![Autodesk University logo]

CS124045

# FORGEing Ahead: Extending BIM 360 Docs to Enhance Workflows for Document Management

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**Learning Objectives**

- Be a Pioneer!
- WHY FORGE? WHY NOT.
- Get a feel for BIM 360 Document Management and BIM 360 Field
- Document approval practices and Observation Management

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## Description

Document management and control for construction is an ever-evolving challenge. Trying to meet standards, naming conventions, and the approval process all provide challenges of their own. BIM 360 Docs software gives us one piece of the puzzle and Forge software is the other. GRAITEC has been researching and experimenting with both BIM 360 Docs and Forge to automate the process of controlling where documents and drawings sit in the approval process within a common data environment, to meet various standards such as PAS 1192 in the United Kingdom. This course describes the journey and adventure of using Forge for the first time to meet a growing demand in the industry. Come and experience the thrills and spills encountered by the GRAITEC developers as they dove head first into this new and uncharted world of APIs and web services. Join in on the fun and the conversation of developing workflows between BIM 360 products using Forge, and learn how to get started with Forge to open endless possibilities.

## Speaker

A BIM 360 Technologies expert and part of Graitec's Construction Specialization Team. I have been implementing BIM 360 throughout Europe over the past five years with a focus on BIM 360 Field, Glue and Document Management [Docs]. Currently, I am involved in extending the BIM 360 portfolio to our customers using Forge and the BIM 360 APIs. I have a strong background in software development and the Autodesk APIs to which, give me a unique perspective when preparing project scopes or gathering customer requirements. I enjoy public speaking at industry events and I am a veteran of eight Autodesk Universities, three of them as a speaker. This will be nine and four. As a regular contributor to the Graitec Blog, I enjoy passing on my experiences and thought leadership to the community.

**First, a note from Grant…**

When I put the plan for this session together, way back in April and May, we (Graitec), had little knowledge of Forge. At the time, Forge didn't do too much. At least we thought that at the time. Since then, The Forge APIs have grown and we have discovered that they (the APIs) can now help us get on with building some great tools. We will also look at the old APIs (they still exist) that can help us mine data within BIM 360 Field.

We are for the most part, still in the 'Proof of Concept' stage but we are making headway with our partners and customers.  This session is about the journey that we have taken to get where we are. The focus is more on the 'why' rather than the 'what' but we will still talk a lot about the 'what'. If you are interested in reasons 'why' to take on Forge then welcome aboard.

Although the session talks about APIs and other programming terms, it is in no way intended just for programmers. In fact, quite the opposite. It is a light-hearted look at what is possible by taking the plunge and learning to swim.

Welcome to Vegas!
Grant

# A Glossary of things to come

**Forge**

Autodesk Forge is a connected developer cloud platform comprised of web services, technical resources, and an engaged community. Forge operates in a common data environment and leverages Autodesk's 35 years of industry expertise, technology, and global network, enabling companies to get started quickly and focus on developing customized and scalable solutions to solve design, engineering, and manufacturing challenges.
https://forge.autodesk.com/

**PAS 1192-2:2013**

The Specification for information management for the capital/delivery phase of construction projects using building information modelling. It is sponsored by the Construction Industry Council (CIC) and published by The British Standards Institution. It came into effect on 28 February 2013.
http://bim-level2.org/en/standards/

**BIM 360 Document Management**

With BIM 360 Document Management, construction teams can manage blueprints, 2D plans, 3D BIM models, and any other project documents. BIM 360 Document Management is designed to streamline your document management processes.
https://info.bim360.autodesk.com/bim-360-docs

**BIM 360 Field**

A construction **field** management software that combines mobile technologies at the point of construction with cloud-based collaboration and reporting. Turn your **field** data into powerful information that improves quality, safety and profitability for construction and capital projects.
https://info.bim360.autodesk.com/bim-360-field
The API is available here.
https://knowledge.autodesk.com/support/bim-360-field/learn-explore/caas/CloudHelp/cloudhelp/ENU/BIM-360-Field/files/GUID-91A6047A-551F-47FC-A88A-5FE01BC10821-htm.html

## Why be a Pioneer

It all starts with a demand.

