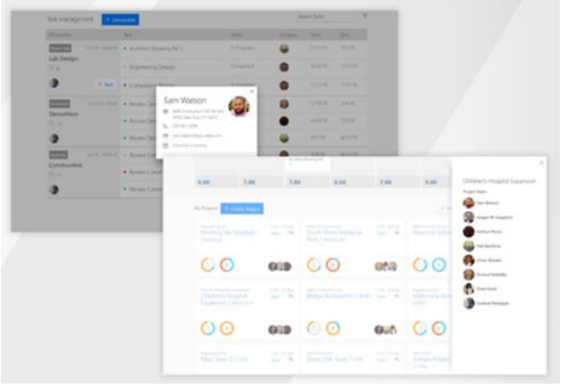
ProjectReady®

Simplify, Unify, Collaborate Across Your Projects









SharePoint

AUTODESK.

box

Collaborative Project Site Creation

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

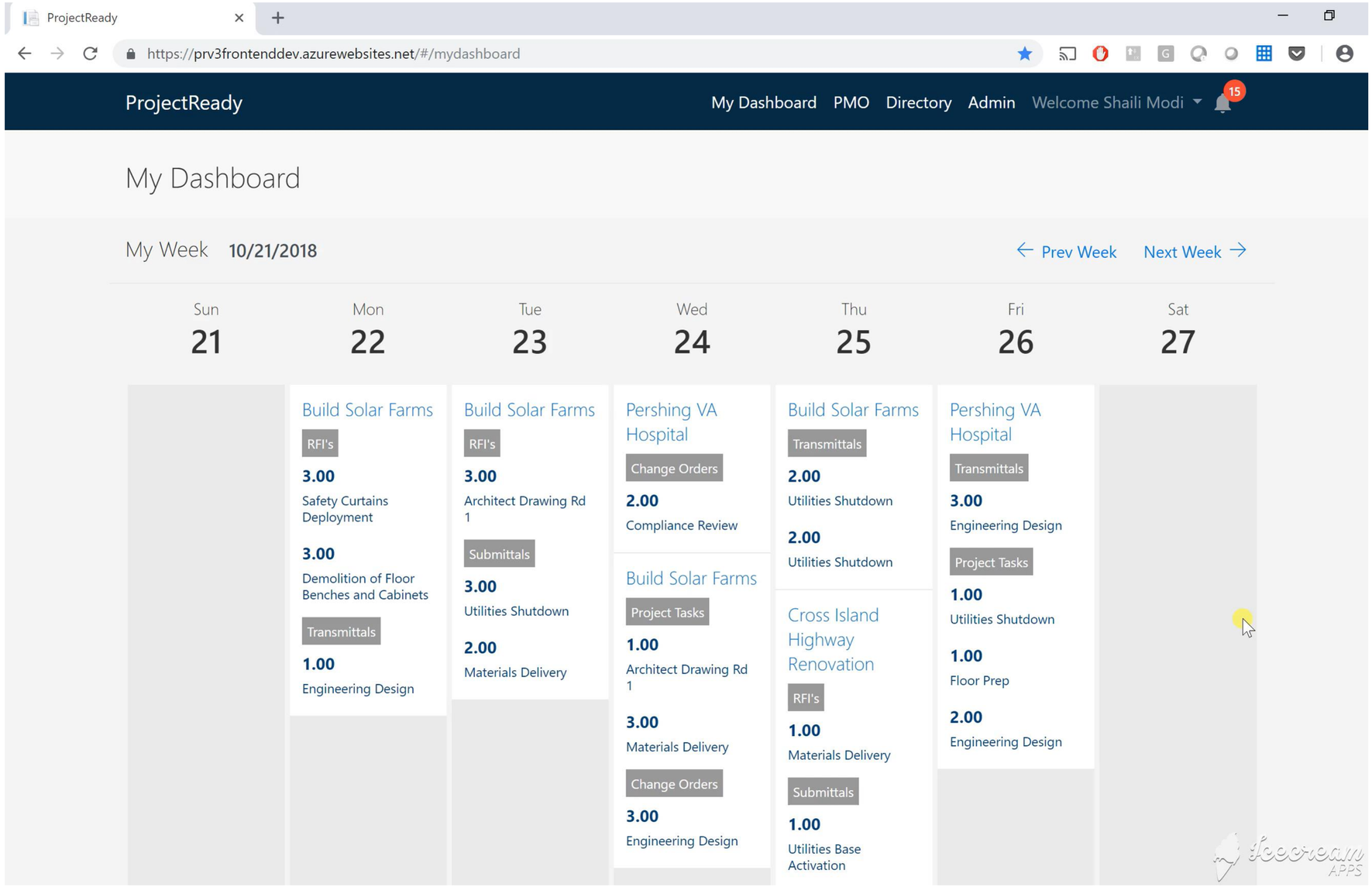
BIM 360 – CREATE PROJECT

- We can Create a Project for BIM 360 Docs using the BIM 360 Account Management APIs.
- We can assign Project administrators.
- We can mange members.

