

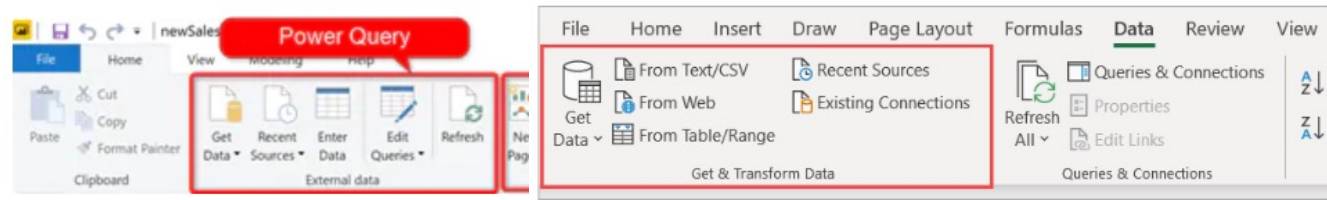
Power BI Hands-On

An Introductory Guide to Data Visualization

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Power BI Power tools?



- Power Query: ETL tool (nice interface, record steps, write M code behind scenes, data integration/merging)
- Power Pivot: Data relationships, data model, measures (DAX code)

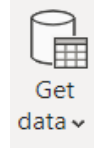
Why Power BI?

1. **Bigger Scale:** Compare to excel, PBI can load over 1M records.
2. **Connection options:** access and extract data from systems and applications.
3. **Better visuals:** Sophisticated, interactive (between visuals or cross reports), customized visuals
4. **Dashboards and KPIs:** customizable (for branding, projects), support browser and mobile UI
5. **UI and UX:** Either for developers or end-users, PBI provides better UI and are user-friendly
6. **Alerts:** schedule notification via emails
7. **Automatic Update:** data update automatically instead of reload.
8. **Collaborative:** data and report sharing

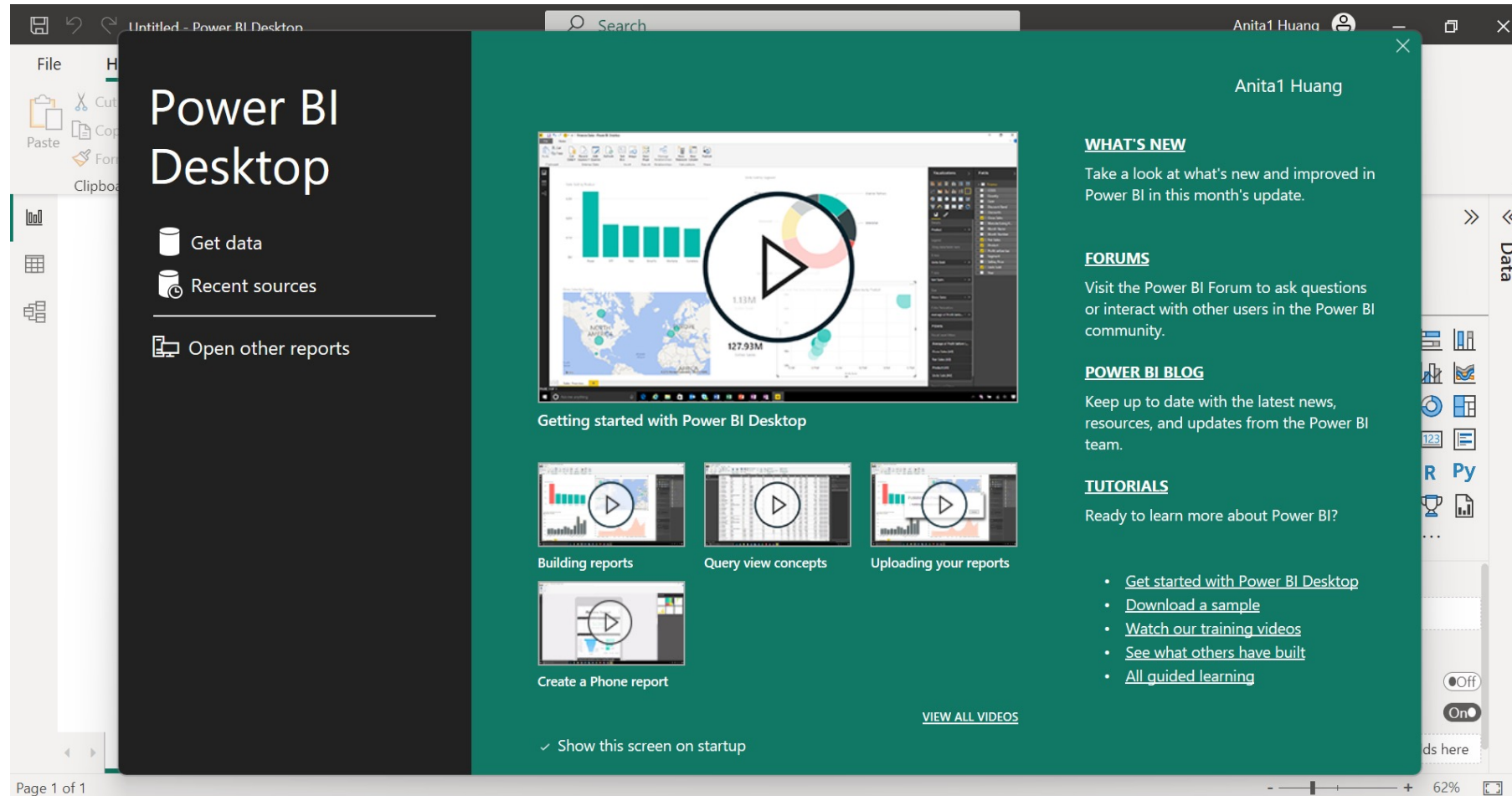
Power BI 實作

Course Outline

1. Power BI Desktop Download
2. Connect to data source ["Get data"]
Excel, database, etc.
3. Data Query [Transform data ETL]
Data types, promoted headers, change sheet name, column names, additional columns, merge etc.
4. Format Report Page
Canvas size, insert shapes, background, wallpaper, design guideline, branding, theme colors, etc.
5. Get to know your project and data
6. Data Modeling
Data relationships, single vs. cross-filters, category label order
7. Chart Design
Theme gallery, cross-sectional vs. longitudinal, etc.
8. Introduction to DAX functions
9. Power BI Handy Features
 - Slicers
 - Page Navigation
 - Bookmarks

