CS463404

Optimize and Administer Your BIM 360 Member Subscriptions

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Learning Objectives

- Downloading member and project data from BIM 360 Data Extractor
- Data Cleanup in Power BI Query Editor
- Creating a Power BI Report Dashboard
- Reading into your reports to plan actions on members and projects

Description

Account Admin Analytics such as Member Limits by Services provide a basic tool for understanding how subscriptions are being used by members working on your projects. It can help with planning when to purchase more subscriptions but lacks the detail to understand which areas of your business are getting the most benefit from BIM 360 and where more support is needed to engage with users to make sure they get the most out of the platform

Speaker(s)

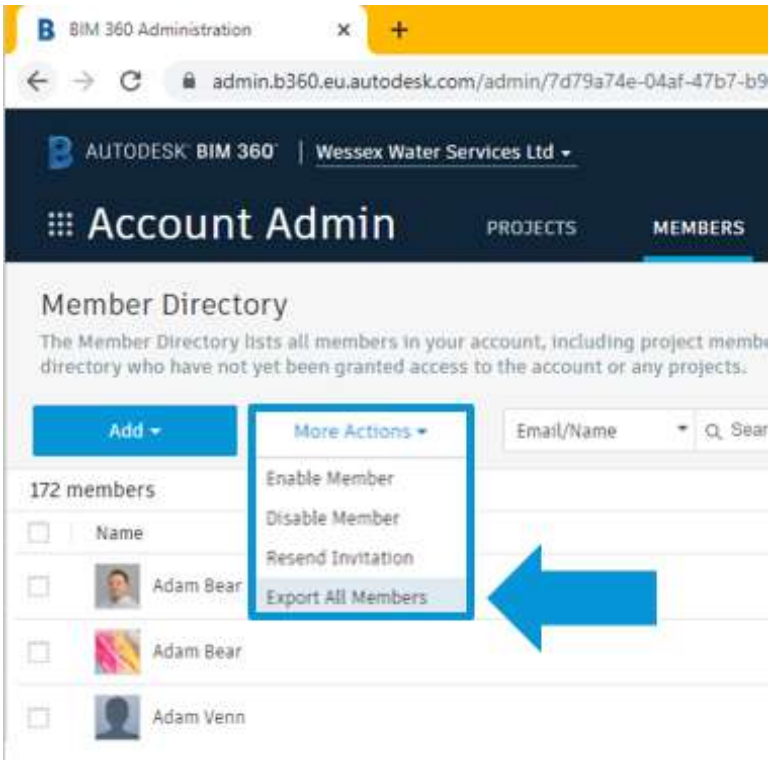
Originally trained as an Architect working for Stirling winning practice AHMM, Adam is now the Strategic BIM Manager for Engineering and Sustainable Delivery, the design and construction arm within Wessex Water. Wessex are the only UK Water utility owner operator to also invest in house services in design and construction. We believe this is critical to giving us the best platform to implement digital engineering processes across an asset's lifecycle.

Downloading member and project data from BIM 360 Data Extractor

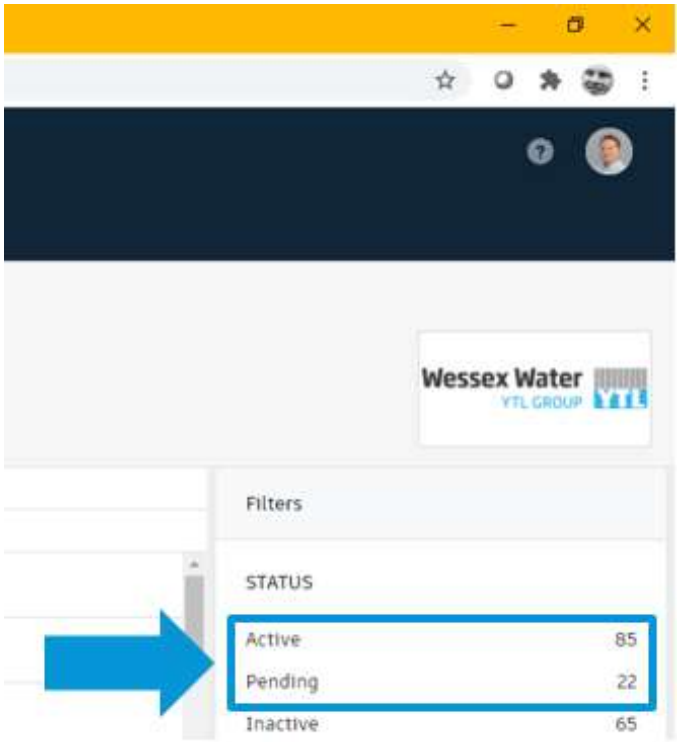
Traditionally you have only been able to download a limited amount of data about Members from the account admin page, with details on the user's status and when their last sign in was. From this data you can visualise quantities of active pending and disabled accounts, but it's not linked to any of the other valuable data in BIM 360. By using the data Extractor, we also have access to a wealth of data on Projects, Companies, Users, Roles, Business Units, Locations, Members, Roles, Issues, Checklists, and Logs.

Account Admin – Member Directory – More Actions – Export All Members

Before the insight data extractor was made available the only data that you could download was in the Account Admin module. Although the information in the data extractor is far more detailed the information available here still has high value and for some situations might be enough for you if you wanted to start off with a much smaller data set. Selecting Export all members creates and downloads BIM360_Members.csv which you can then use to analyse members.



