*Notes from PowerBI learning cource*

Question 🡪 manager wants to see reports on a daily basis, essentially creating automation in powerbi of a long process

Create this report page by the end. People can look at the data on a daily basis and interact with it.

A screenshot of a computer

Description automatically generated

Star schema allows us to interact with the data. Middle box is the measured data, and the boxes around are the ways we describe the data. E.g. total sales **by** region/order date/product

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First import your data, I have imported the American sales data. Pressed get data > text/csv, then selected it. Press TRANSFORM to wrangle and clean data.

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Initially came with four empty rows, press reduce rows and remove empty rows.

Then press transform, use first row as headers



It tries to work out the data types, change accordingly, and also change column names accordingly

I want to remove data before 2020, press order date and filter by date.

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I see a column with 1s and 0s which I want to be yes and no, right click header and press replace values

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And replace 1 with yes etc.

But what if I want to do this in one go? Like with the MS (marital status) column that abbreviates Married with M and single with S. Go to add column tab and make a new conditional tab, press conditional tab,

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Removing columns you don’t need as people often put everything into a model “just in case”, but not often the best way to build a model

Delete MS column

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We have username columns, we cant to make columns that make email addresses using the usernames.

Select username column (just press it) > Add column tab > column from examples (on the left side) > from selection

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In the replace text column type what you want. [Jon24@gmail.com](mailto:Jon24@gmail.com), do the same for the second, then powerBI has enough information to work out the rest.

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How do we split the second column from country to area of US

Select column > split column > be delimiter

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PQ realised the delimiter is custom, the pipe symbol (| - this one) but it could be a comma, equals etc.

Hit ok

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If you look closer, there is a space before each country name because there was a space originally

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We need to trim the white space

Select both > press transform tab > format > trim

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If I want to remove columns I can use another method, telling it what to keep.

Select the columns you want > remove columns > remove **other** columns

This is a good method as you remove columns as a function, its automated. Say someone adds another column to the data that you don’t want in it, this method automatically removes it but if you used the other method of deleting the ones you don’t want it wont delete the column that was added in later.

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Want to remove rows with the subcategory = “internal parts”

Press arrow next to column name > text filters > does not equal

You can write internal parts and then INTERNAL PARTS, but how can you do this all in one go?

Standardise the text so its all in first letter uppercase, rest lower case

Select column > transform tab > format > capitalise each word

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We want to build a hierarchy that goes from product category to product subcategory to individual products. We have sub category and product in one sheet, but category in another sheet called product rollup. **Essentially how do you merge two queries?**

Select the main table you want > Home > combine > merge queries > merge queries

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Select product rollup in the second table, and select the product category columns in both tables. Should say 400 rows match

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You get a new column with tables in them, press the table expanders and select the rows you want, i.e. product category

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Say you have a group of **files** withexcel sheets in them **of the same format** and you want to merge them all into one query.

New source > more… > folder > find the folder (with other country sales)

A table of numbers and numbers

Description automatically generated with medium confidence

These are all the files you want to combine

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Description automatically generated

This is how it combines them. Select the sample file, the file it looks at and uses as a template while combining, all other files should look like this with same column names etc. select the table.

Skip files with errors is important, if it skips that data won’t go in the model, hence if you get an error, you can fix it to make it work.

Say if a few months into the future a new country file needs to go into the model, simply drop it into the original other countries file, and it will go straight into the model

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We need to combine other countries with united states to do global sales analysis

Other countries table > append queries > append queries as new

Select other countries and united states sales

However, the combined query has the column sales. US query has sales, other countries don’t. its null for other counties, but US has values.

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Want to make a column for total sale price. Quantity \* price

Select quantity and price columns > add column on top ribbon > standard > multiply

*POWER BI desktop*

This is about forming the relationships between the measured values (sales) and the predictors (country, product, and region)

Press model view > manage relationships

Just add relationships between sales and all the predictor values, using the primary key to anchor the relationship, making sure they are many to one relationships and have one way cross filter relationships

Sales and product will create a many to many relationship, which isn’t really what we want. It can be done but is more for advanced users, its many to many because one product related to many sales, but one sale relates to many products, which is wrong due to the fact that there are duplicates in the product table i.e. the same product and the same sale id

Go to transform data > product > remove rows > remove duplicates

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We can give more information in the model about our data. Press table view in the desktop, choose customer > country > column tools > data category country

Do a similar thing with all the sales values, press the column you want, the little arrow next to the dollar sign to choose the default currency, comma to add a comma every three zeros

Numeric rows are often summed shown with the omega sign in the model



We don’t really want to sum the values, press the column > summarisation > don’t summarise

A close up of a logo

Description automatically generated

But it makes sense for other columns like line total sales, it’s the total sales…

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Creating data groups

In our sales territory table, we have countries and regions in those countries, could we roll the countries into continents?

We don’t actually have continent data, but we can group them up

Table view > sales territory table > sales territory country > column tools > data groups > new data group

We want Canada and the US in north America, press Canada > group > rename the group to North America > press the group header and press the US and then add group

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Should look like this

You can use shift/control to all multiple countries at the same time

Change the name of the group accordingly, we will change it to sale territory continent

Check the box that says include other group. If we added another country to the data, it would have no group to go into if there was no other group.