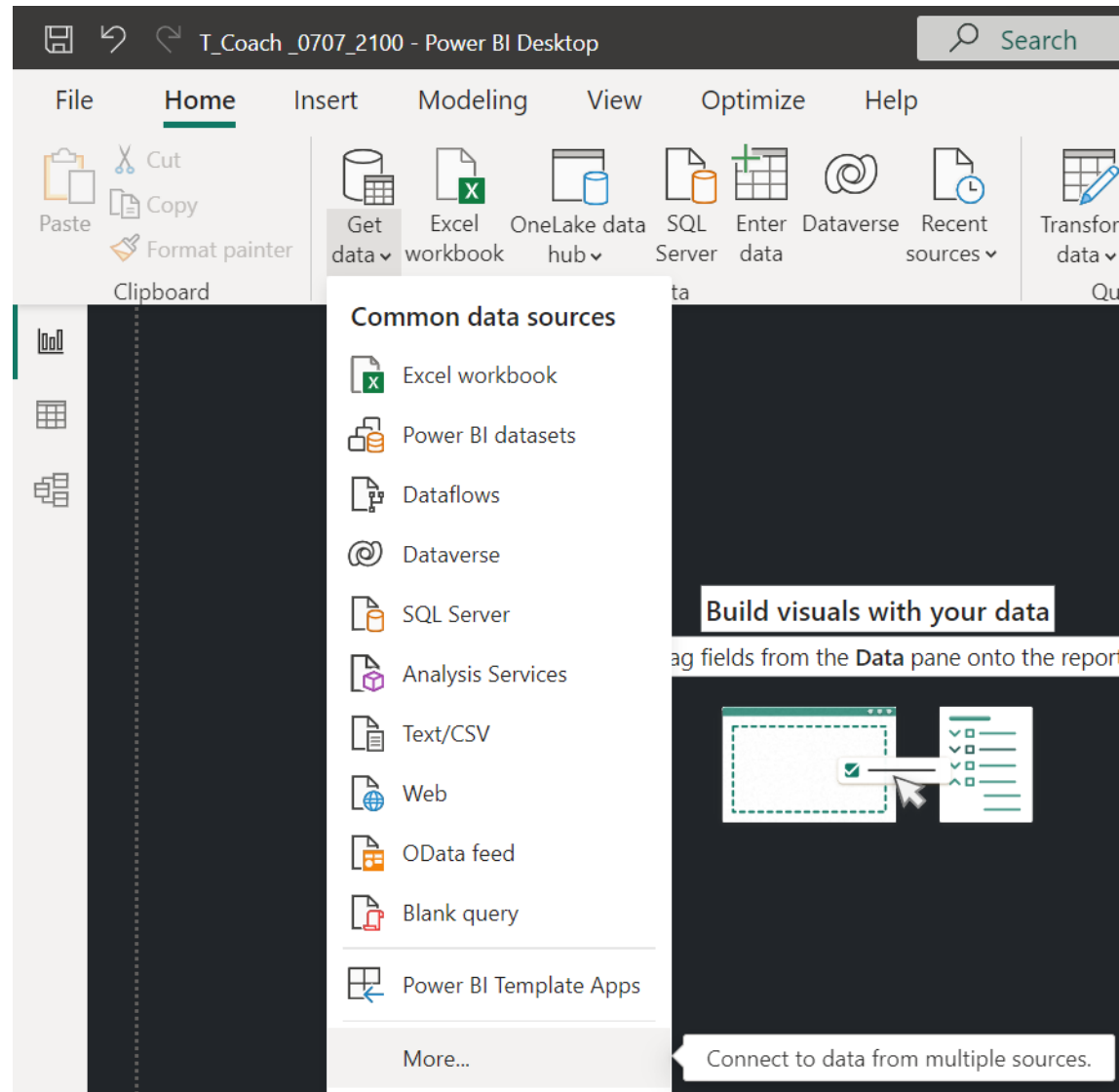


1. Power BI Desktop Download



[Power BI Download Link](#)

2. Connect to Data Source



3. Power Edit Query

T_Coach_0707_2100 - Power Query Editor

檔案 Home Transform Add Column View Tools Help

Close & Apply New Source Recent Sources Enter Data Data source settings Manage Parameters Refresh Preview Properties Advanced Editor Manage Columns Reduce Rows Sort Split Column Group By Data Type: Any Use First Row as Headers Replace Values Combine Text Analytics Vision Azure Machine Learning AI Insights

Queries [15] = Source[[Item="工作表1",Kind="Sheet"]][Data]

	Column1	Column2	Column3	Column4	Column5
1	Progress by month	Interview Type	Clinic A	Clinic B	Clinic C
2	2023/1/1	Registration		3	3
3	2023/1/1	1st interview		2	3
4	2023/1/1	2nd interview		2	4
5	2023/1/1	3rd interview		0	2
6	2023/1/1	4th interview		4	2
7	2023/1/1	5th interview		3	0
8	2023/1/1	Survey requested		1	4
9	2023/1/1	Survey completed		2	1
10	2023/2/1	Registration		5	2
11	2023/2/1	1st interview		4	0
12	2023/2/1	2nd interview		1	4
13	2023/2/1	3rd interview		3	1
14	2023/2/1	4th interview		3	0
15	2023/2/1	5th interview		4	3
16	2023/2/1	Survey requested		1	0
17	2023/2/1	Survey completed		2	0
18	2023/3/1	Registration		4	2
19	2023/3/1	1st interview		5	1
20	2023/3/1	2nd interview		3	1
21					

Other Queries [14]

InjectionT_pts_progr...

Query Settings

PROPERTIES

Name

InjectionT_pts_progress

All Properties

APPLIED STEPS

- Source
- Navigation
- Promoted Headers
- Changed Type
- Inserted Sum

11 COLUMNS, 49 ROWS Column profiling based on top 1000 rows

PREVIEW DOWNLOADED AT 下午 01:21

4. Project Background & Data

- Company Name: FITNESS
- FITNESS Treatment Program: Injection meds
- Treatment Combines with:
 1. Checkup Interviews (by **Clinics**)
 2. Tracker APP (patient engagement)



Injection_Treatment_MAU



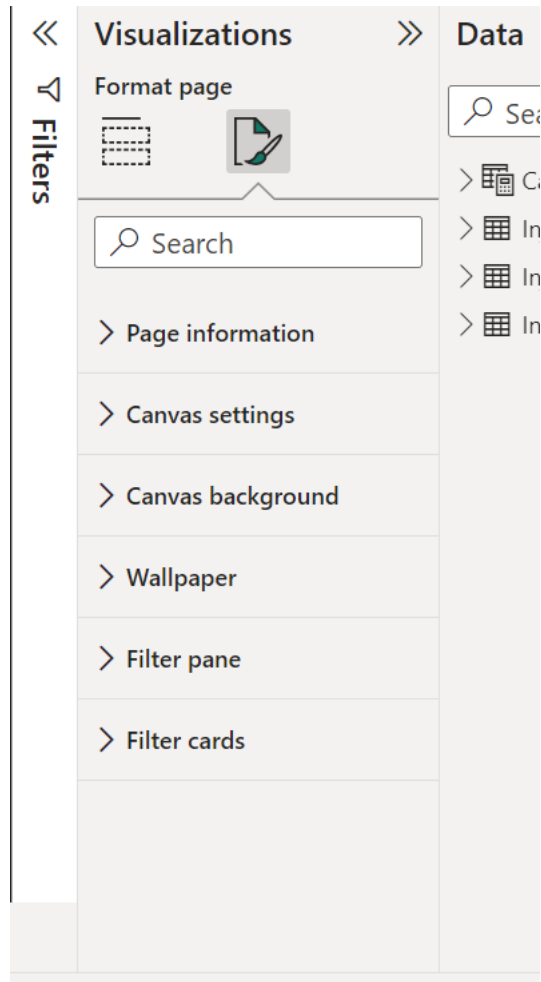
Injection_Treatment_pts_interview

5. Metrics (KPIs)

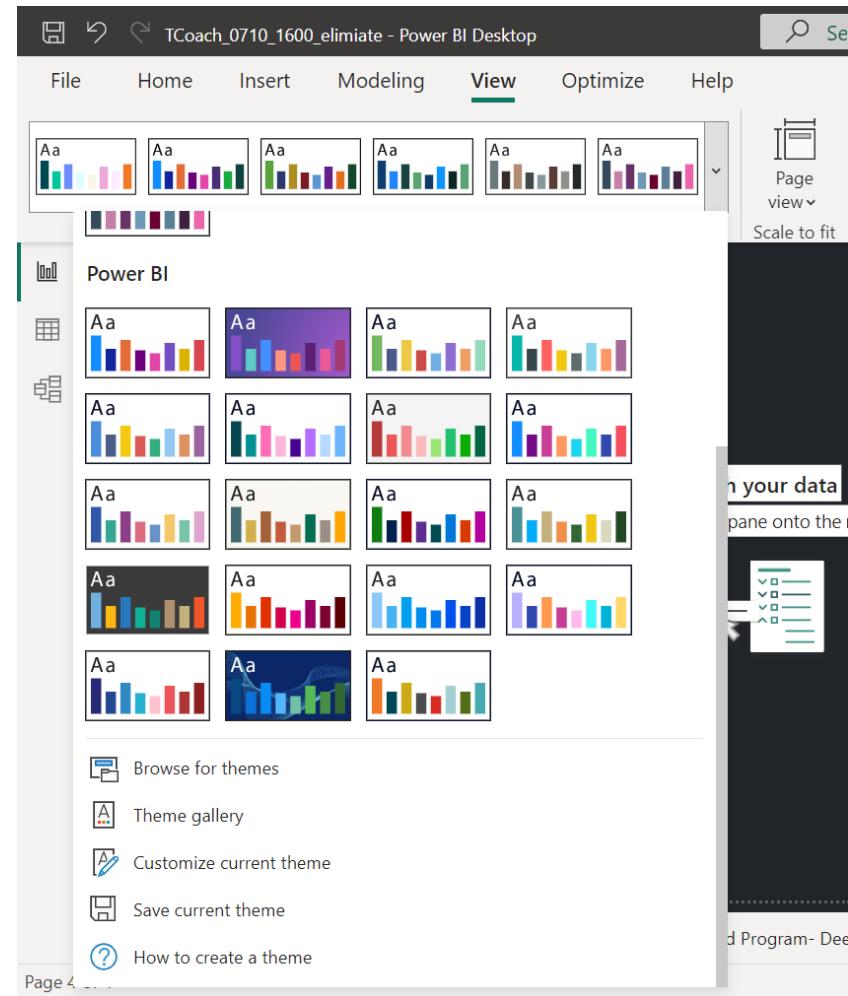
KPI: Injection treatment program- registration and patients progress