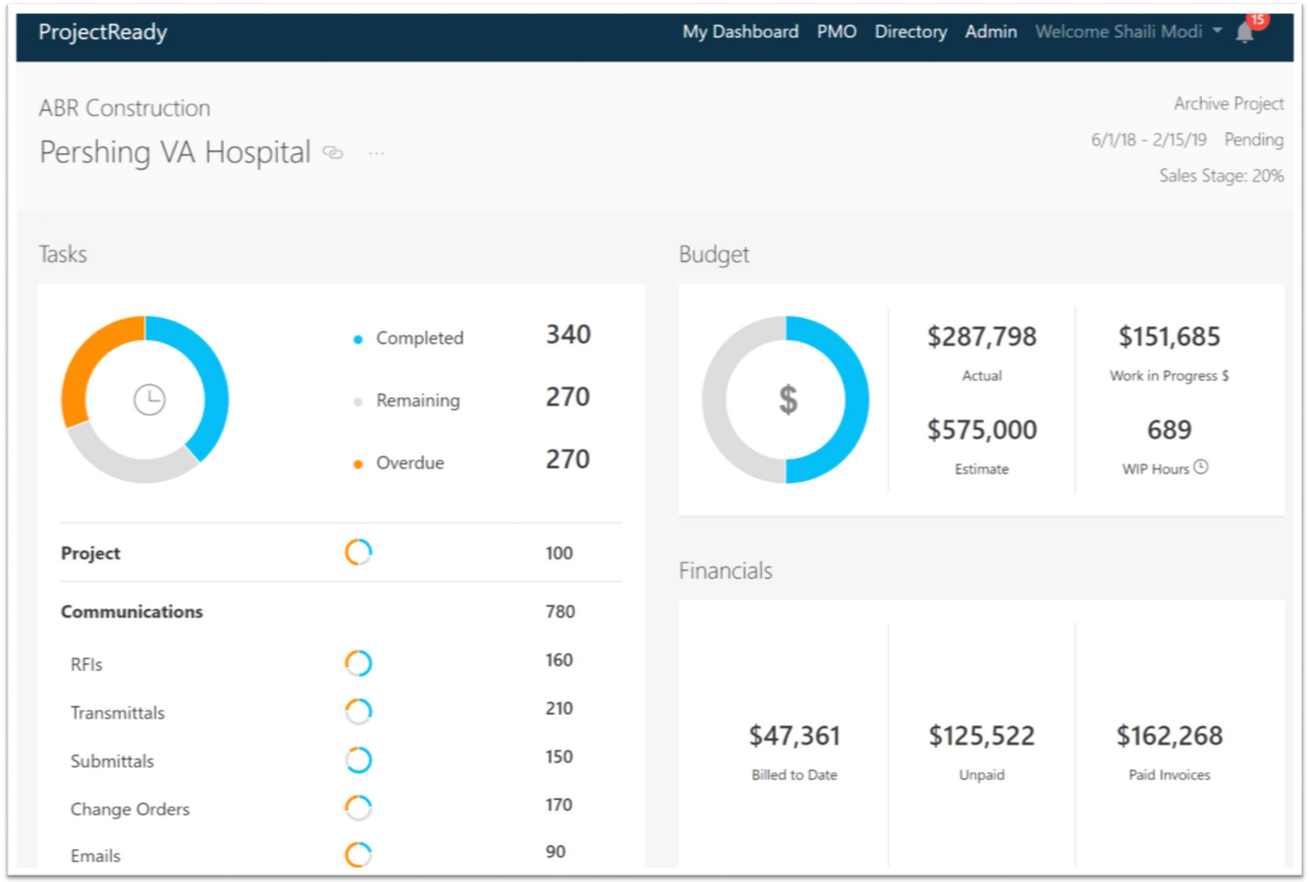
SHAREPOINT – CREATE PROJECT

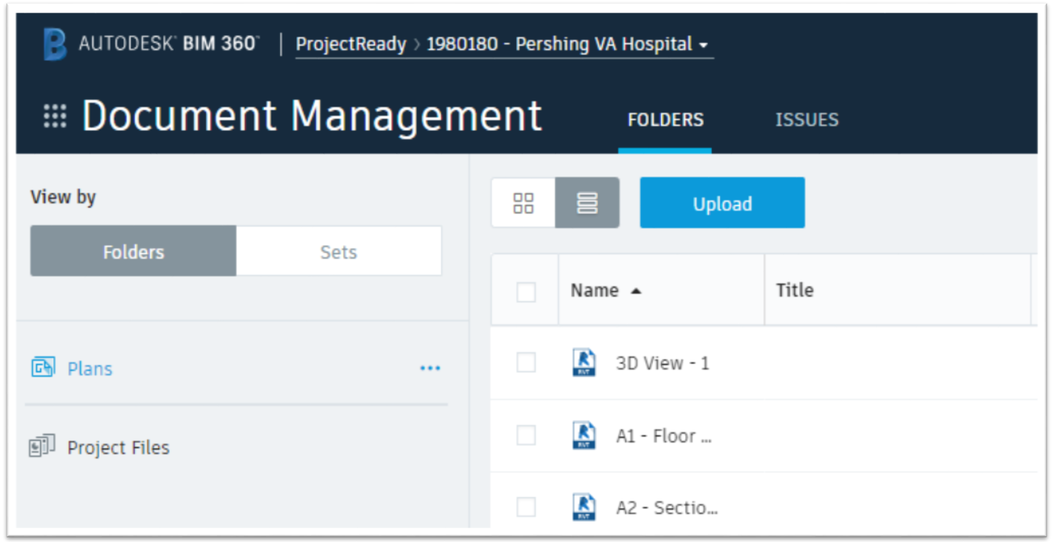
- SharePoint has default templates for creating sites and we can customize and create our own templates as well.
- Using SharePoint’s “CreateSite” operation we can create many different types for SharePoint sites programmatically.

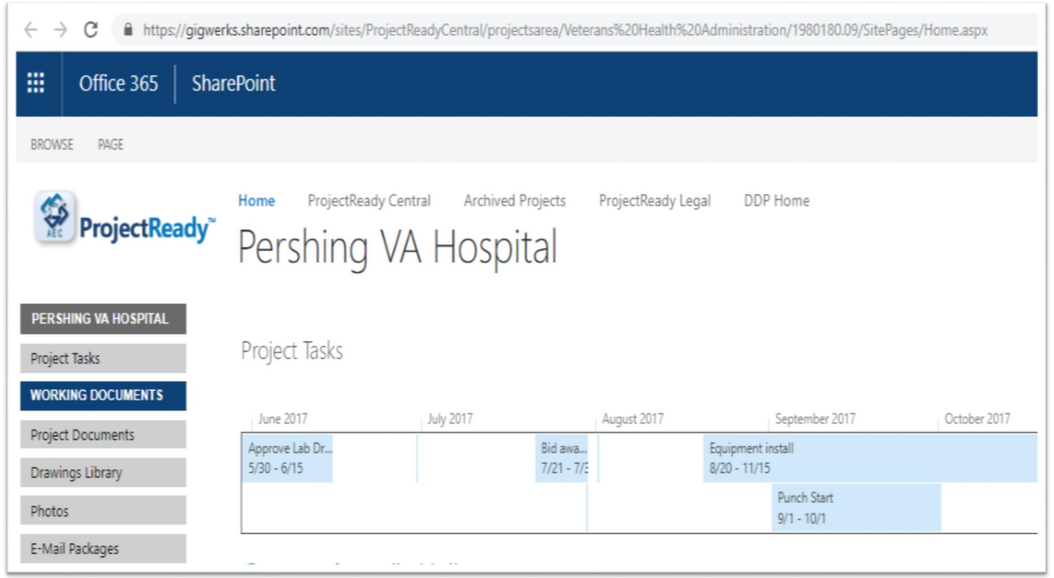
Demo – Provisioning Projects



Demo – Provisioning Projects





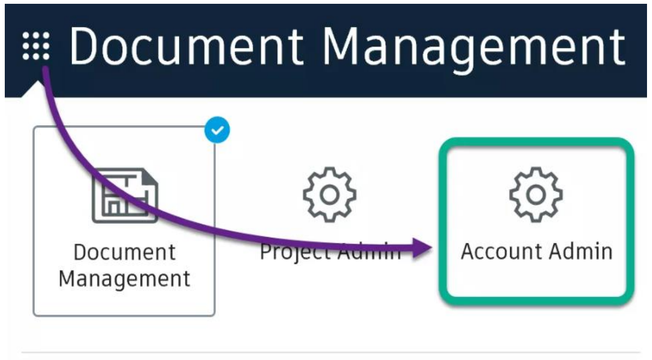


BIM 360 – Create Project

The BIM 360 Account Admin API automates setting up projects, assigning project admins, and managing member and partner company directories.

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.



BIM 360 – Create Project

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.