EXPORT ALL MEMBERS



DRILLED DOWN STATISTICS FOR ACTIVE, PENDING AND DISABLED USERS

The account admin member directory also gives a useful drill down of active pending and disabled users that gives more detail than the analytics page which combines active and pending users in a single count against your subscribed licenses. By understanding these subcategories of users, we are better able to plan future license number subscriptions and support current users.

BIM360_Members.csv

The generated csv file contains only a few headings:

- Email
- Account name
- First Name
- Last Name
- Default Company
- Default Role
- Project
- Status
- Last Sign In

The most useful of these are Last Sign In and Status which when cross referenced with Email give a simple way to track how users are engaging with BIM 360. The email field is

especially useful as we can use it later to relate user data downloaded from the data extractor.

Standing on Shoulders

Previous Autodesk University classes have looked at how you can use forge to download the same data and these are well worth a watch to see what is possible with the data, but using the extractor makes this process incredibly easy and allows Autodesk to release new datasets in the extractor in a consistent way.

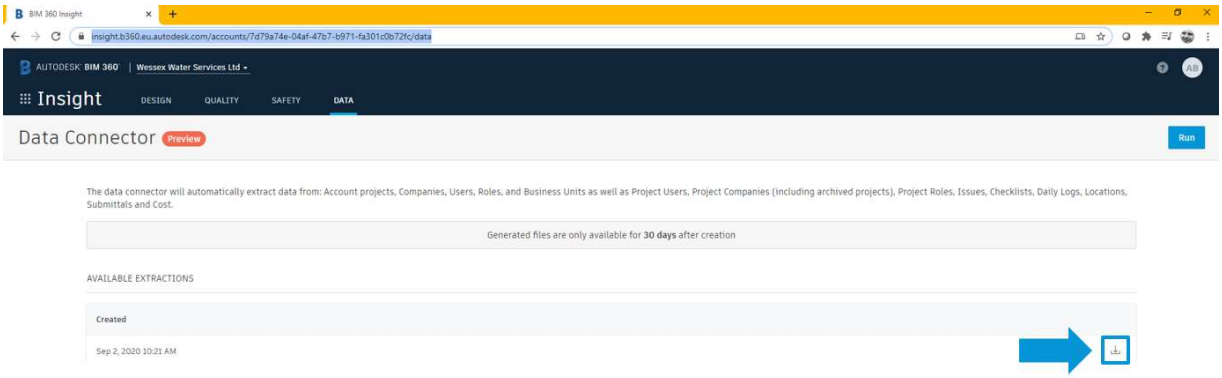
For reference to Forge and BIM 360 check out Marcelo Nonauto Santos and Diego Faria 2019 Industry Talk CS322871 “Integrating Power BI and BIM 360 Through Forge for Dynamic Construction Analytics” which started our interest and investigation into how BIM 360 data can be used with business intelligence tools like Power BI.

https://www.autodesk.com/autodesk-university/class/Integrating-Power-BI-and-BIM-360-Through-Forge-Dynamic-Construction-Analytics-2019

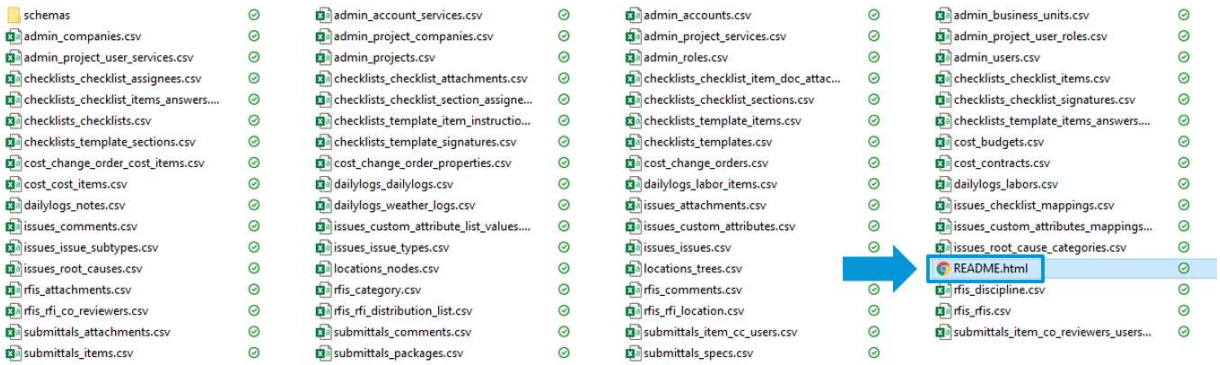
EXCERPT FROM AU CLASS DETAILING FORGE ROUTE TO POWER BI DASHBOARD

Insight Data Connector

Account Admin Insight, which is different to and is not to be confused with Project Insight, provides the data connector to download dozens of csv files of data related to users and projects across a wide variety of BIM 360 functions. To run the data extractor simply go to the Account Admin Insight Module, Data Tab, and click on the run box. Processing will take a couple of minutes after which you can download all the files as a single zip