Last year at Autodesk University, I presented a session about how BIM 360 Docs (it was known as Docs back then) could be used for purposes other than construction documents. I discussed retail and planogramming, interior design and quality checking. I always felt there was more to Docs at the time but let's face it, it was not the fanciest tool in the box.

From that session came a fantastic discussion with members of the audience putting in their two pennies worth of thoughts and challenging the then current workflows of Docs.

• It doesn't do what a Common Data Environment needs to do?
• It has no way of verifying drawing naming conventions?
• How does it handle the drawing approval process?
• Can we claim that the documents are the latest and greatest?

It's just a small list of the many questions that got fired at me that day. So, I, in turn fired them back at Autodesk (as you do). The replies varied but it seems that the 'Roadmap' contained many answers….it's coming in a future release…..we're working on it.

Without going too much further here, many of my ideas for Forge applications came from listening to the attendees of last year's session.

Q. So why be a pioneer?

A. To provide a solution.

Sounds simple. To be a pioneer and provide a solution we need something to solve. I have chosen two challenges to talk about today.

### BIM 360 Document Management and the drawing approval process (PAS 1192)
I got asked by a customer during a BIM 360 Docs consulting session about the approval process in the CAPEX section of the common data environment as described in the PAS 1192 document that describes BIM level 2. I am NOT a PAS 1192 expert but I reviewed my potential solution with my customer and he seemed pleased that what I had proposed would work. The solution uses Forge to communicate with BIM 360 Document Management.

### BIM 360 Field and cross project reporting (sort of)
BIM 360 Field is a wonderful tool for storing and reporting on everything that does or could happen on a construction site. For those of you familiar with BIM 360 Field it has limited cross project reporting. When I was asked if a user could log into BIM 360 Field and see all of the issues assigned to him across all the projects he was involved in, I thought, what a great idea. This solution uses the BIM 360 APIs to delve into the BIM 360 Field database.

So, let's be pioneers!

## Why Forge?........ Why Not?

Because I thought it would be cool to try something new

BIM 360 Document Management was built upon the Forge API structure (trying not to be too technical here). It is a set of web functions that allows applications in the cloud to share thoughts and talk to each other. Once we capture the thoughts and data, we can then perform wonderful things.
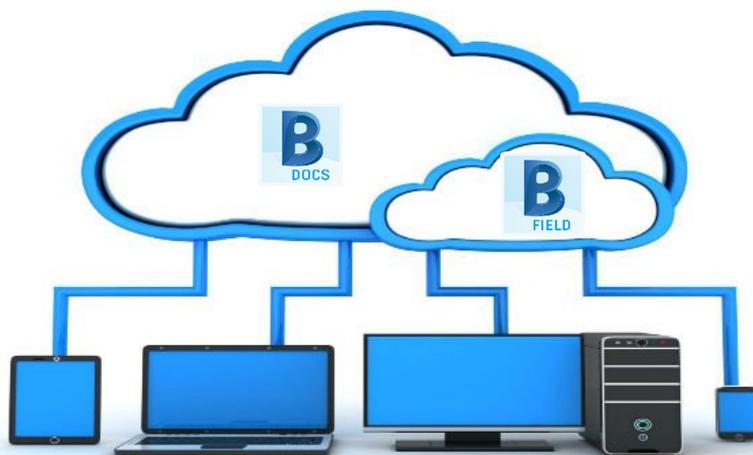
Join the Autodesk Developer Network if you are not already a member.
http://usa.autodesk.com/adsk/servlet/index?id=26144602&siteID=123112
This will give you access to developers who use the code. They create apps and solve member problems and they do it well.