- https://developer.api.autodesk.com/hq/v1/accounts/**:account_id**/projects
- https://developer.api.autodesk.com/hq/v1/regions/eu/accounts/**:account_id**/projects

BIM 360 – Create Project – Example Request

```
curl -X POST -H "Content-Type: application/json" -H "Authorization: Bearer 9ezBnx9Rd5D1xG4KMt6b72T4w0MG"
https://developer.api.autodesk.com/hq/v1/accounts/e3d5ef8d-5c37-4b9d-925d-1e6d24753ace/projects -d '
{
"name": "Pershing VA Hospital",
"service_types": "field",
"start_date": "2018-05-02",
"end_date": "2019-04-03",
"project_type": "office",
"value": 35000,
"currency": "USD",
"job_number": "1980180",
"address_line_1": "The Fifth Avenue",
"address_line_2": "#301",
"city": "New York",
"state_or_province": "New York",
"postal_code": "10011",
"country": "United States",
"business_unit_id": "c17e6837-96cd-4839-868e-051a2ad65d28",
"timezone": "America/New_York",
"language": "en",
"construction_type": "Renovation",
"contract_type": "Design-Bid"
}'
```

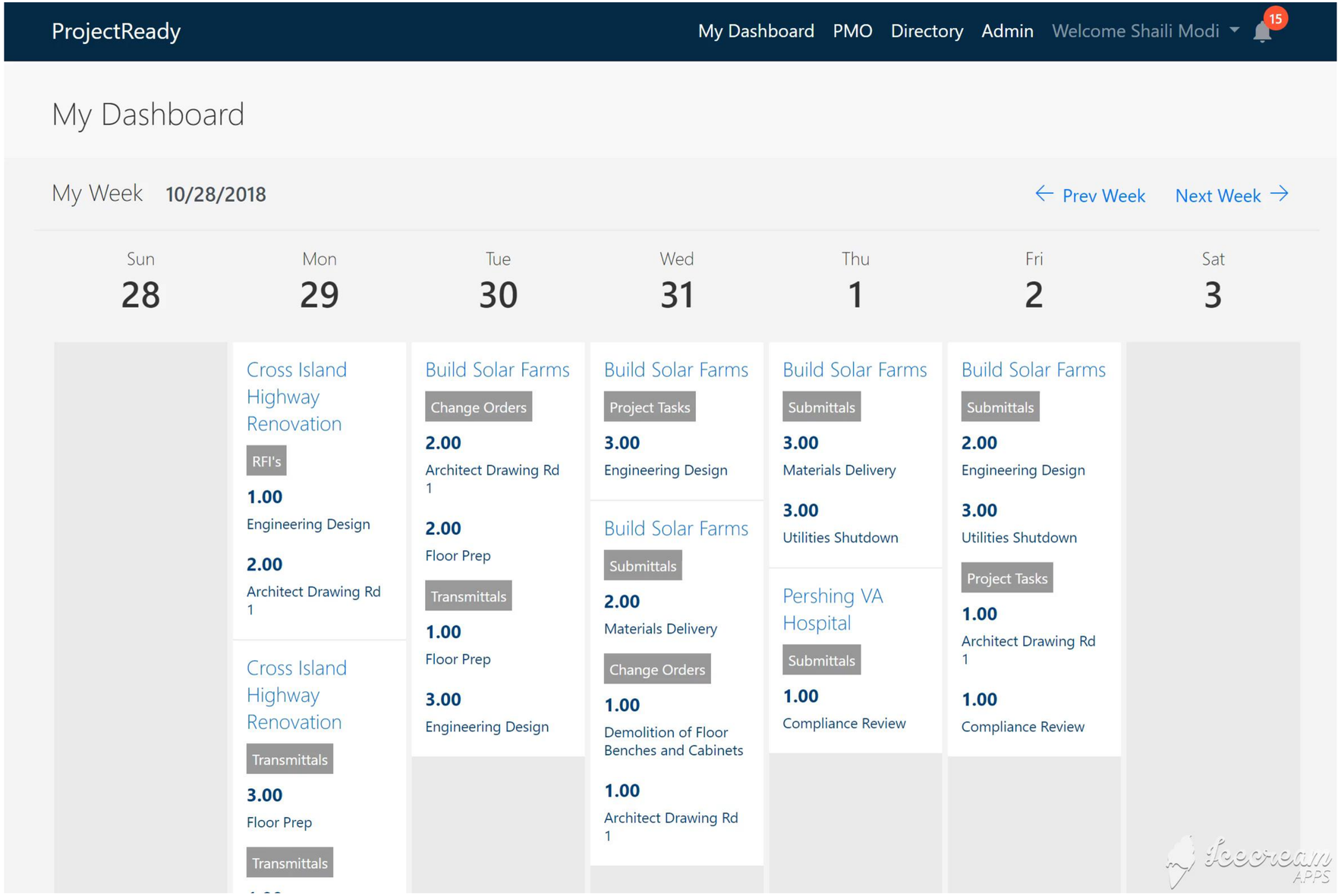
SharePoint – Create Project – Example Request

```
#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()
```

Moving BIM 360 Docs to SharePoint

Demo
Document management between BIM 360 Docs and SharePoint



Demo
Document management between BIM 360 Docs and SharePoint

GW Bridge Renovation - GW0005A <no-reply@sharepointonline.com>

Floor Survey - Design - Task Assigned - Transmittal Approval GW0005A-Transmittal-99