INSIGHT DATA EXTRACTOR SHOWS YOU ALL OF THE DATA YOU HAVE PROCESSED IN THE LAST 30 DAYS



DATA EXTRACTOR CSV AND README FILES

By downloading as a zip, you can keep your own record of all your data extractions, BIM 360 will delete the extractions in BIM 360 after 30 Days. By running regular reports, you will have an easy way to look back over how your BIM 360 use has change over time. Extracting all these csv files into a folder referenced by Power BI is an easy way to update / overwrite previous data. The zip file also contains a useful readme.html and schemas sub folder which describes all the data headings used in each file.

users

Users in BIM 360.

ordinal_position	column_name	data_type	constraints	notes
1	id	string: UUID		The HQ User ID
2	autodesk_id	string	Max length: 255	Autodesk User ID
3	bim360_account_id	string: UUID		BIM 360 HQ Account ID.
4	email	string	Max length: 255	Email address for the user
5	name	string	Max length: 255	Name for the user
6	first_name	string	Max length: 255	First name of the user
7	last_name	string	Max length: 255	Last name of the user
8	address_line1	string	Max length: 255	User specified address
9	address_line2	string	Max length: 255	User specified address
10	city	string	Max length: 255	City for the user address
11	state_or_province	string	Max length: 255	State for the user address
12	postal_code	string	Max length: 255	Postal code for the address
13	country	string	Max length: 255	Country for the user

README HELPFILE DATA FOR ADMIN_USERS.CSV

For each csv data table, we can easily read the heading names and the data type. For example, admin_users.csv contains a heading “email” which is a string data type. Knowing this information for each heading is very useful when transforming data.

Data Clean-up in Power BI Query Editor

Power BI's Query Editor enables non coders to transform their data sets into a usable format, laborious tasks such as defining header names and types, removing, duplicating and renaming columns, deliminating values, parsing dates and calculating ages can be done in an intuitive user interface that any excel user will feel at home in. Optionally, for those that want to have complete control of their data transformations the M code script generated behind the scenes can be worked on in an advanced editor.

Relationships between multiple datasets are established to link the information in each table. 'admin_users' does not include the pending / active / inactive status of members so this can be linked using their email with 'BIM360_Members' from Account Admin Members exports. Data that won't change frequently can be manually entered into a separate table such as the descriptive names for BIM 360 Services and the Service Levels subscribed to. Power BI can also query when a file was last saved or data was refreshed.

Extract Transform Load (ETL)

Having Extracted out data from BIM 360 the next step is to transform the data before it is loaded into the report visuals. This 3-stage process is commonly referred to as Extract Transform Load or ETL for short. Whilst in context the background to ETL is useful to have an awareness of the process of using BIM 360 and Power BI makes many of the traditional complexities of ETL greatly simplified to make setting up a dashboard report much easier.

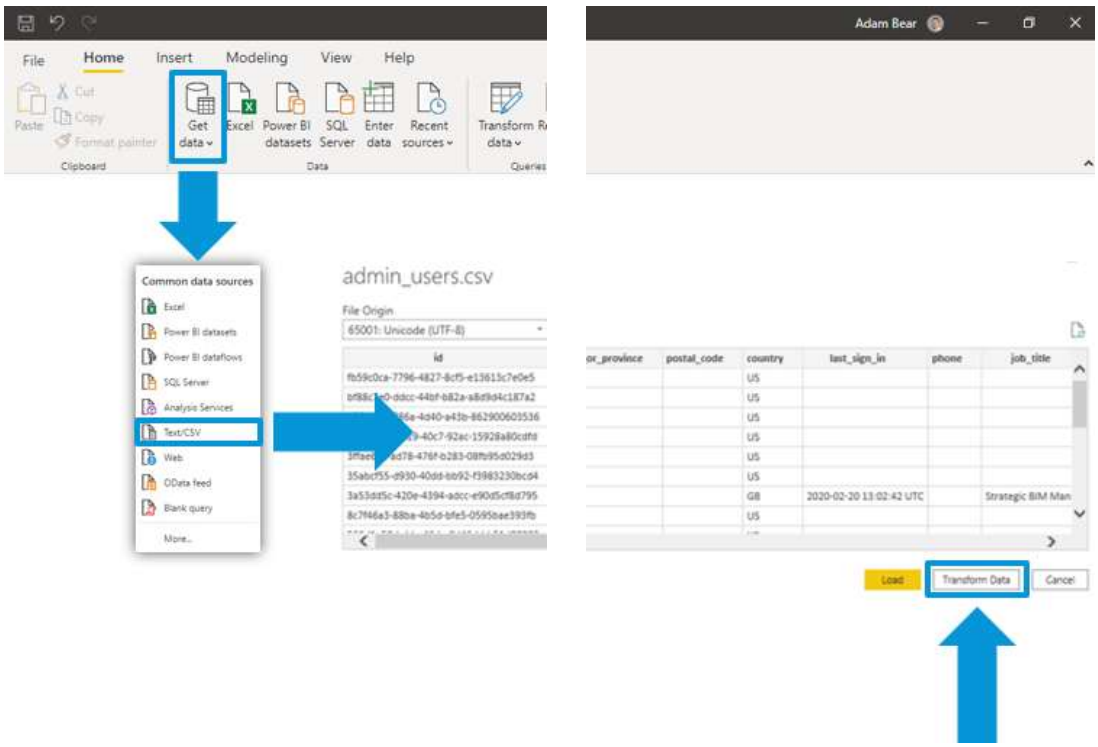
Microsoft Power BI Desktop

If you have not already downloaded and installed a copy of Microsoft Power BI you can use the link below, Power BI is free to use if you do not want to share the results of your reports online. For many users this is excellent free entry point into the world of business intelligence dashboard reports, allowing you to experiment and create visualisations at no cost and even the ability to screenshot or export pdfs of reports, before investing in still relatively cheap licenses for the ability to share reports online.