1. Number of patients register to the program each month
2. Cumulative number of patients register to the program over time
3. Number of patients in each interview stage by clinics

5. Format Report Page



Color Picker Website Recommend



Things to take in mind:

1. Color palette?
2. Font family?
3. Project theme?
4. End users?

Guideline: Clear

Supplementary References for Dashboard Design:

1. <https://dataschool.com/how-to-design-a-dashboard/>
2. <https://dataschool.com/how-to-design-a-dashboard/introduction/>

6. Power BI visual #1

KPI: Number of patients register to the program each month

Visual Type: Bar

X-axis: Month

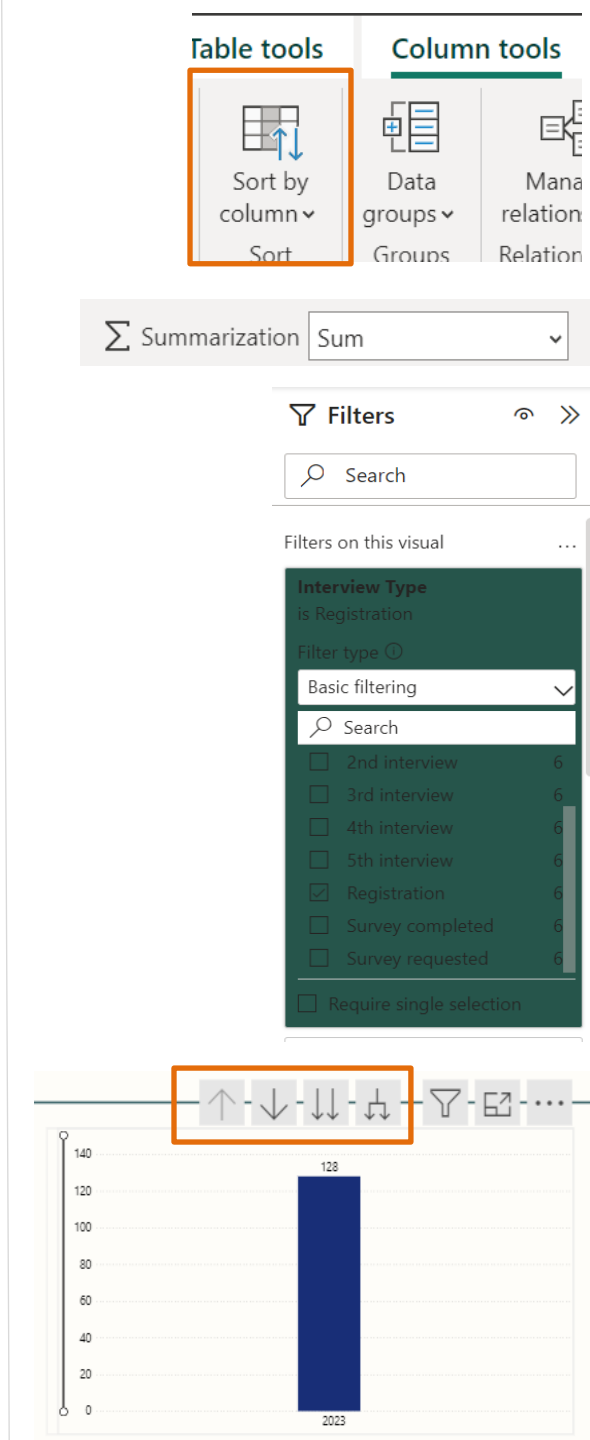
```
FORMAT('table_name'[date column], "Mmm")
```

Y-axis: Sum of the registration number of all clinic each month

```
SUM ('table_name'[Total Number])
```

Filters on this visual: Interview Type= Registration

```
CALCULATE(  
    SUM ('table_name'[Total Number]) ,  
    Filter('table_name',  
        'table_name'[Interview Type]=="Registration"  
    )  
)
```



Power Query Add calculated column

Combine Year and Month column into DATE

Power Query ribbon showing the 'Add Column' tab with the 'Merge Columns' button highlighted. The formula bar displays the M code for adding a calculated column.

Formulas Bar:

```
= Table.AddColumn(#"Promoted Headers", "Progress by Month", <br>    "zh-TW"), Text.From([MONTH], "zh-TW")), "/" ), type text)
```

Table Data:

	ABC 123 YEAR	ABC 123 MONTH	ABC 123 Interview Type	AB 12
1	2023		1 Registration	
2	2023		1 1st interview	
3	2023		1 2nd interview	
4	2023		1 3rd interview	
5	2023		1 4th interview	
6	2023		1 5th interview	
7	2023		1 Survey requested	
8	2023		1 Survey completed	
9	2023		2 Registration	
10	2023		2 1st interview	
11	2023		2 2nd interview	
12	2023		2 3rd interview	
13	2023		2 4th interview	
14	2023		2 5th interview	
15	2023		2 Survey requested	
16	2023		2 Survey completed	
17	2023		2 Survey completed	

Power Query Add calculated column

Add a column that sum up the selected value each row

The screenshot displays the Power Query Editor interface. The 'Add Column' tab is active, and the 'Statistics' dropdown menu is open, showing options: Minimum, Maximum, Median, Average, Standard Deviation, Count Values, and Count Distinct Values. The background data table has columns: Interview Type, Clinic A, Clinic B, and Clinic C. The 'Applied Steps' pane on the right shows 'Inserted Sum' as the current step.

	Interview Type	Clinic A	Clinic B	Clinic C
1	Registration	3		
2	Interview	2		
3	Interview	2		
4	Interview	0		
5	Interview	4		
6	Interview	3	0	
7	Survey requested	1	4	
8	Survey completed	2	1	
9	Registration	5	2	10
10	Interview	4	0	3
11	Interview	1	4	7
12	Interview	3	1	9
13	Interview	3	0	6
14	Interview	4	3	9
15	Survey requested	1	0	5
16	Survey completed	2	0	1
17	Registration	4	2	1
18	Interview	5	1	1
19	Interview	3	1	6
20	Interview	2	1	2

What is Measure?