To Shaili Modi

Click here to view the Cover Sheet

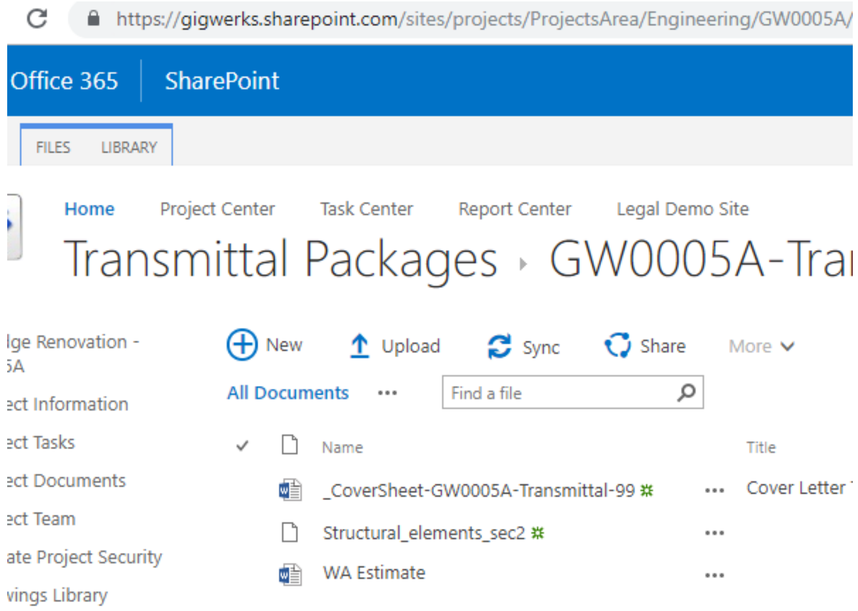
Click here to Approve/Reject the task - Transmittal Approval GW0005A-Transmittal-99

Link to Transmittal folder

Below is the Package Information

Document Name: WA Estimate.docx
Date Created: 5/23/2017 10:16:00 PM
Date Modified: 5/23/2017 11:34:26 PM
File Size: 58197
Link to Document

Document Name: Structural_elements_sec2.rvt
Link to Document



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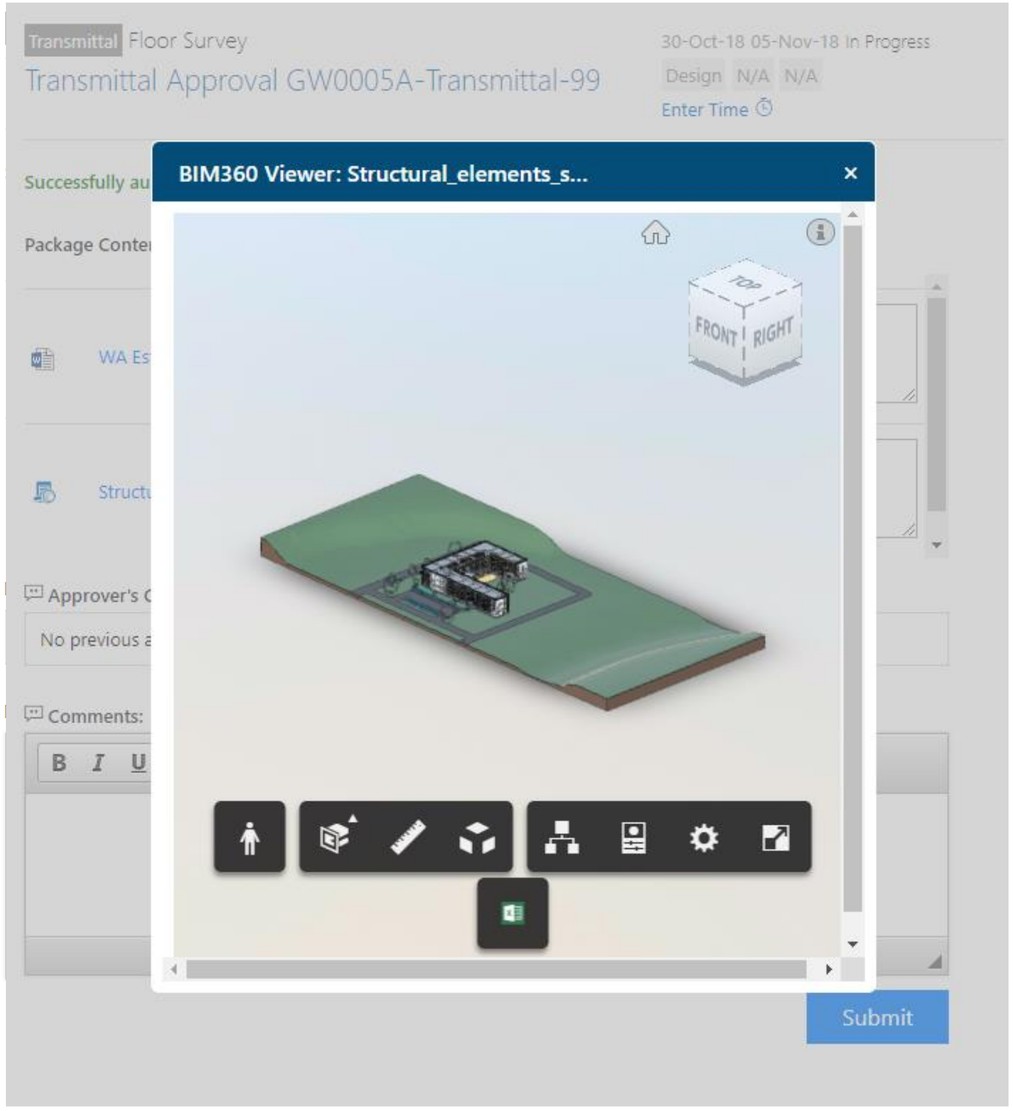