https://powerbi.microsoft.com/en-us/desktop/

Importing Data to Power BI

Under the Home tab of Power BI use get data to connect to a CSV data source. This kind of interface should be familiar if you have ever used data sources in Excel, in fact recent versions of Excel have included Power Query Editor as an integrated data transformation tool. For many users who are more familiar with Excel than Power BI this seems like a natural place to start exploring data before building in depth reports with Power BI.

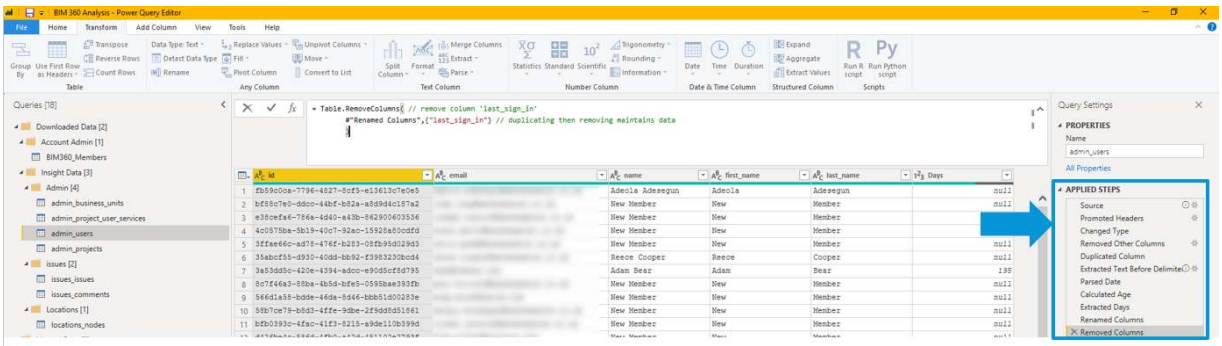


IMPORTING AND TRANSFORMING DATA

After connecting the data source, you can either immediately Load the data into the Power BI report or Transform the Data first. You will almost always want to transform the data before loading. Transforming the data opens Power Query Editor that may be familiar to you if you have used similar workflows in Excel.

Power Query Editor

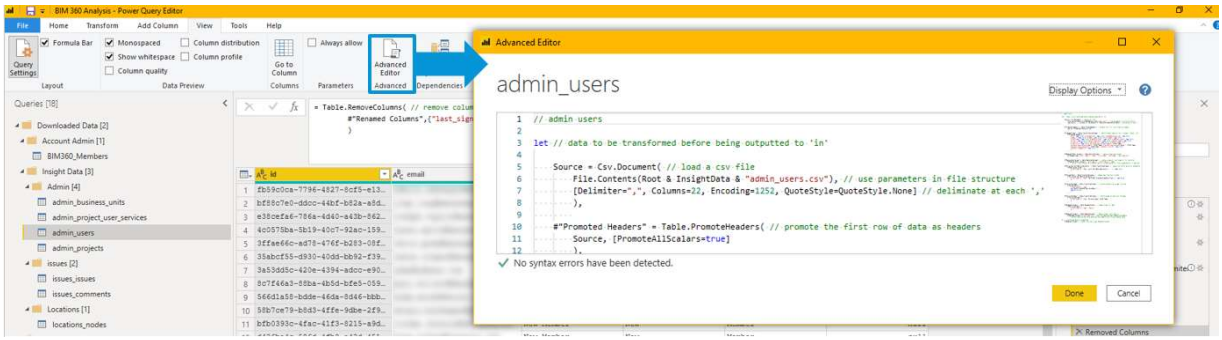
The power query editor provides a simple and user-friendly interface for transforming data. The process of transforming data is step based with each transformation being undertaken on the previous stage.



POWER QUERY EDITOR

M Code

Although the intuitive graphical interface to Power Query Editor means that you don't really need to know any coding, it is still available in the background. Under the view tab the advanced editor allows direct text entry, and modification of the underlying language simply known as M or Mashup as it allows you to mix a variety of data sources.



Whilst beginning with Power BI there is enough control in the graphical interface to be able to completely ignore the M code powering transformations. As you become more comfortable you may want to experiment with manipulating automatically generated code or even write from scratch in some cases.

To find out more about M Code visit Microsoft's learning resources at the link below.

https://docs.microsoft.com/en-us/powerquery-m/

For a helping hand you can access the M code for Power Query Editor used in this presentation available on GitHub.