- A calculation/ an aggregation
- Useful in the context of visuals
- Dynamically respond to user interactions and selections.
- Provide interactive results on visuals based on the data or filters applied
- Actively adjusts and recalculates the totals based on the active filter

CALCULATE(

SUM ('table_name'[Total Number]) ,

1. Filter('table_name',

2. 'table_name'[Interview Type]=="Registration"

)

)

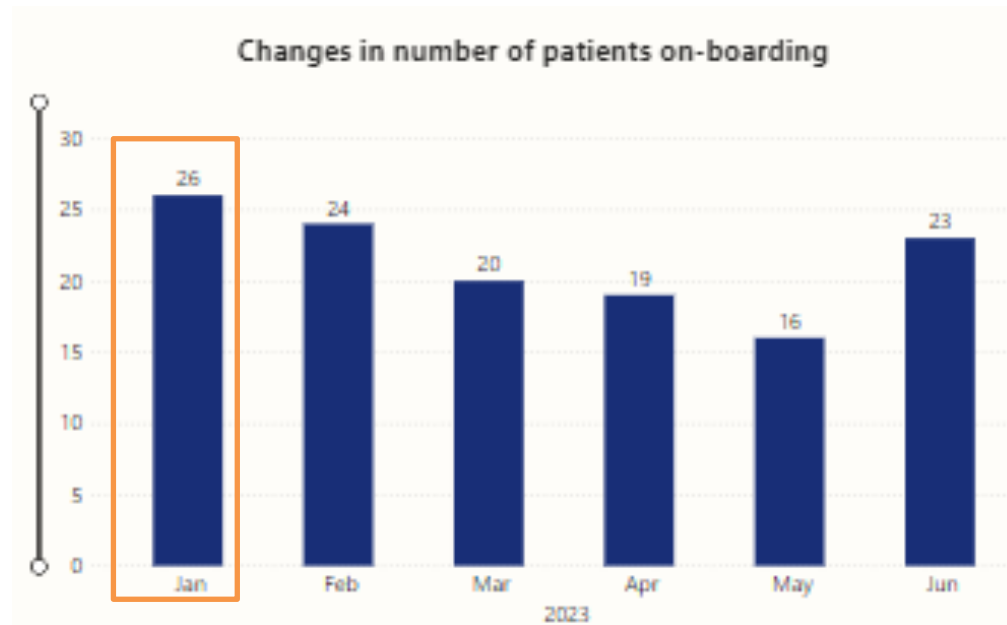
Initial Condition: February 2023

128

Fields

Sum of Total Number

123



X-axis

YEAR



Month_name



CALCULATE(

SUM ('table_name'[Total Number]) ,

1. Filter('table_name',

2. 'table_name'[Interview Type]=="Registration"

)

)

Condition 1

	A	B	C	D	E	F	G	H	I	J	K	L
1	YEAR	MON	Interview Type	Clinic A	Clinic B	Clinic C	Clinic D	Clinic E	Clinic F	Clinic G	Clinic H	Total Number
10	2023	2	Registration	5	2	10	1	0	4	1	1	24
11	2023	2	1st interview	4	0	3	2	0	1	2	1	13
12	2023	2	2nd interview	1	4	7	0	2	0	2	2	18
13	2023	2	3rd interview	3	1	9	3	3	1	2	2	24
14	2023	2	4th interview	3	0	6	5	0	7	1	1	23
15	2023	2	5th interview	4	3	9	2	3	4	1	2	28
16	2023	2	Survey requested	1	0	5	0	3	8	0	1	18
17	2023	2	Survey completed	2	0	1	4	3	6	2	2	20
50												


```

CALCULATE(
    SUM ('table_name'[Total Number]) ,
    1. Filter('table_name',
    2. 'table_name'[Interview Type]=="Registration"
    )
)

```

Condition 2

	A	B	C	D	E	F	G	H	I	J	K	L
1	YEAR	MON	Interview Type	Clinic A	Clinic B	Clinic C	Clinic D	Clinic E	Clinic F	Clinic G	Clinic H	Total Number
10	2023	2	Registration	5	2	10	1	0	4	1	1	24
50												
51												

Your turn- Exercise

Please visualize below metric:

1. Number of patients in 1st interview each month

6. Power BI visual #2

KPI: Cumulative number of patients register to the program over time

X-axis: Month

```
FORMAT('table_name'[date column], "Mmm")
```

Y-axis: Sum of the registration number of all clinic each month

```
SUM ('table_name'[Total Number])
```

Filters on this visual: Interview Type= Registration & cumulate to the max month

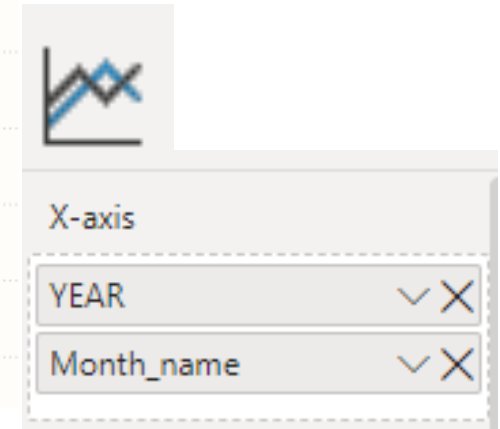
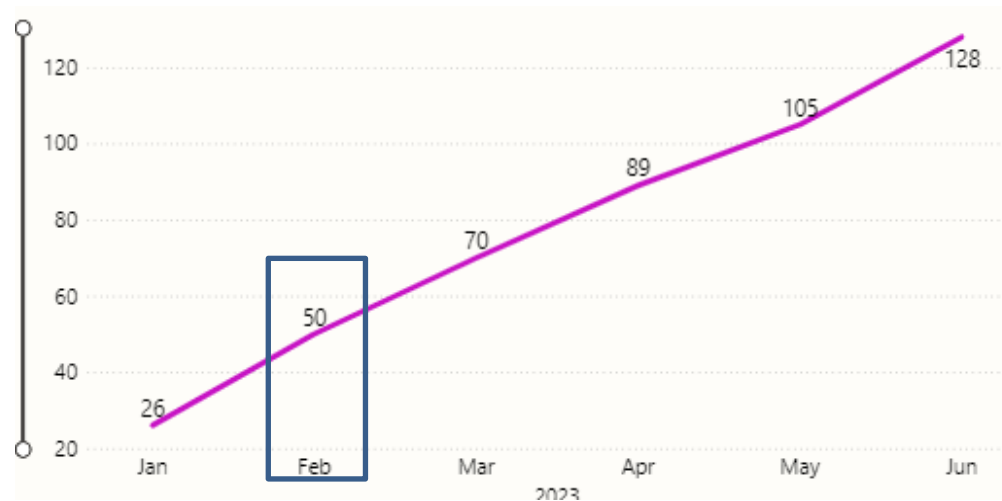
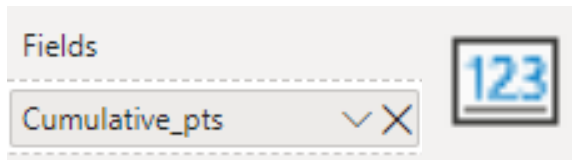
```
CALCULATE(  
    SUM('table_name'[Total Number]),  
    FILTER (  
        ALL('table_name'),  
        'table_name'[Interview Type]=="Registration" &&  
        'table_name'[Progress by month] <= MAX('table_name'[Progress by month])  
    )  
)
```

```

CALCULATE(
    SUM('table_name'[Total Number]),
    FILTER (
1.  ALL('table_name'),
2.  'table_name'[Interview Type]==“Registration“ &&
3.  'table_name'[Progress by month] <= MAX('table_name'[Progress by month])
    )
)

```

~~Initial Condition: February 2023~~



```

CALCULATE(
    SUM('table_name'[Total Number]),
    FILTER (
1.    ALL('table_name'),
2.    'table_name'[Interview Type]==“Registration“ &&
3.    'table_name'[Progress by month] <= MAX('table_name'[Progress by month])
    )
)