BIM 360 cloud applications are different from desktop versions of other Autodesk products. On a desktop application such as AutoCAD we develop custom functions by using APIs such as .NET, that work inside the host application's memory space. It doesn't quite work that way with cloud applications such as BIM 360 Document Management.
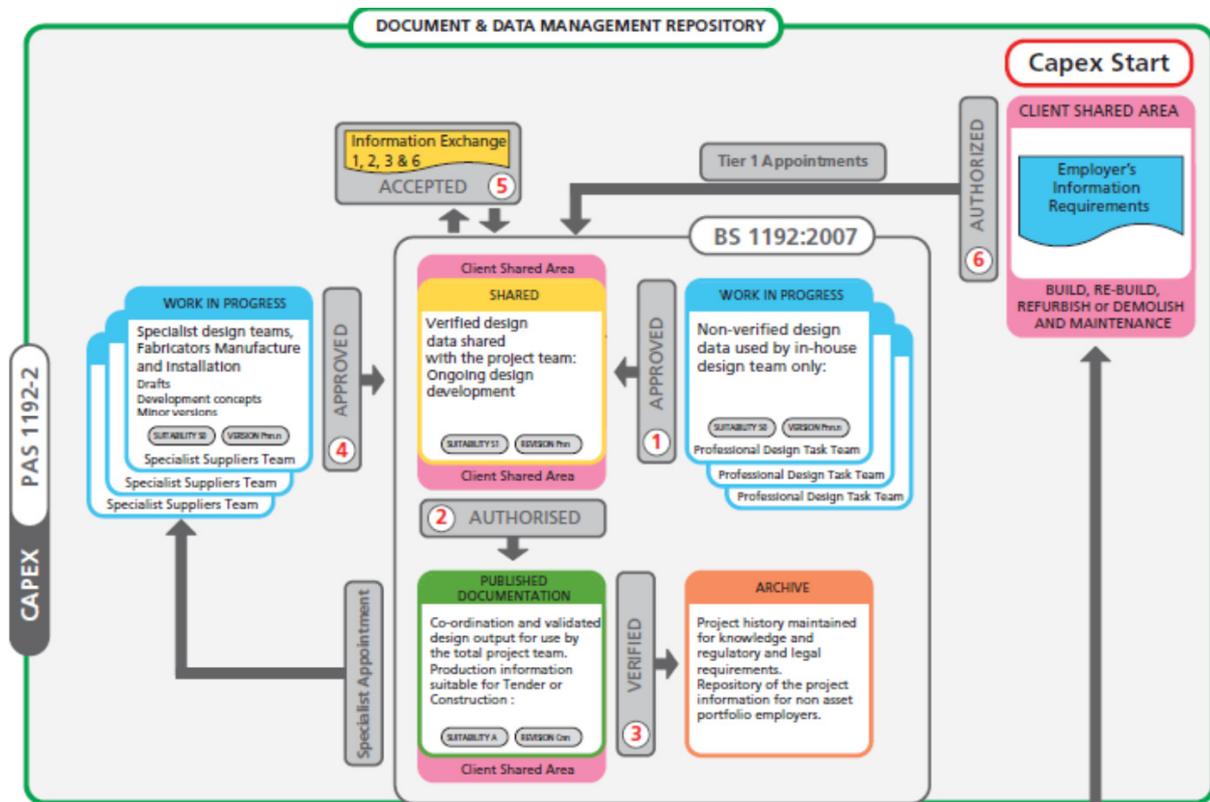
We need to find a way into the data structures of the cloud app and manipulate the data. We cannot manipulate the interface (create a custom menu). So, we need to build a separate web app that communicates with BIM 360 Document Management.



What this means is that we can integrate data from 'Forge Enabled' applications with any other application (Forge or not).

# Challenge #1

**BIM 360 Document Management and the drawing approval process (PAS 1192)**



Capex PAS 1192.2

The question posed to me was:
'How can I demonstrate the drawing approval process by using BIM 360 Document Management?'

I could make a case that by providing the right folder structure and permissions, it could probably be done but might be an administrative nightmare.

The question was also put in my direction at last year's AU. I thought about this and came up with my proposed solution to build a parallel website that hosted drawing packages and allowed me to monitor its approval status. When the document reached a 'shared' status, the app would move it into the appropriate folder on B3DM.