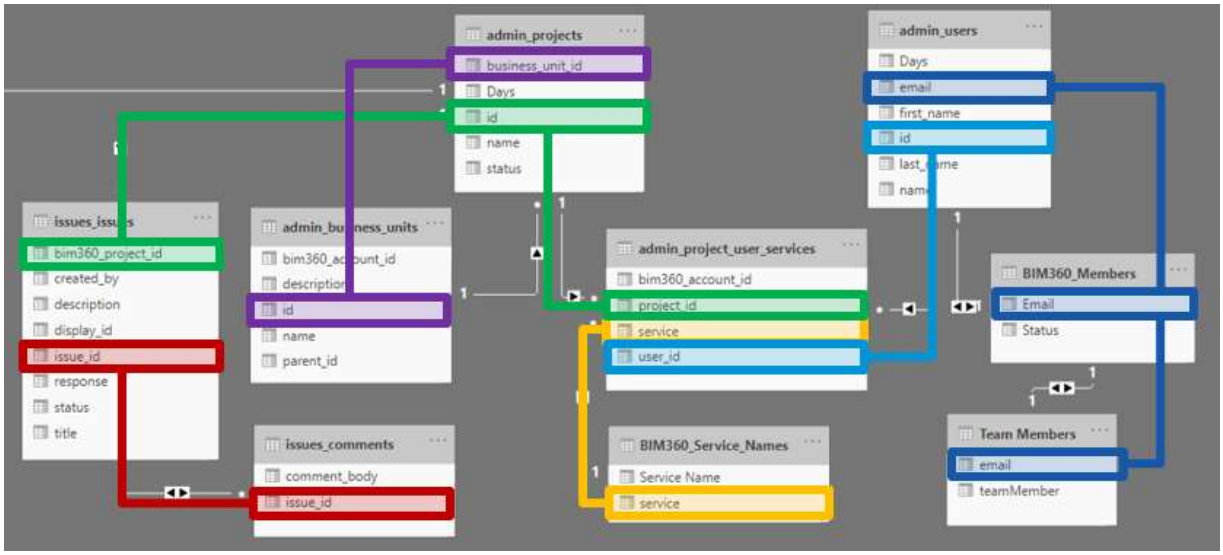
https://github.com/adambear82/powerBIm360

Managing relationships between data tables

Under the modelling tab of Power BI reports select Manage Relationships to view and edit the cross-referenced connections between data fields.

Although each csv file downloaded in the data extractor provides its own interesting information to get the most useful results, we need to define the relationships between the fields in the data tables. The complexity of the relationships will depend on the results that need to be achieved. Ideally the fields that we want to relate will be named identically such as "email" as Power BI will be able to autodetect some relationships. Where some fields are capatilised such as "Email" autodetection of relationships may not succeed. Sometimes the names of a field need to be considered in the context of the name of the data table source.

For example, admin_users[id] is relatable to admin_project_user_services[user_id] but it is only by knowing the content of each data table that it becomes apparent where the links should be.

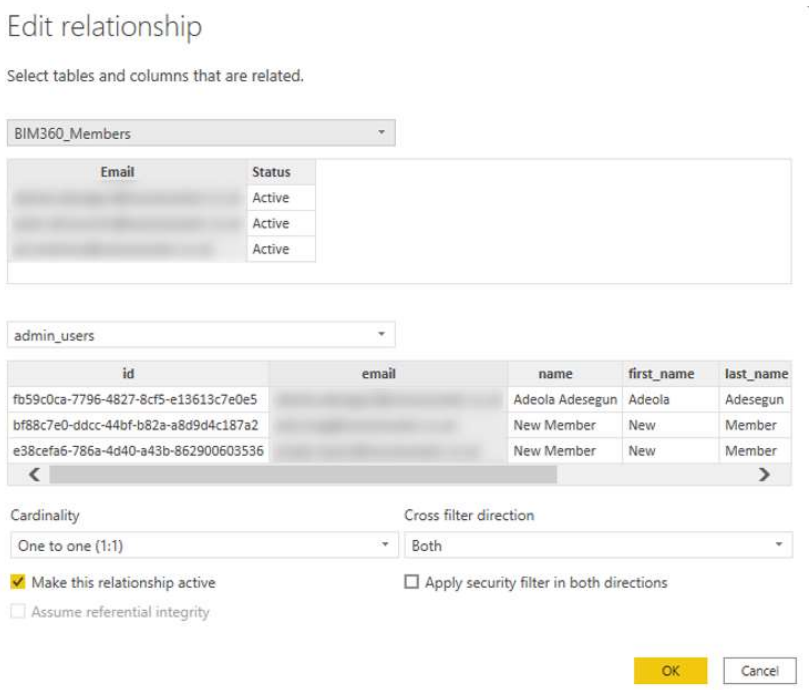


CONNECTING DATA TABLES CREATES CROSS REFERENCED RELATABLE INFORMATION

It is a good idea to only build up the complexity of the related data where it is necessary, creating relationships between data that you have no intention of cross referencing only slows down system performance and makes the report more complicated to manage.

A simple relationship to start with is “email” from admin_users (generated by the data extractor) with “Email” from BIM360_Members (generated by Account Admin Member Directory function to Export All Members). Because email is capatilsied in one but not the other the relationship needs to be set manually by simply dragging one of the email fields onto the other.