BIM 360 Docs Structure

HUBS

GET HUBS API

project/v1/hubs

PROJECTS

GET PROJECTS API

project/v1/hubs/{hub_id}/projects

FOLDERS

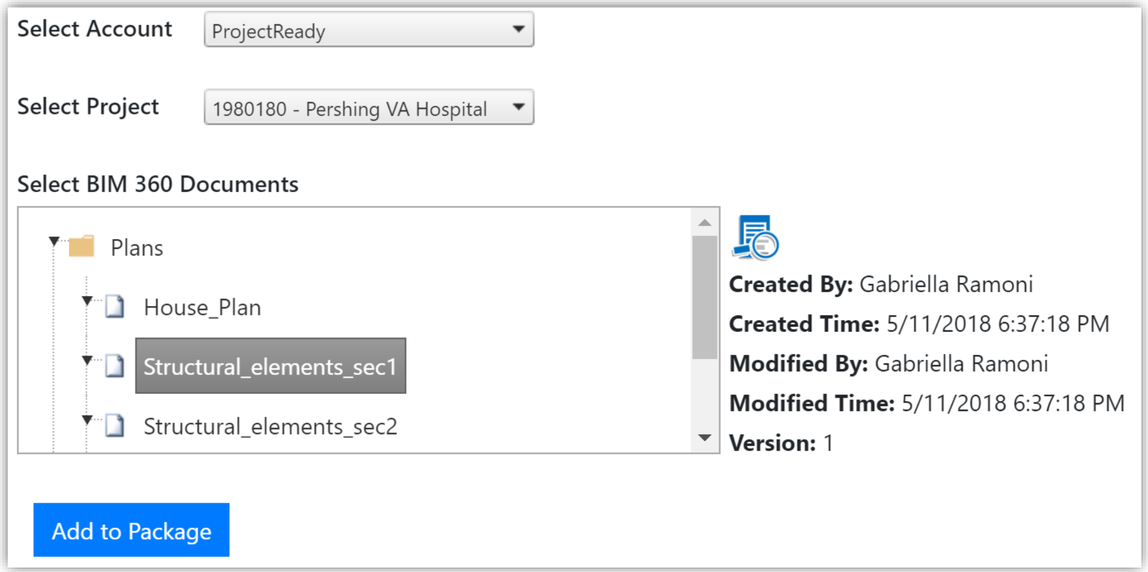
GET FOLDERS API

project/v1/hubs/{hub_id}/projects/{project_id}/topFolders

DOCUMENTS

GET DOCUMENTS API

data/v1/projects/{project_id}/folders/{folder_id}/contents



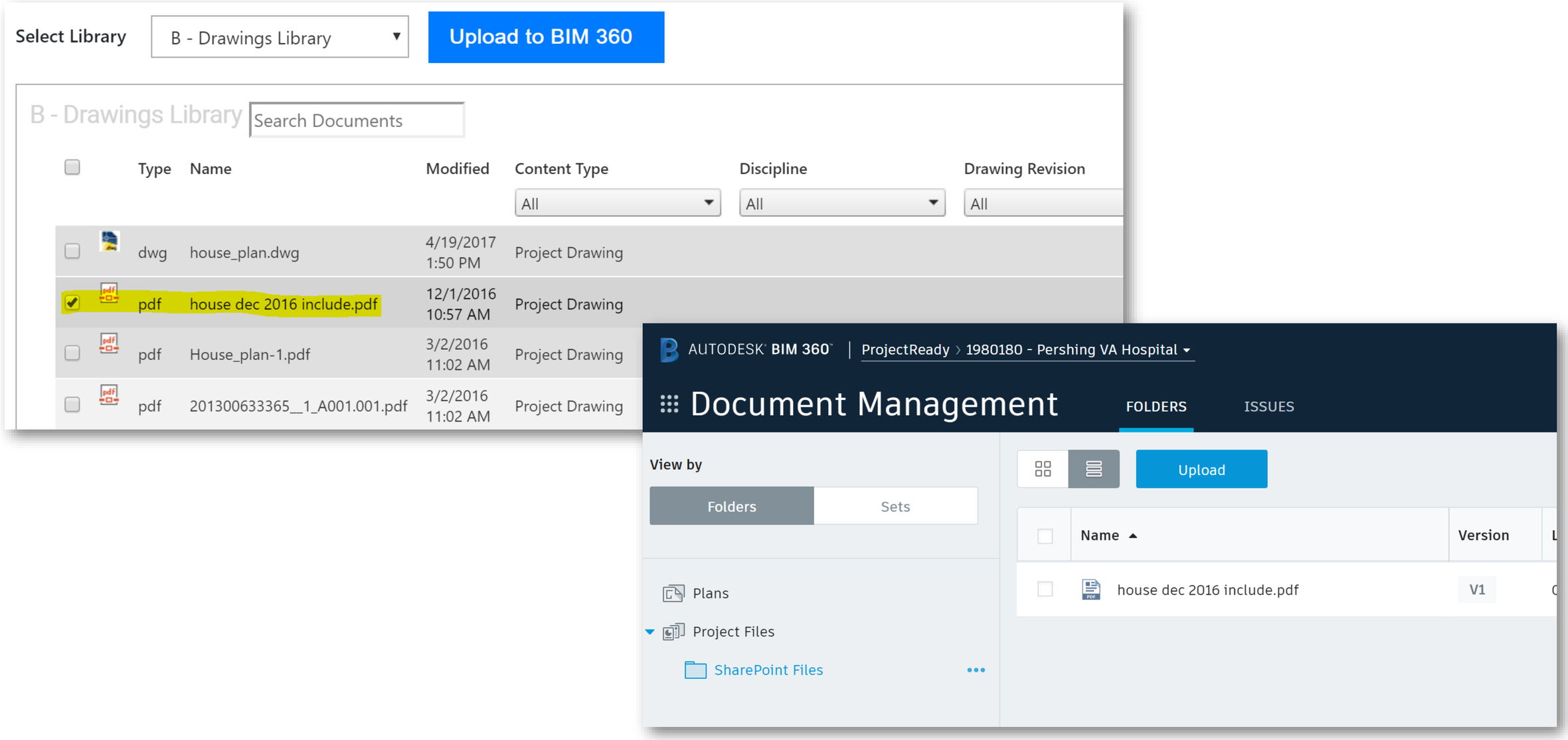
BIM 360 Docs – Download Document

```
public static byte[] Download(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;
        }
```

SharePoint – Upload Document

```
//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();
```

Demo
Document management between BIM 360 Docs and SharePoint



BIM 360 Docs – Upload Document

HUB & PROJECT

FIND THE HUB AND PROJECT

- PROJECT/V1/HUBS
- PROJECT/V1/HUBS/{HUB_ID}/PROJECTS

FOLDER

- NOTE – THAT YOU CAN ONLY UPLOAD FILES TO THE BIM 360 PROJECT FILES FOLDER OR TO A FOLDER NESTED UNDER THE PROJECT FILES FOLDER

STORAGE LOCATION

- CREATE A STORAGE LOCATION
- UPLOAD FILE TO STORAGE LOCATION
- POST PROJECTS/:PROJECT_ID/STORAGE
- RESPONSE – BUCKET KEY & OBJECT NAME

UPLOAD FILE

- PUT BUCKETS/:BUCKET_KEY/OBJECTS/:OBJECT_NAME
- CREATE A 1ST VERSION OF THE UPLOADED FILE
- POST PROJECTS/:PROJECT_ID/ITEMS

BIM 360 Docs – Extract Metadata

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

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.

- Step 1: Convert the Source URN into a Base64-encoded URN
- Step 2: Translate the Source File into SVF format
- Step 3: Verify the Job is Complete
- Step 4: Retrieve a List of Model View (Metadata) IDs
- Step 5: Retrieve Properties for the Model View (Metadata) ID