So, I asked the question back:
'Would this work?'
'I think so. Can you show me?' Was the reply.
'Let me see and I'll get back to you'

**The Criteria**

- B3DN must not be changed
- New documents need to be placed in folders as required
- Central point of update for 'Shared' files

**Dan's Timeline**

As all great thinkers have, (haha), we have smart people that help us realise our goals.  In my case, it was Dan. I asked Dan to look into Forge to develop a Proof of Concept to describe my thoughts via a web app as I described. I, of course thought this would be easy and straight forward. Dan, however did not.  Here are the discovery highlights.

Originally tried using bim 360 api **(11/08/16)**
Had issues logging in via the api, followed Mikako's tutorials, wasn't working at all, got in contact with Mikako, she couldn't figure out what was wrong, eventually she came to realise that her tutorials were on the American servers our projects were on the eu servers, meant we had to add ".eu" to API calls to login. Mikako made a blog post on her field to address what she found via our email exchanges;
https://fieldofviewblog.wordpress.com/2016/08/18/base-url-for-bim-360-field-in-european-countries/

Finally got access (06/09/16), realised the api was massively restricted to the admin functionality (creating new projects and companies) but had no access to files and folders, spoke to Mikako again, access to the files and folders "coming soon" – to date the bim 360 api still has no access to files and folders

DM api enhanced to access dim 360 docs **(07/02/17)**
Not sure exactly when Grant realised this, must have been around April time?
Logging in was easy, able to see list of projects and change between them, view all files and folders and download files, no cross access to plans/field using same api **(26/04/17)**

Uploading to folder wasn't working at all, followed step by step tutorial on the data management api, still wasn't working, reached out for help from Zhong Wu, there was an api line that needed changing that wasn't documented anywhere at all on the forge site, how are people meant to know about this? **(02/05/17)**
https://stackoverflow.com/questions/43734245/uploading-a-file-to-storage-location

Uploading to most folders fine, uploading to the "plans" folder has issues, if it's a pdf then must go through a manual stage where you specify the title blocks, no way to automate this (03/05/17) confirmed by forge engineers

In order to meet PAS1192 requirements changing names/attributes via the api to docs would be ideal as we can use docs inbuilt versioning – turns out the api currently doesn't allow the changing of names/attributes via the api **(04/05/17)** – to date the api is still unable to do so
https://stackoverflow.com/questions/43764669/updating-the-properties-of-an-item

Partner programmer is having difficulty uploading to docs, had a chat, had exactly the same issue I did where an api line needed changing, again this isn't documented anywhere on the forge site so it's no surprise other people didn't know, helped him out and he got it working **(11/05/17)**

uploading revit files and 2d sheets works well, splits up correctly and the docs viewer works with it automatically **(17/05/17)**

tried creating folders, which is essential for what we need, turns out the dm api can't do this either… confirmed by forge engineers **(25/05/17)**

Grant noticed a product called a360sync which syncs files between field glue and docs, had a look at it, due to the restraints on docs/dm api this is very limited, docs must be used as the host for everything so it is only one way traffic, not overly useful **(02/06/17)**

Due to the inability to create folders and rename files the site production stalled massively, currently keeping an eye on the forge site waiting for any updates to the api so it's more useful **(05/06/17 to …)**

Grant has seen that folders can now be added **(19/07/17)**
Attempted to add folders **(25/07/17)** getting the same error message that BIM 360 does not support folder creation, turns out Grant misunderstood and its "coming soon"

Got a response on a stack overflow question about updating properties attempted their solution, didn't work at all **(25/07/17)** responded asking for further assistance.