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Create a **hierarchy** for products. i.e. bike > mountain bike > name > etc.

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Select the properties table with the properties and data panes open

Right click product category > create hierarchy

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Optimising relationships

The connection between tables is usually a number, i.e. the sales ID, the product ID, sales-territory is based on a text based column, the region column.

Sales has the region key, so does the region table, but the region table has the region ID. So combine the two queries. After doing this, the sales table will have the region ID, then change the relationship.

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Hiding columns in the model

In the final model, you want people to control the data using the factors like region, product, customer, etc. They will see global sales in relationship to these things, but they don’t need to see other data in the sales table like the key IDs.

So its good practice to hide those.

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It shows up on the table

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Apply the hierarchy as required.

Hide stuff that isn’t necessary or gets repeated. So category, subcategory, and name are also present outside the hierarchy, so just remove them for clarity sake.

*DAX*

Data analysis expression 🡪 using formulas to make more complicated data, not just aggregating means/medians etc.

e.g. make a full name from a first and last name. calculate gross margin. Year over year changes.

*How to make full name? DAX syntax*

**Full Name = Customer[FirstName] & “ ” & Customer[Lastname]**

Full Name is the name of the new column that is made that contains the new information

Customer[FirstName] is FirstName column from the Customer table

& symbols are concatenating strings, firstname + a space + lastname

Table view > select your table on the right side (Customer Table) > right click > new column > type code into the box on top

It can also make measures, e.g. the total money made, all the sales added up to one number. This number can then be used in the reporting which you can filter by our measures, like year or location etc.

Right click table > make measure

**Total Sales = SUM(Sales[Line Total Sales])**

It doesn’t make a column because its just a number that it created, a calculation that you can display in the graphs section.

Report view > customer table > total sales (small calculator symbol) > drag onto the report

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Description automatically generated

Drag anther factor in like order date and you can see it gives you a graph

A screenshot of a computer

Description automatically generated

You see it has four decimal places, we need to format the measure.

Press the measure > measure tools



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Set to two decimal places

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The filter pane is a little self explanatory, filters on the whole report all the pages you’ve made, filters on a single page, and filters on a single visual

Drag the year box from order sales > order date > date hierarchy > year into the filter on all pages.

Press basic filtering type then select what you want

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Logical expressions using DAX

Add new column

**Primary Buyer =  AND(Customer[Number Cars Owned] = 0, Customer[Home Owner] = "No")**

If we write AND and hover over it to see the syntax 🡪 AND (x, y). It gives true if both conditions are met, false if not.

Can use the OR function too

Remember, you are making a new column not a measure!

**Secondary Buyer = OR(Customer[Number Cars Owned] = 0, Customer[Home Owner] = "No")**

Can also use In operator

We want to categorise the colours in the product table

Table > new column

**Color Category = IF('Product'[Color] IN {"Black", "Blue", "Red"}, "Darker", "Lighter")**

This one is a little different, but if the product colour is either black, blue, or red, it’s darker, else it is lighter.

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How can we use measures and DAX to get total margin percentage, essentially the difference between the amount made in the sale and the cost of the product as a percentage of the total sale amount.

Lots of steps, break it down using columns and measures

**Line Product Cost = Sales[Order Quantity] \* RELATED('Product'[Standard Cost])**

**Line Margin = Sales[Line Total Sales]-Sales[Line Product Cost]**

**Line Margin % = DIVIDE(Sales[Line Margin],Sales[Line Total Sales], 0)**

The zero is what will show up if there is an error

A screenshot of a computer screen

Description automatically generated

Total sales is all the money made, line product is money from the product alone, margin is the difference between the product and the total sale, percentage is the percentage of the margin from the total.

Theres a problem, see the totals row at the bottom, 10 million is not 53 percent of 26 million

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We can use measures to fix this, just manually calculate the total margin, and then the percentage margin

New measure > **total margin = SUM(Sales[Line Margin]) >**

New measure > **Total Margin % = DIVIDE([Total Margin],[Total Sales],0)**

A screenshot of a graph

Description automatically generated

Now its fixed

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Another way we can move away from this method of using columns to build on more columns is with our total sales column

We made it in power query with the line total sales

Instead we can make a measure > **Total Sales SUMX = SUMX(Sales, (Sales[Unit Price] \* Sales[Order Quantity]))**

A screenshot of a graph

Description automatically generated

Same numbers

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Using the Filter function

What if we want to count stuff up, use the COUNTROWS function

If we want to count the number of line items, literally everything

New measure > **Count of Sales Orders Line Items = COUNTROWS(Sales)**

Individual sales is different, we want the number of unique SalesIDs/orders

**Count of Sales Orders = DISTINCTCOUNT(Sales[Sales Order Number])**

**A screenshot of a number

Description automatically generated**

I want to get the number of sales where the line total sales was greater than 50£

**Count of Sales Orders Line Items GT 50 = COUNTROWS(FILTER(Sales, Sales[Line Total Sales] > 50))**

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Using the ALL function

ALL function overrides the filter context for those particular expressions, useful for ratio calculations

**Count of ALL Sales Orders Line Items = COUNTROWS(ALL(Sales))**

This is counting all the rows despite the filter

A screenshot of a computer screen

Description automatically generated

59,000 despite the filter of year, it shows the total

**Pct Sales Orders Line Items All Time = DIVIDE([Count of Sales Orders Line Items],[Count of ALL Sales Orders Line Items],0)**

This is the count of the sales orders line items, so all the sales as a percentage of everything in the three years.