```

Condition 1

ALL function:
Removes any existing
filters on the table

	A	B	C	D	E	F	G	H	I	J	K	L
1	YEAR	MON	Interview Type	Clinic A	Clinic B	Clinic C	Clinic D	Clinic E	Clinic F	Clinic G	Clinic H	Total Number
2	2023	1	Registration	3	3	7	3	1	6	1	2	26
3	2023	1	1st interview	2	3	8	5	1	1	0	2	22
4	2023	1	2nd interview	2	4	8	1	3	3	2	1	24
5	2023	1	3rd interview	0	2	1	5	0	8	1	2	19
6	2023	1	4th interview	4	2	8	4	0	4	1	2	25
7	2023	1	5th interview	3	0	2	0	4	4	1	2	16
8	2023	1	Survey requested	1	4	8	5	1	5	2	2	28
9	2023	1	Survey completed	2	1	8	4	1	1	0	2	19
10	2023	2	Registration	5	2	10	1	0	4	1	1	24
11	2023	2	1st interview	4	0	3	2	0	1	2	1	13
12	2023	2	2nd interview	1	4	7	0	2	0	2	2	18
13	2023	2	3rd interview	3	1	9	3	3	1	2	2	24
14	2023	2	4th interview	3	0	6	5	0	7	1	1	23
15	2023	2	5th interview	4	3	9	2	3	4	1	2	28
16	2023	2	Survey requested	1	0	5	0	3	8	0	1	18
17	2023	2	Survey completed	2	0	1	4	3	6	2	2	20
18	2023	3	Registration	4	2	1	5	2	2	2	2	20
19	2023	3	1st interview	5	1	1	3	2	7	1	2	22
20	2023	3	2nd interview	3	1	6	3	3	2	2	1	21
21	2023	3	3rd interview	2	1	2	0	3	6	1	1	16
22	2023	3	4th interview	4	1	5	1	3	4	1	2	21

```

CALCULATE(
    SUM('table_name'[Total Number]),
    FILTER (
        1. ALL('table_name'),
        2. 'table_name'[Interview Type]==“Registration“ &&
        3. 'table_name'[Progress by month] <= MAX('table_name'[Progress by month])
    )
)

```

Condition 2

	A	B	C	D	E	F	G	H	I	J	K	L
1	YEAR	MONTH	Interview Type	Clinic A	Clinic B	Clinic C	Clinic D	Clinic E	Clinic F	Clinic G	Clinic H	Total Number
2	2023	1	Registration	3	3	7	3	1	6	1	2	26
10	2023	2	Registration	5	2	10	1	0	4	1	1	24
18	2023	3	Registration	4	2	1	5	2	2	2	2	20
26	2023	4	Registration	5	3	6	2	0	2	0	1	19
34	2023	5	Registration	5	0	0	5	3	1	1	1	16
42	2023	6	Registration	1	4	10	2	4	0	1	1	23
50												

```

CALCULATE(
    SUM('table_name'[Total Number]),
    FILTER (
1.  ALL('table_name'),
2.  'table_name'[Interview Type]==“Registration“ &&
3.  'table_name'[Progress by month] <= MAX('table_name'[Progress by month])
    )
)

```

Condition 3

	A	B	C	D	E	F	G	H	I	J	K	L
1	YEAR▼	MONTH▼	Interview Type ▼	Clinic A ▼	Clinic B ▼	Clinic C ▼	Clinic D ▼	Clinic E ▼	Clinic F ▼	Clinic G ▼	Clinic H ▼	Total Number ▼
2	2023	1	Registration	3	3	7	3	1	6	1	2	26
10	2023	2	Registration	5	2	10	1	0	4	1	1	24
50												

All: (when filtering) removes any existing filters on the table
<=: less than or equal to the maximum progress by month

Your turn- Exercise

Please draw below two charts:

1. Number of patients completed survey each month
2. Cumulative number of patients completed survey over time
- (3. Please make it into a combo chart)

6. Power BI visual #3

KPI: Number of patients in each interview stage by clinics

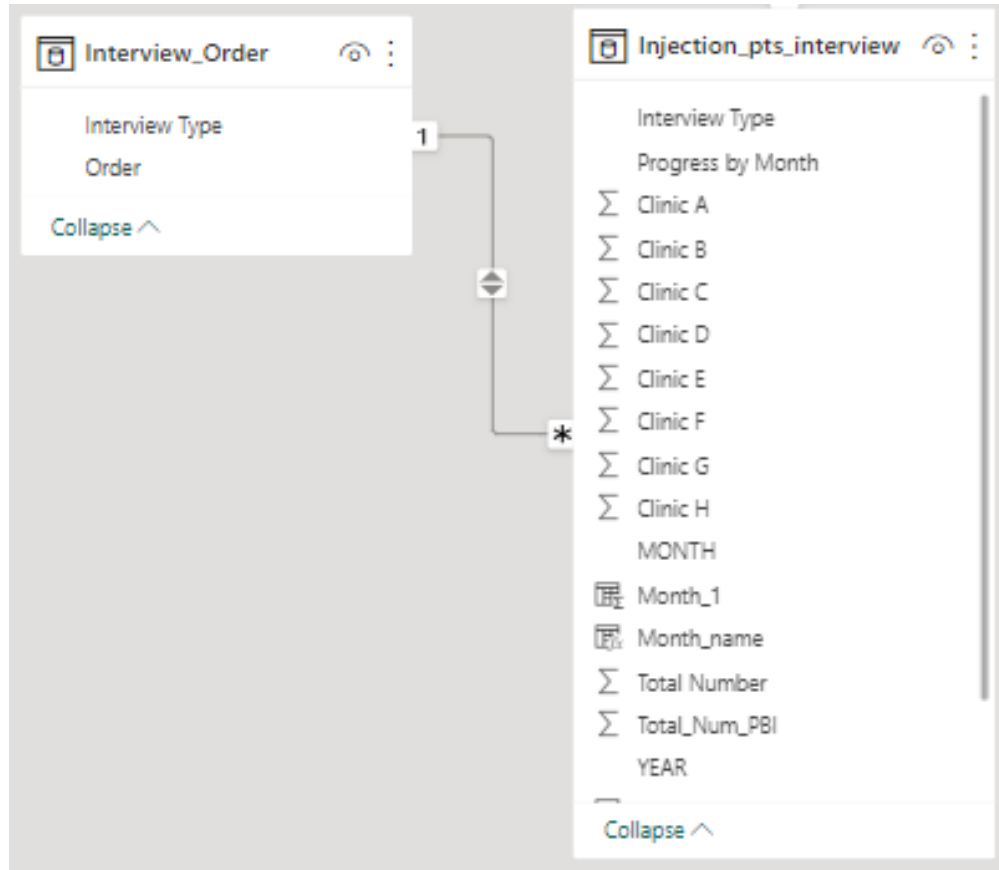
X-axis: Each interview progress stage

Registration->1st interview-> 2nd interview->3rd interview-> 4th interview -> 5th interview-> survey requests-> survey completed

Y-axis: Number of patients by clinics

Sum each clinic's patient number across all month

5. Data Model



Edit relationship

Select tables and columns that are related.

Injection_pts_interview

Interview Type	Clinic A	Clinic B	Clinic C	Clinic D	Clinic E	Clinic G	Clinic H	YEAR_1	Month_1
Registration	3	3	7	3	1	1	2	2023	
1st interview	2	3	8	5	1	0	2	2023	
2nd interview	2	4	8	1	3	2	1	2023	

Interview_Order

Interview Type	Order
Registration	1
1st interview	2
2nd interview	3

Cardinality

Many to one (*:1)

Cross filter direction

Both

☒ Make this relationship active

☐ Apply security filter in both directions

☐ Assume referential integrity

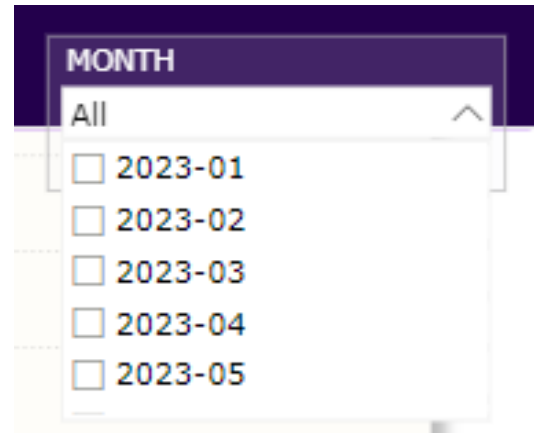
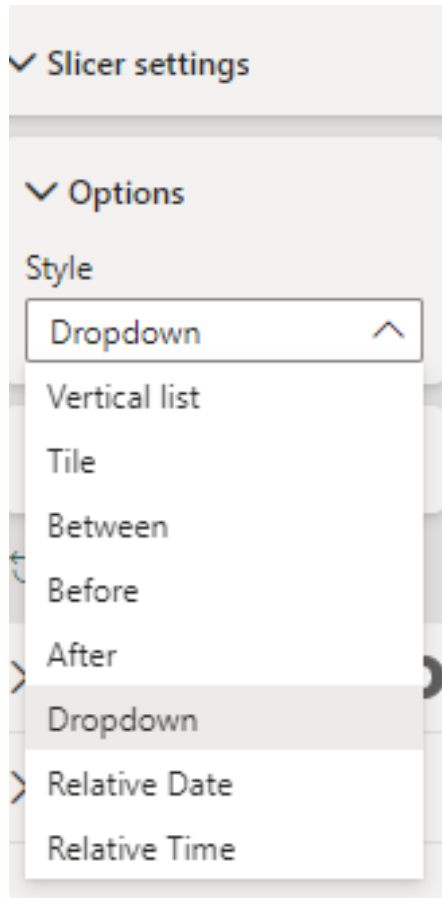
OK