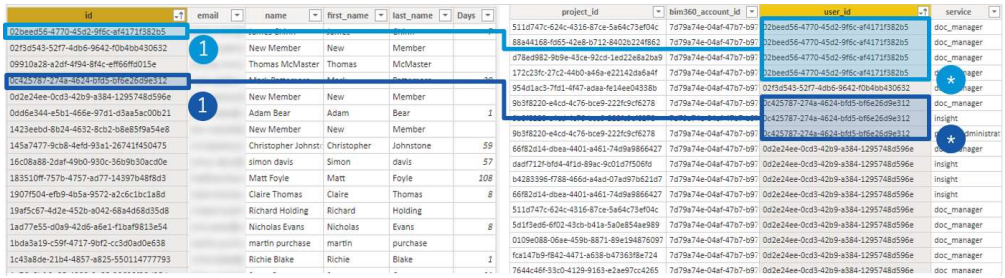
To edit the relationship properties right click on the line that appears between the two data fields and select properties or simply select the manage relationships feature in the home tab of the ribbon.



EDITING THE RELATIONSHIP MANUALLY GIVES GREATER CONTROL OVER AUTOMATICALLY DETECTED SETTINGS

One to Many Relationships

Data is often separated into multiple data tables to avoid unnecessarily repeating information more than is required. For example, the table admin_users provides a new row of data for each user so that there only needs to be as many rows as there are users. Whereas the table admin_project_user_services contains a new row for each and every service that each user is assigned to, for each project. Because BIM 360 contains many different services for an admin user who is assigned to multiple services on multiple projects, they will have a long list of services associated with their user hash. If this information was to be recorded in admin_users it would mean that data, that always stays the same, such as the user's email would need to be replicated for each row which would be an inefficient way of storing and retrieving data. The solution to this is to use a one to many relationships where a single row of data in one table can be related to many rows of data in another table.



A SINGLE USER HASH IS ASSOCIATED WITH MANY SERVICES IN BIM 360

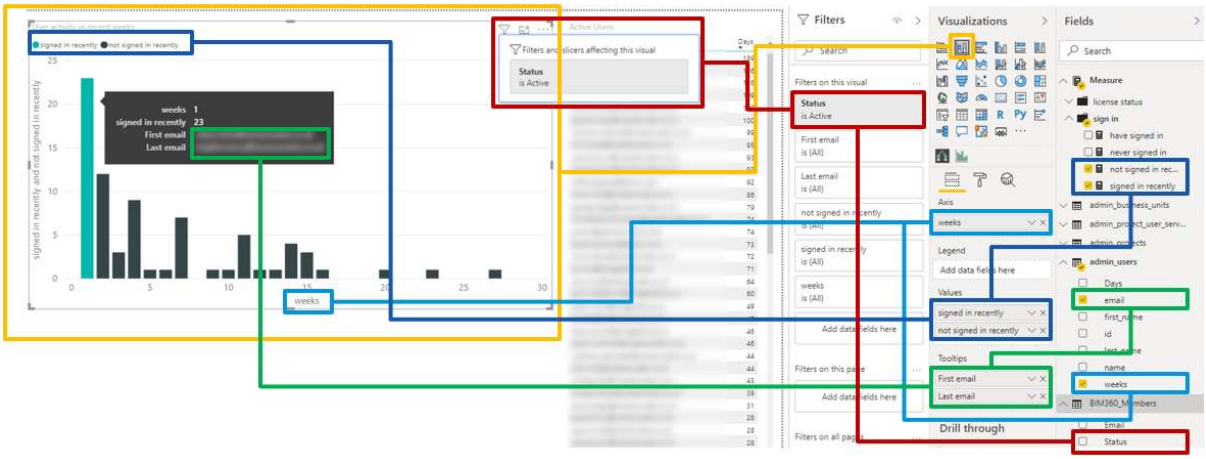
Creating a Power BI Report Dashboard

Once the downloads from the data extractor have been transformed and loaded into Power BI you can create visual reports that show a high level of detail on BIM 360 usage. A simple drag and drop interface allows tables and charts to be built and filtered quickly to understand the data. The number of pending users can be measured in the BIM360_Members[Status] table can be used in a gauge.

The final stage in the Extract Transform Load ETL process is to load the data from the Power Query Editor where it has been transformed, into the Report Editor where the loaded data can be used to build up visualisations and dashboard reports.

Creating a report

Reports are created by dragging the available fields onto the canvas. This automatically generates a table of the data values in the canvas. More fields can be dragged onto the table in the canvas. Fields can be selected from either the data table where the first field was from or tables where there is a relationship between two tables. The fields displayed don't necessarily have to be the fields that are related. For example, user ids are long hash codes that have little human readable relevance, but they are used to cross reference relationships so that any two tables with the same user id hash codes can be related. Once the data in the canvas is populated it can then be filtered and the visualization changed. (If measures have been set up, they can also be used as filters, more on measures later…)



CREATE REPORTS IN POWER BI BY DRAGGING FIELDS ONTO THE CANVAS

Visualising data

A table is often not the most engaging way to present data in a dashboard visualisation. Gauges are a popular method of displaying a value between two extremes and bar charts are an established way of presenting data over time or different categories. It is very easy to explore how data would look in different graph types by cycling through all the different

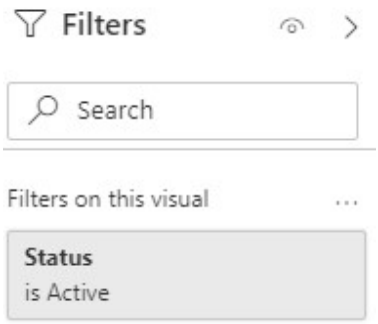
visualisation types available. Once a preferred type is found its worth duplicating the visualisation and keeping as a safe copy before going through all of the different types of visualisation available. After a short while you will develop a personal taste for favorite types of visual as each type have their own merits.