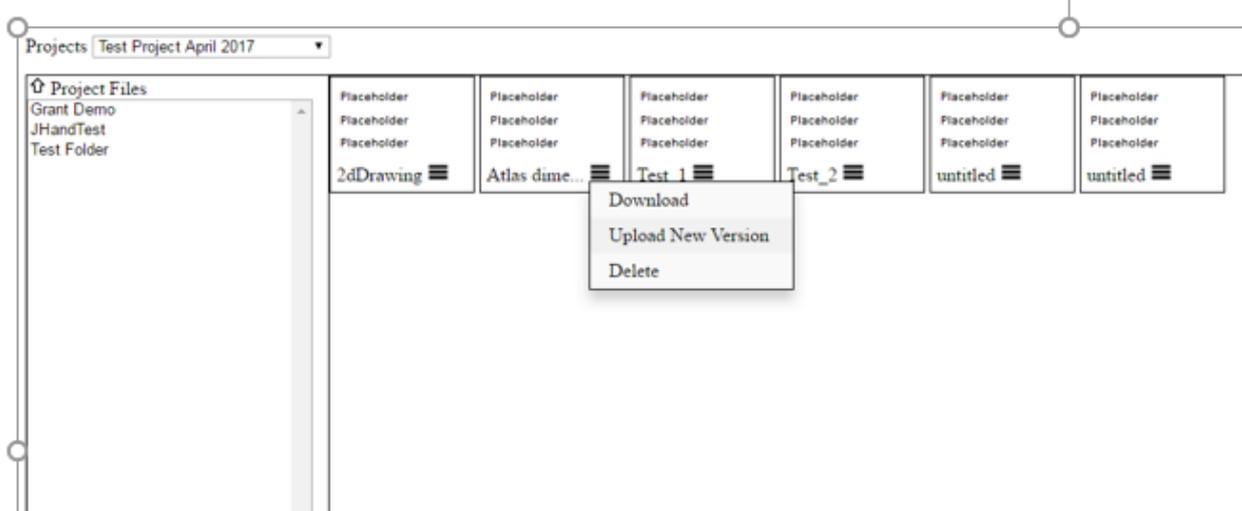No response from the stack overflow property person, tried asking again.
Watched forge webinars late august early Septembers, mentioned about future updates coming, they added in folder creation, can't seem to get it working, emailed Mikako asking for help, again.

Hey Grant,
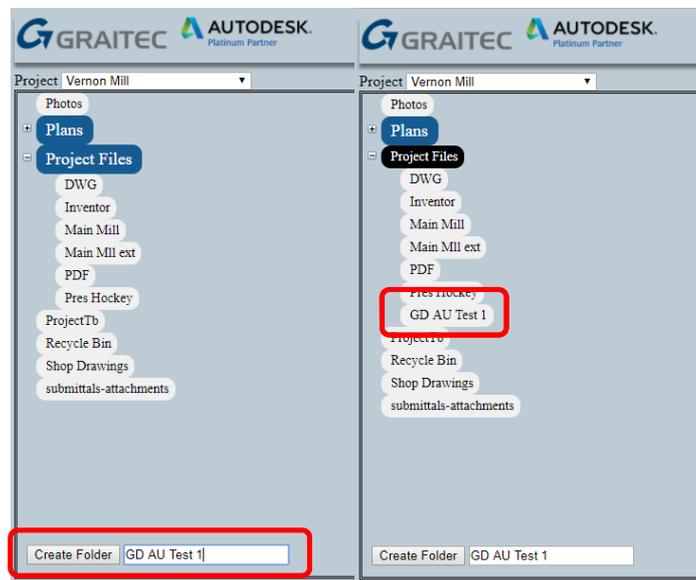Quick update, Jaime managed to get the folder creation working, was a mistake in their documentation…
Will continue with the site later this week **(26/09/2017)**