Cancel

6. Power BI visual-slicers and buttons



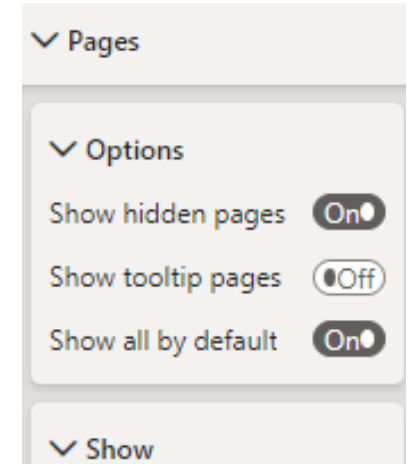
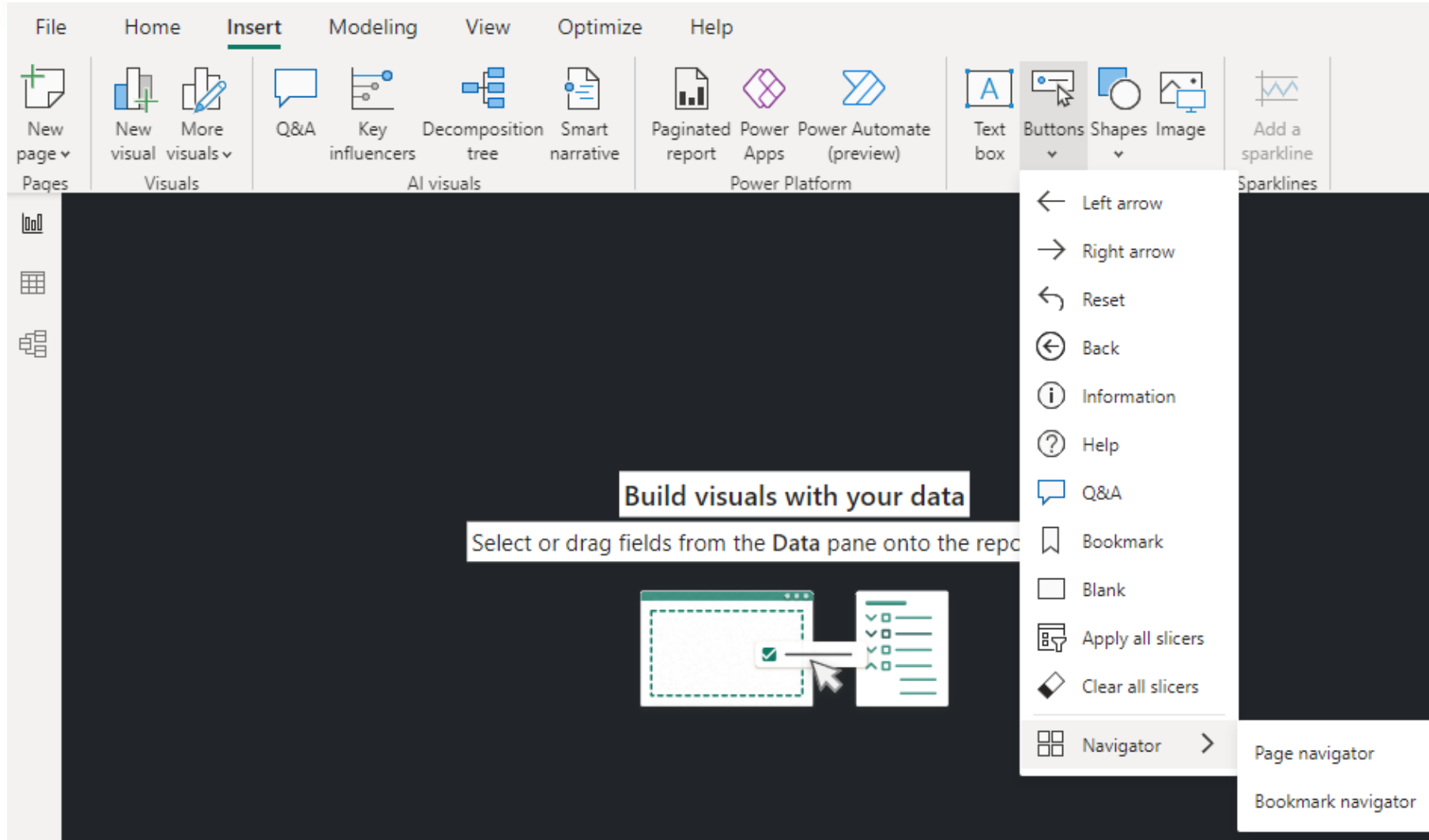
Click to filter tables based on your variable selected



Clear all slicers

Recommended link: [ICON Download](#)

7. Navigations and Bookmarks



8. Buttons, Selections, and Bookmarks

The screenshot shows the Power BI interface with the 'Data / Drill' tab selected on the ribbon. The 'Selection' pane is open, displaying a list of objects. The 'Info Button Open' object is selected, and a context menu is visible with the following options: Update, Rename, Delete, Group, Data (checked), Display, Current page, All visuals, and Selected visuals. The 'Bookmarks' pane is also visible, showing 'Add' and 'View' buttons.

Ribbon: Data / Drill

- Gridlines
- Snap to grid
- Lock objects
- Page options
- Filters
- Bookmarks
- Selection
- Performance analyzer
- Sync slicers

Selection Pane

- Layer order
- Tab order
- Add
- View
- Show
- Hide
- Info Button Open
- Info Button Close
- Button
- Card
- Month Slicer
- Button
- ss seperate v line
- Patient progress propo...
- Group 2
- Means of proportion b...
- Patient Type

Context Menu for 'Info Button Open'

- Update
- Rename
- Delete
- Group
- ✓ Data
- ✓ Display
- ✓ Current page
- ✓ All visuals
- Selected visuals

The screenshot shows the 'Button' task pane with the 'Action' dropdown menu open. The menu options are: Back, Bookmark, Drill through, Page navigation, Q&A, Web URL, Apply all slicers, and Clear all slicers.