POWER BI DEFAULT VISAULISATIONS

If the default visualisation types are not varied enough for your needs, you can get more visuals from the visualisation marketplace accessed by selecting the 'ellipsis' (dot dot dot) icon. Most visualisations are provided free of charge although there are some businesses that charge for highly flexible visualisations.

Filtering versus Measuring

The simplest way of drilling down data from loaded data tables is to use filtering in the report. This had the advantage that there is no need to learn another coding language and the simple graphical interface can be relied upon.



FILTERS CAN BE APPLIED WITH A SIMPLE INTERFACE
ALTHOUGH FILTERING CAPABILITIES MAY NOT BE ADVANCED ENOUGH FOR YOUR NEEDS

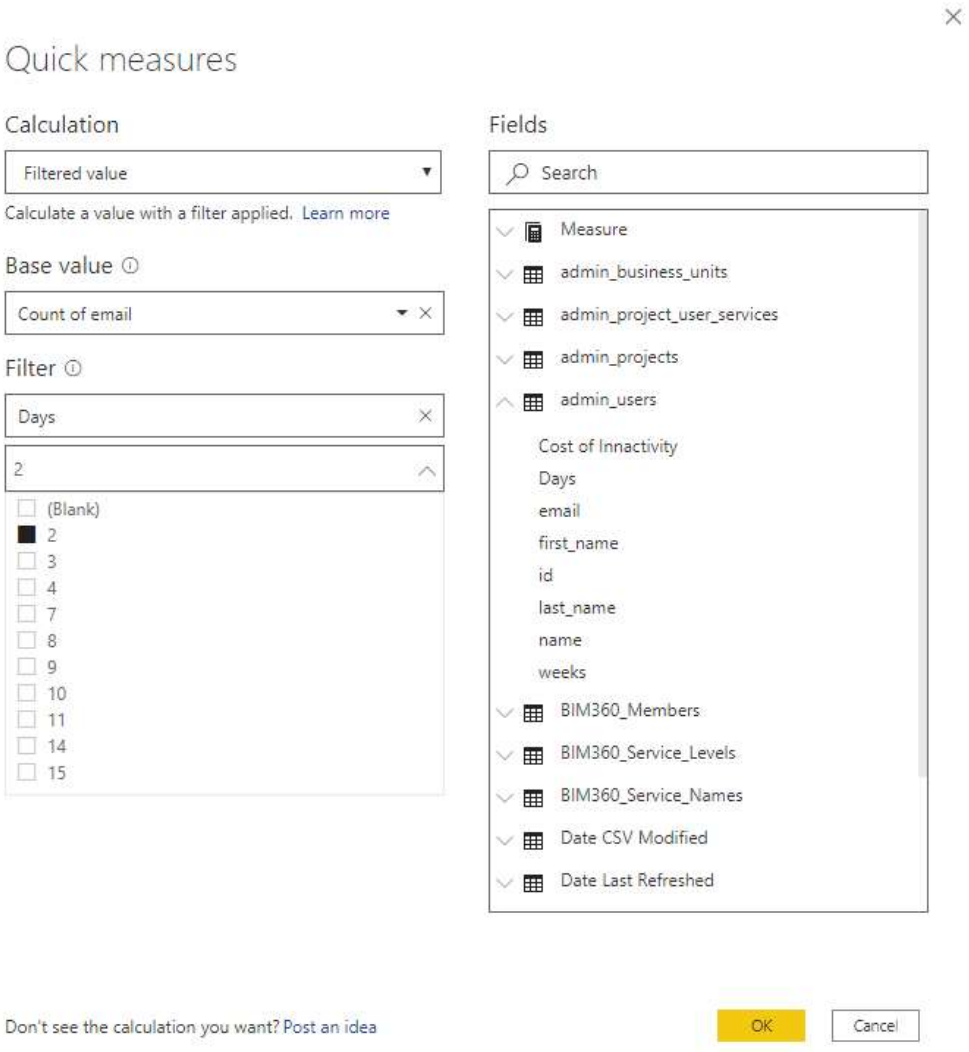
To make filters easy to use for most situations the filtering tools are not especially complicated or advanced and there may be some situations where using a measure is more appropriate. If for example you want to use the same measure in multiple places throughout a report it may be possible to use filters, but you would need to be sure that the exact same filters where used consistently, otherwise there would not be a like for like comparison. By using a measure, the filtering and any further calculation can be defined

in a single location and referred to multiple times without the possibility that it could be changed by mistake as is the case with multiple filtered values.