**The App in all its glory 'ish'**
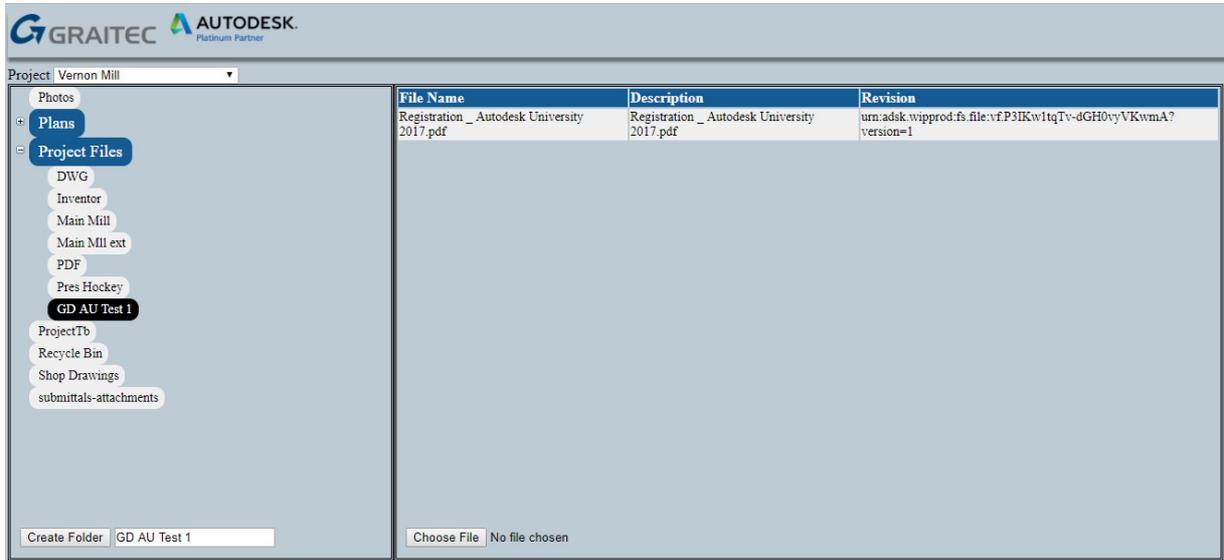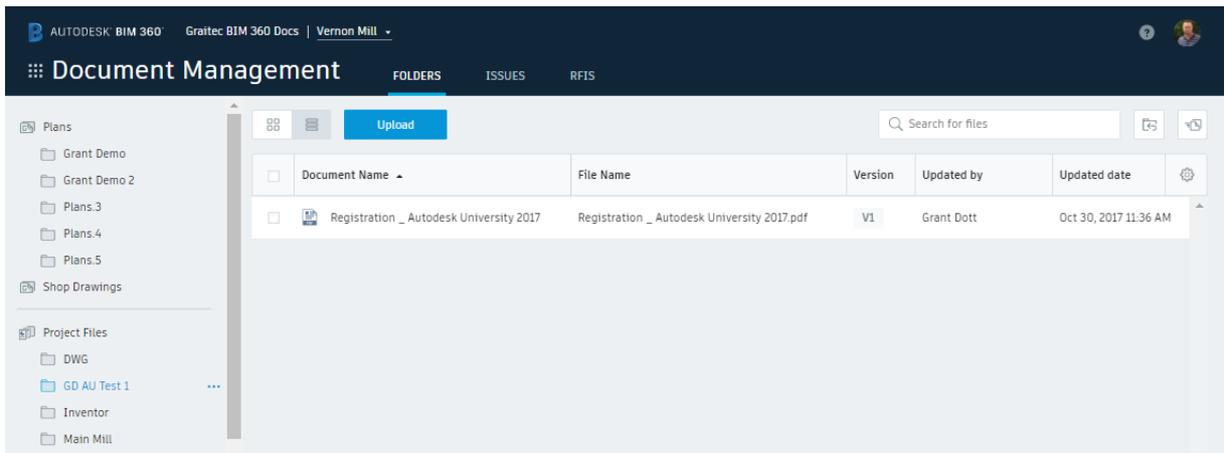


Dan's first try

We tried many times to get it right but it was a success just to be able to see the data and update the data. It gets better….



We can create folders

And… upload files to that folder



Success.

## Challenge #2

**BIM 360 Field and cross project reporting (sort of)**

This one was a bit easier to accomplish…
Dan says because it was because it didn't use Forge!

BIM 360 Field does a very good job of filtering Issues but on a per project basis. During a recent client visit where I was conducting some pre-sales demonstrations, it was brought to my attention that if the client had many projects, how could they see all the issues assigned to the logged in user. Not on a per project basis as the BIM 360 Field GUI shows but just a list of all the issues across any or all projects.