Button Task Pane

- General
- ...
- ✓ Action
- Type
- Back
- Bookmark
- Drill through
- Page navigation
- Q&A
- Web URL
- Apply all slicers
- Clear all slicers

Simple DAX(Data Analysis Expressions) Functions

1. **DIVIDE**(<number>, <number>)
Ex. DIVIDE(88,100)
2. **ROUND** (<number>, 第幾幾位小數點)
Ex. ROUND(數值,2)
3. **SUM**('TABLE name' [Column Name])
4. **CALCULATE** (expression, <filter1>, <filter2>...)
Ex. CALCULATE(SUM(Sales[Sales Amount]), 'Product'[Color] = "Blue")
5. **IF**(<logical_test>, <if_true>[, <if_false>])
Ex. IF(A>0, "+", "-")
6. **CONCATENATE** (<text1>, <text2>)
Ex. CONCATENATE("±", Round(SUM(11.8/100]),2)
→ Joins two text strings into one text string
7. **& Function**
Ex. "+" & SUM(11/100) & "%"
→ Joins two text strings into one text string
8. **Emoji**

```
-- Using CONCATENATE function
Result = CONCATENATE("Hello", " ", "World")
-- Output: "Hello World"

-- Using & operator
Result = "Hello" & " " & "World"
-- Output: "Hello World"
```

DAX Functions Reference

The screenshot shows a web browser window with the URL learn.microsoft.com/en-us/dax/round-function-dax. The browser's address bar and tabs are visible at the top. Below the browser, the Microsoft Learn navigation bar is shown, with 'Documentation' selected. The main navigation menu includes 'DAX', 'Overview', 'Functions', 'Queries', 'Statements', and 'Operators'. A left-hand sidebar contains a search box labeled 'Filter by title' and a list of DAX function categories. The 'Math and trig functions' category is expanded, showing a list of functions including 'Math and trig functions overview', 'ABS', and 'ACOS'. The main content area displays the title 'ROUND' in large bold letters, followed by the text 'Article • 06/21/2022 • 2 contributors'. Below this, a section titled 'In this article' lists links for 'Syntax', 'Return value', 'Remarks', and 'Example 1', with a 'Show 2 more' link. At the bottom of the main content area, the first sentence of the article is visible: 'Rounds a number to the specified number of digits.'

← → ↻ 🏠 🔒 learn.microsoft.com/en-us/dax/round-function-dax

📁 應用程式 📁 Sanofi 🗣️ Google 翻譯 📧 收件匣 (603) - hxa... 🗄️ 我的雲端硬碟 - Go... 🗣️ WITS Meeting Ro... 📁 UIUX 🗣️ HRMS »

Microsoft | **Learn** Documentation Training Certifications Q&A Code Samples Assessments More ▾ Search 🔍

DAX Overview Functions Queries Statements Operators

🔍 Filter by title

▼ DAX functions

- DAX function reference
- New DAX functions
- > Aggregation functions
- > Date and time functions
- > Filter functions
- > Financial functions
- > Information functions
- > Logical functions
- ▼ Math and trig functions
 - Math and trig functions overview
 - ABS
 - ACOS

Learn / Data Analysis Expressions (DAX) /

ROUND

Article • 06/21/2022 • 2 contributors

In this article

- Syntax
- Return value
- Remarks
- Example 1
- Show 2 more

Rounds a number to the specified number of digits.

<https://learn.microsoft.com/en-us/dax/dax-function-reference>

Metrics (KPIs)

KPI: Tracker APP- Patient Engagement Analysis (Monthly)

1. Monthly active user (MAU) rate
2. Differences in MAU compare to last month
3. The proportion of each user types monthly

User Types: active user, non-active user, potential user, completed user

Engagement Data and Data Model

Patient Type Table

	A	B	C	D
1	Patient Type ▼	type ▼	legend order ▼	type_parent ▼
2	Active pts (MAU)	1	4	In program pts
3	Non-active pts	2	5	In program pts
4	Potential pts	3	1	Potential pts
5	Completed pts	4	2	Completed pts
6	In program pts	5	3	
7				
8				
9				
10				
11				
12				
13				
14				
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19				
20				
21				
22				

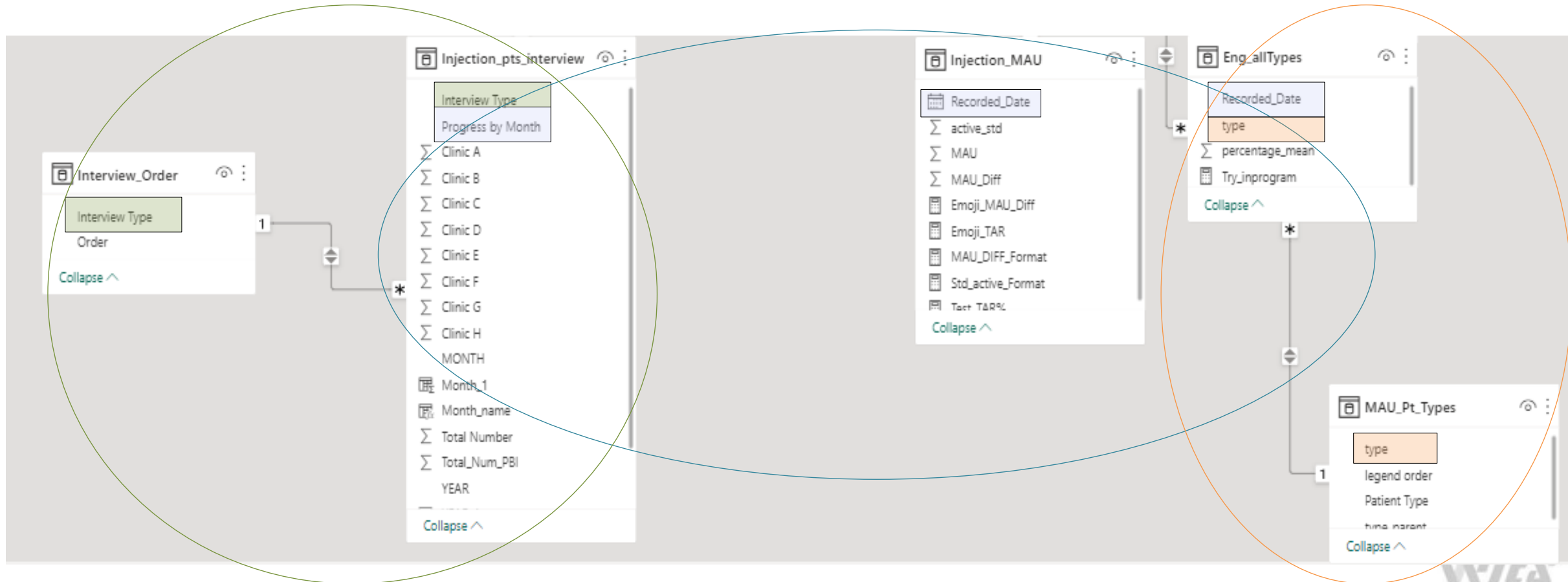
Active Engagement User Rate

[illegible]

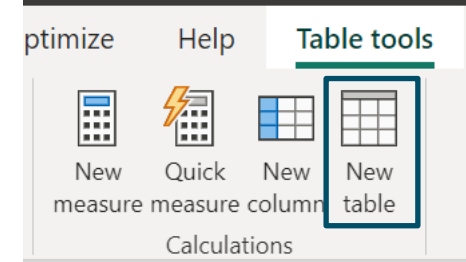
All User Types Engagement Rate

Recorded Date	type	percentage	mean
2023/1/1	1	0.243909	
2023/2/1	1	0.373397	
2023/3/1	1	0.352972	
2023/4/1	1	0.507393	
2023/5/1	1	0.585072	
2023/6/1	1	0.525058	
2023/1/1	2	0.21522	
2023/2/1	2	0.22111	
2023/3/1	2	0.31264	
2023/4/1	2	0.20132	
2023/5/1	2	0.1343	
2023/6/1	2	0.26539	
2023/1/1	3	0.43404	
2023/2/1	3	0.225723	
2023/3/1	3	0.152715	
2023/4/1	3	0.103861	
2023/5/1	3	0.022018	
2023/6/1	3	0.013404	
2023/1/1	4	0.106831	
2023/2/1	4	0.17977	
2023/3/1	4	0.181673	
MAU Pt Types	Injection MAU	Eng allTypes	(+)