BIM 360 Docs – Extract Metadata

:urn/metadata

:urn/metadata/:guid

:urn/metadata/:guid/properties

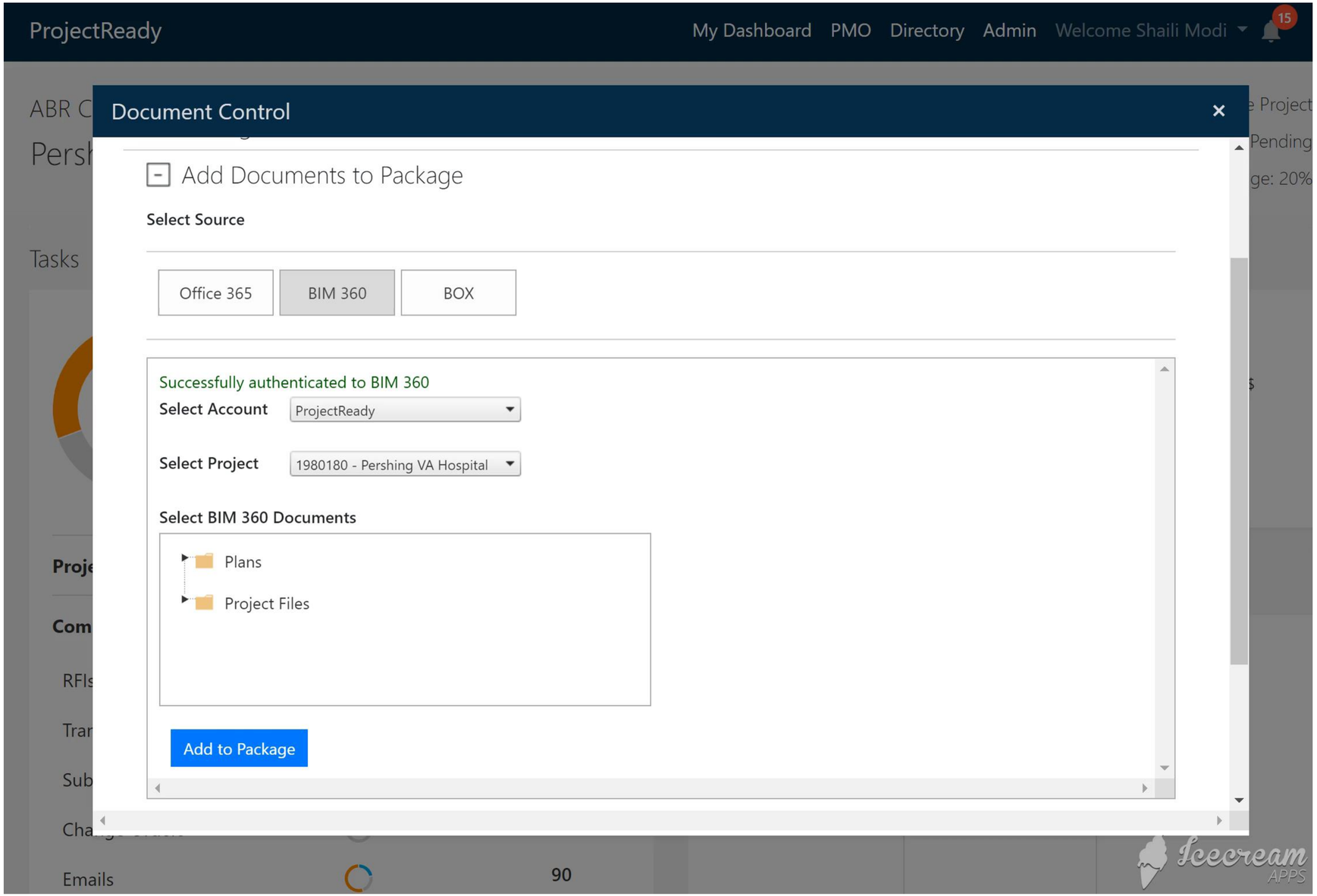
Although most design apps (e.g., Fusion and Inventor) only allow a single model view (object tree and set of properties), some apps (e.g., Revit) allow users to design models with multiple model views (e.g., HVAC, architecture, perspective).

The “:urn/metadata/:guid” call returns an object tree, i.e., a hierarchical list of objects for a model view.

The “:urn/metadata/:guid/properties” call returns a list of properties for each object in an object tree. Properties are returned according to object ID and do not follow a hierarchical structure.

curl -X 'GET' -H 'Authorization: Bearer PtnrvrtSRpWwUi3407QhgvqdUVKL' -v 'https://developer.api.autodesk.com/modelderivative/v2/designdata/dXJuOmFkc2sub2JqZWN0czpvcy5vYmplY3Q6bW9kZWxkZXJpdmF0aXZlL0E1LnppcA/metadata/4f981e94-8241-4eaf-b08b-cd337c6b8b1f/properties'

Demo
BIM 360 Docs – Extract Metadata



Summary – Useful links

API BASICS

https://forge.autodesk.com/developer/documentation

https://docs.microsoft.com/en-us/sharepoint/dev

PROVISIONING BIM AND SHAREPOINT

https://forge.autodesk.com/en/docs/bim360/v1/tutorials/create-project/

https://docs.microsoft.com/en-us/sharepoint/dev/scenario-guidance/site-provisioning

DOCUMENT CONTROL

https://forge.autodesk.com/en/docs/data/v2/developers_guide/overview/

https://docs.microsoft.com/en-us/sharepoint/dev/sp-add-ins/working-with-folders-and-files-with-rest

Questions?

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