This house builder has many projects and would have to keep going back and forth between projects to see the Issues. They simply wanted to see a list off all Issues regardless of project and all in one list.
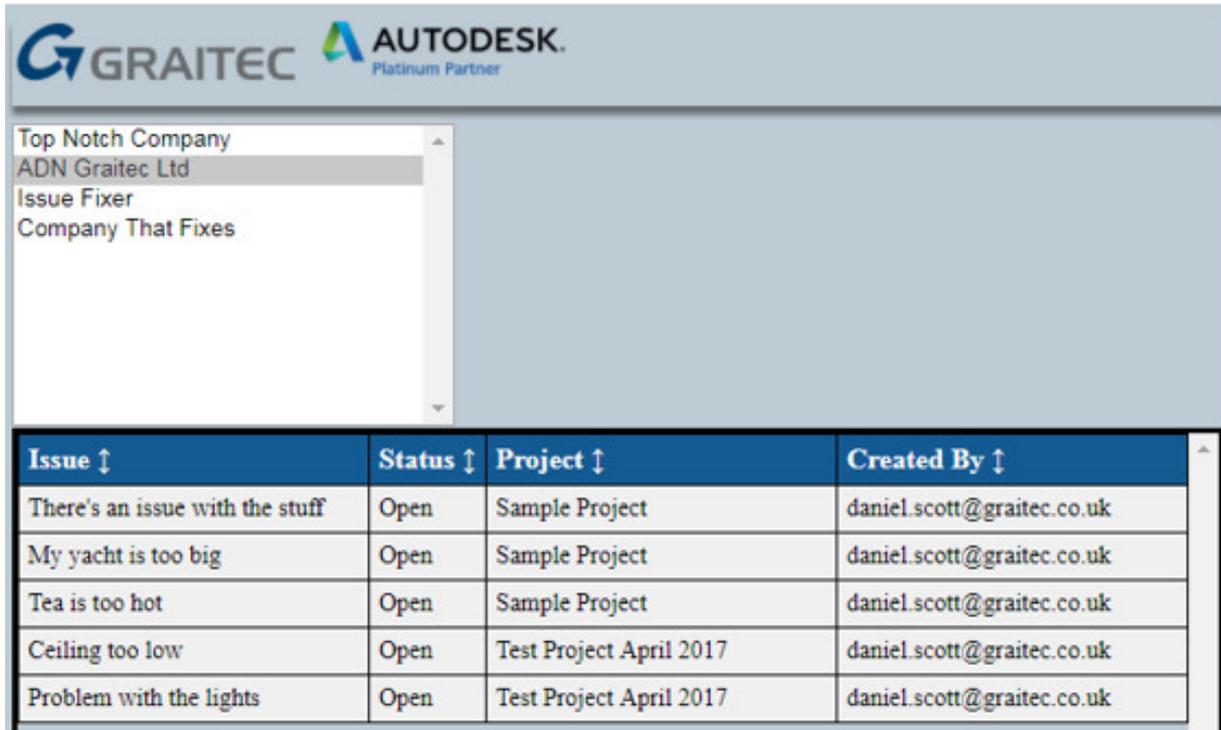
So, I thought about it, then called Dan.
We had tried in the past to build functions about subcontractor activity across multiple projects. So, we had a grasp on what was possible. This was the next step.

**The Criteria**

- House builder with 'lots' of design Issues
- All Issues raised back to the design office
- Currently all Issues are on a per project basis and needed to handle all projects to any company or person.

In some ways, this was easier because Dan had all the basic stuff coded up, we just needed to enhance the GUI.

This is what Dan came up with based upon my criteria.



Cross project Issue register

## FORGEing ahead

I have highlighted two different API approaches to two different challenges. The reason being that while there are great new tools available (Forge), some of the old tools (BIM 360 Field API) are just as effective and it is wise to do a bit of research as to what is the best approach.

I have also found that if you wish to research new tools such as Forge, it is much easier to have an objective in mind to try and accomplish rather just go at it with wild abandon.  It is also much easier to convince higher ups to let very expensive programmers work on what could be a shot in the dark. A good goal, with achievable objectives is all you need. Listen to your customers and they will guide you.

The next steps are of course to use the new and the old together.  How about synchronising B3DM with B3F.  Might not have to do that much longer in terms of files but what about data, attributes and document naming.

Much more discussion on the day and hopefully some demos to wrap it all up.


Grant.