Data Model



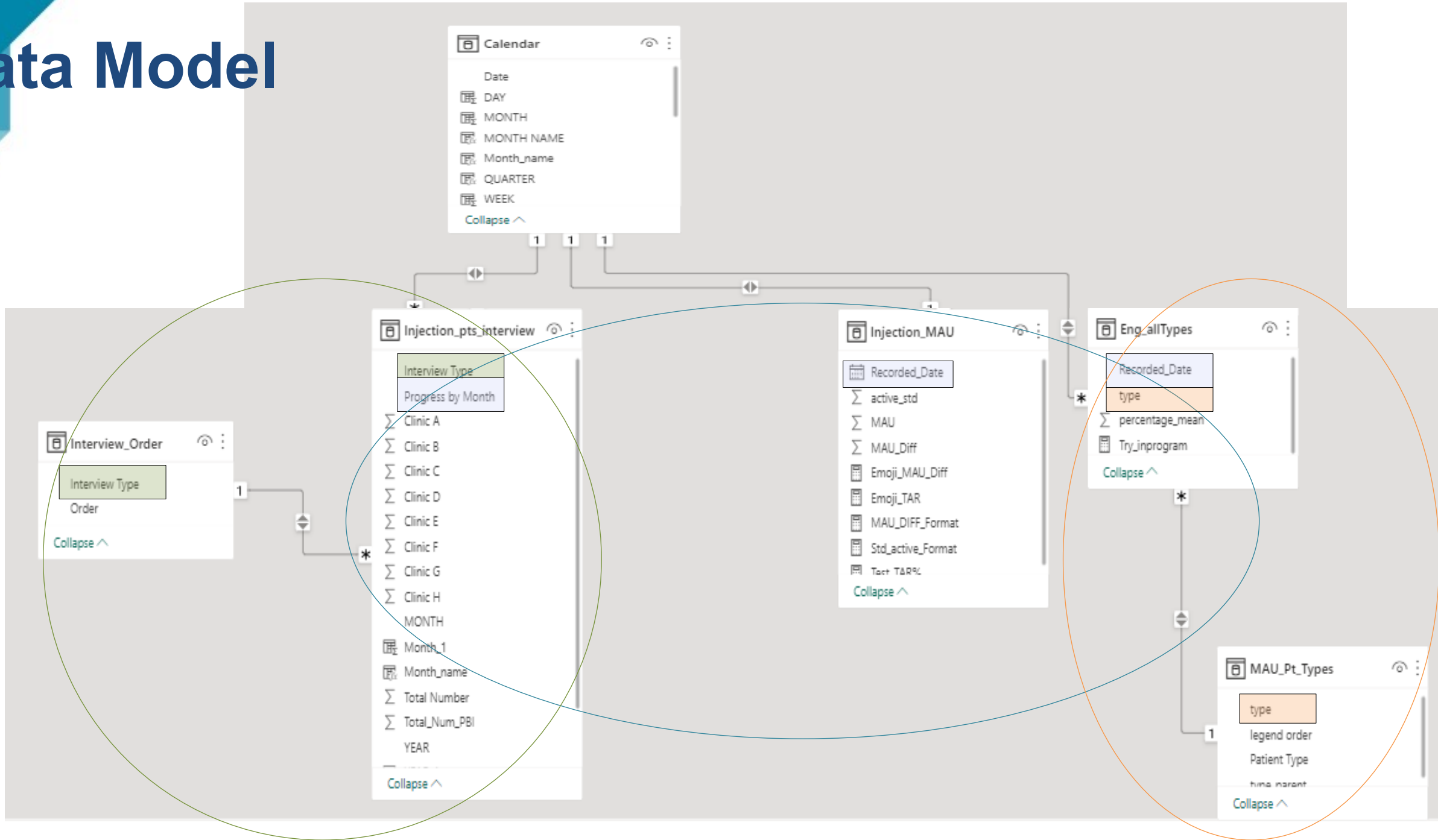
Data Model



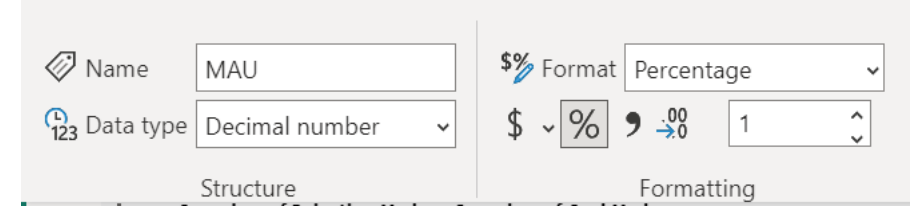
- Create a calendar table in PBI to connect all date data for date slicers

```
Calendar =  
CALENDAR(DATE(2023,1,1),DATE(2023,12,31))
```

Data Model



Power BI visual #4, #5



KPI: Monthly active user (MAU) rate

1. Visual Type: Card

Field: MAU of each month

`SUM ('table_name'[MAU])`

2. Visual Type: Card

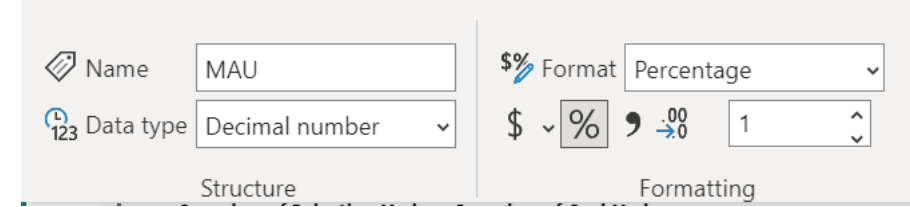
Field: Standard Deviation of MAU

Try 1: `SUM(Injection_MAU[active_std])`

Try 2: `"(± " & SUM(Injection_MAU[active_std]) &")"`

Try 3: `"(± " & Round(SUM(Injection_MAU[active_std]),2) &")"`

Power BI visual #6



KPI: Differences in MAU compare to last month

1. Visual Type: Card

Field: Monthly MAU differences

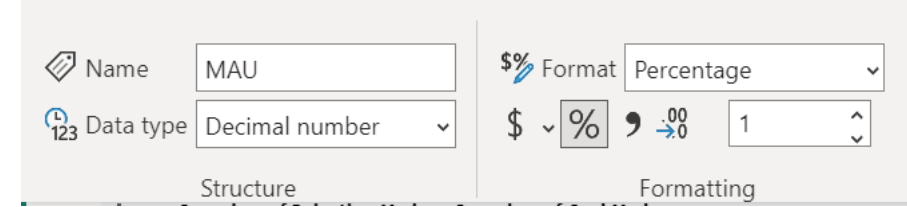
Try 1: `Var mau_diff= SUM ('table_name'[MAU_Diff])`

Try 2: `Var mau_diff= ROUND(SUM ('table_name'[MAU_Diff]),2)`

`RETURN`

`IF(mau_diff>0, "+" & mau_diff & "%",
mau_diff & "%")`

Power BI visual #6-1



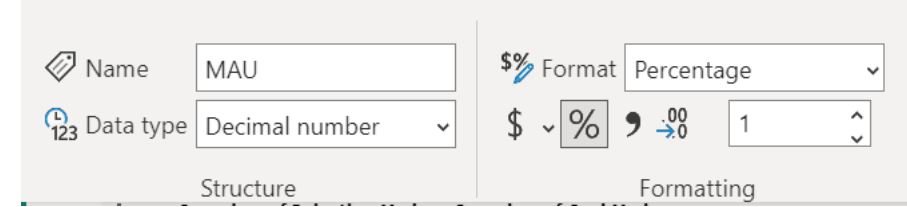
KPI: Differences in MAU compare to last month

2. Visual Type: Card

Field: Emoji for Monthly MAU differences

```
Var mau_diff= ROUND(SUM ('table_name'[MAU_Diff]),2)
RETURN
IF(
    mau_diff>0, "😊",
    IF (mau_diff<0, UNICHAR(128577), UNICHAR(128528))
)
```

Power BI visual #6-1



KPI: The proportion of each user types monthly

(User Types: active user, non-active user, potential user, completed user)

1. Visual Type2 :Pie

(Proportion of active, and non-active user)

Legend: Patient/ User Types

Value: percentage of active and non-active user

2. Visual Type: Pie

(Proportion of in-program user, potential user and completed user)

Legend: Patient/User **Type Parent**

Value: percentage of in-program, potential and completed user



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TOGETHER, WE ARE PRIMED TO MAKE THE WORLD
BETTER WITH OUR CLIENTS.