DAX coding language

Using measures does require the need of another coding language, Data Analysis Expressions or DAX. This is somewhat different to M used in Power Query Editor and is another barrier to overcome. To learn more, visit the Microsoft link below.

https://docs.microsoft.com/en-us/dax/



THE QUICK MEASURE TOOL PROVIDES A SIMPLE INTERFACE TO CREATE DAX MEASURES

To make life easier Power BI has a built in Quick Measure tool which aims to provide similar functionality to Power Query Editor which autogenerates M code. Quick Measures

work well if one of the default template measures included in Power BI suits your needs, if the quick measure you want isn't available you will likely need to resort to DAX

Under the Measure Tools tab, the Quick Measure feature allows DAX measures to be created with no knowledge of the underlying DAX coding language. By selecting the calculation as a filtered value and by dragging email to base value, this is automatically calculated as count of the number of emails and is filtered by the number of days since last user login was 2. This autogenerates the following DAX

```
Count of email for 2 =
CALCULATE(COUNTA('admin_users'[email]), 'admin_users'[Days] IN { 2 })
```

Which can more comfortably be re written as

```
Count of email for 2 =
CALCULATE(
      COUNTA(
            'admin_users'[email]
            ),
            'admin_users'[Days]
            IN { 2 }
)
```

By itself it is not very useful to be able to count the number of users, identified by their email, where it has been 2 days since they last logged in. It is much better to be able to group users who have logged in recently, say within the last 7 days. Although a less than operation is not one of the default calculations available in the quick measures tool it is not too difficult to read documentation on DAX and construct the following measure manually:

```
signed in recently =
CALCULATE(
    COUNT(
      admin_users[Days]
      ),
    admin_users[Days] <= 7
    )
```

For a helping hand you can access the DAX code used for measures in this presentation available on GitHub.

https://github.com/adambear82/powerBIm360

It is best to start with simple measures, before combing multiple filters or calculations to build up more complicated values. Once the required measures have been defined, they can be reused throughout a report with the assurance that they will always report values consistently in a way that could not be relied upon with filtered data table values.

Reading into your reports to plan actions on members and projects

Care should be taken to construct a visual report that first explores trends before progressively drilling down through subcategories to examine detail. Each visual should suggest an action to support either business units, projects or members. Such that least active members are not a statistic and are supported to benefit from BIM 360.

Tell a story by starting at the beginning

A funnel visualisation is an accessibly clear way of presenting a sequential set of data that subdivides into a smaller group at each stage.

FUNNEL VISUALISATION USED TO REPRESENT A SERIES OF SUBCATEGORIES

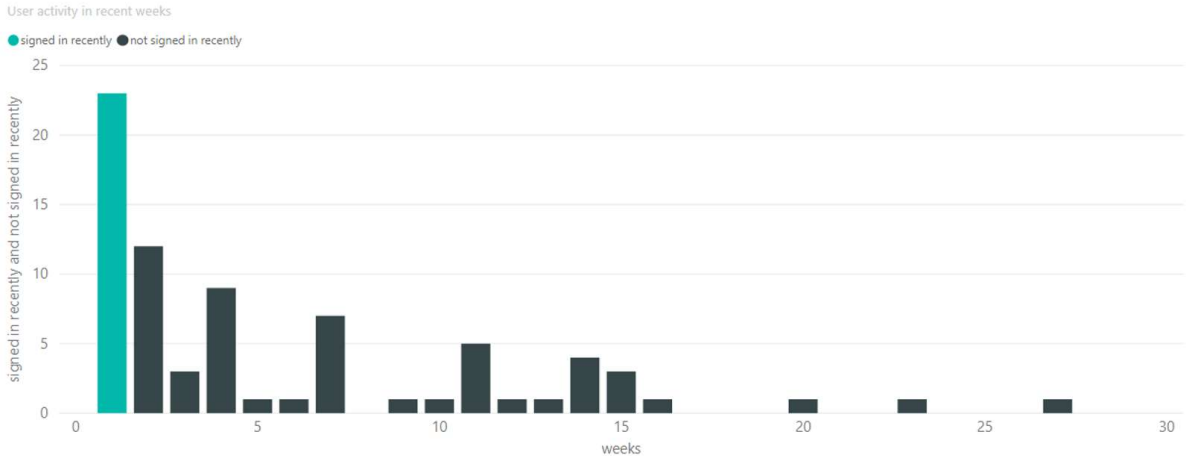
- **Count of email:** The largest number shows how many users have been invited to your organisation's BIM 360 platform.
- **Using license:** Combining Pending and Active user counts replicates the number of users consuming a license as displayed in account admin analytics. Pending users have been invited but have not yet created an Autodesk ID in order to access BIM 360
- **Docs available:** The number of docs available is a manually set number for the number of licenses that are subscribed to. This number should be higher, or equal to, the number of active users otherwise it will not be possible to manage active users.
- **Active members:** These are the members who have been invited and who have created an Autodesk ID. When this number approaches the number of Docs licenses available it is appropriate to consider if any users that have not signed in recently could be temporarily disabled to free up a license for another user.
- **Signed in recently:** By filtering a count of users who have signed in within the last 7 days we can see, as a ratio of the above categories, how many users have signed into BIM 360 in the last week. Whilst it is useful to know the context of this value in relation to the above figures it becomes critical to track this value over time

Continue the story by drilling down into the detail

A key measure of value being derived from BIM 360 will be how often it is being signed into by each user. Clearly if a user has not accessed the platform for 100 days, at a cost of say around £0.50 per day then a cost of £50 has been held for that user not to have any benefit from. Although not significant sums for an individual user, if this was multiplied over hundreds of users it would become more concerning.

To ensure best value for the business it becomes appropriate to ask two questions:

- How can such users be supported so that they can start to use BIM 360 more effectively?
- Does this kind of user require an active BIM 360 license or could it be better distributed to a new user to better manage the number of licenses that need to be subscribed to



COUNT OF WHEN DISTINCT USERS LAST SIGNED IN OVER SUCCESSIVE WEEKS