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We want to create a date table to make use of time intelligence functions in DAX

If users want to filter the data in the dashboard by date, this is how to do it

Table view > table tools > new table

**Order Date = CALENDAR(Min(Sales[Order Date]), Max(Sales[Order Date]))**

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Description automatically generated**

Makes a table with all the dates, starting from the oldest date to the newest date, with columns for year, month and day

Column tools > data type > date instead of date/time

New column > **Order Date Year = Format(“Order Date”[Order Date], “YYYY”)**

**Order Date Month= Format(“Order Date”[Order Date], “MMM”)**

**Order Date Month Number = Format(“Order Date”[Order Date], “MM”)**

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Disable auto date time setting

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Description automatically generated

Date hierarchies are automatically set up, powerbi does this for every date type in the model, but its quite unhelpful

File > options & settings > options > under CURRENT FILE, Data Load > uncheck Auto date/time

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The table we’ve made, we need to designate it as the date table

Order date table > table tools > mark as date table > switch on Mark as date table > select the date column, which is order date

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Building the relationship between sales and order date table

Model view > drag order date from order date table on top of order date in the sales table

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Basic time intelligence function

A screenshot of a data

Description automatically generated

Because of our time table, it has done this…

Remove order date from the columns and use order date year from the new table

We’re going to use the TYD dax function to make year to date data

Sales table > new measure > **YTD Sales = TOTALYTD([Total Sales], “Order Date”[Order Date])**

**A screenshot of a graph

Description automatically generated**

YTD sales is the cumulative sales for the year, shows the total sales for each year

Drag order date month onto table, but its ordered wrong

A calendar with months and dates

Description automatically generated with medium confidence

Remember we also made the number for the month that goes up from 1 to 12, so we can order these with those numbers

Table view > order date table > order date month > sort by column on the top ribbon > order date month number

A table with numbers and a few months

Description automatically generated

Now fixed

Shows money made each month, then cumulates this

How do we do quarterly sales

Sales table > new measure > **QTD Sales = TOTALQTD([Total Sales], “Order Date”[Order Date])**

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Using Calculate function

We can make a column that shows sales for the year before. So if you had sales April 2024, the next column will shows sales April 2023

New measure > **PY Total Sales = CALCULATE([Total Sales], SAMEPERIODLASTYEAR(“Order Date”[Order Date]))**

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Right click table > Quick measures 🡪 has measures that you can choose from essentially making it easier

For example choose year over year change

A screenshot of a calculator

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Makes this code for total sales yoy%

While this is good, we can make it better by formatting it. Go to the website DAX formatter

Paste code in and copy it

A screenshot of a computer program

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A screenshot of a computer screen

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It takes the sales from that point last year and creates a percentage of it

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Creating clustered column chart

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Description automatically generated

Continent x axis, total sales y axis

Configure the graph as needed, removing the axis names, data labels, one decimal place, y max as 15 million

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A screenshot of a computer

Description automatically generated

Don’t select the graph we made before, then press this button

A screenshot of a graph

Description automatically generated

It should look like this, the hierarchy we chose of the product subcategory allows use to drill down into the individual names

If we hover over the bar we can see more detail on the bar, called a tool tip, we can edit this to add more information

Add data to visual tab > drag order quantity to tool tip box

We can drill down by right clicking the bar and pressing drill down

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Line chart

X axis date year, y axis total sales

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Make KPI visual

We’re going to make a target value as a measure

So sales > new measure > **Target = 7000000**

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Description automatically generated

Value total sales, trend axis order date year, target as the target measure we just made

Formatting 🡪 callout value, display units millions. Trend axis 🡪 turn it off. Target label 🡪 turn of distance to goal

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Create card visual

A screenshot of a computer

Description automatically generated

Drag target value onto it

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Slicer

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Add continent onto the field box

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Add a background to our dashboard

A screenshot of a graph

Description automatically generated

Press canvas > format page > canvas background

Choose the background, fit to page, and transparency to 0%

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Apply a theme file

View > choose a colour scheme

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adjust existing visuals

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Custom tooltip

Create a new page for visuals and call it sales region

Format page > page information > allow use as tooltip

Page view > actual size

Pie chart > country + total sales

Format as you need, like removing legend, data labels etc.

Then go to the original page, press the clustered bar chart > format view > general > tool tips > type should be report page, page should not be auto, select sales region

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Exploring drill through, we want to drill through from a graph to the product sales details table

A screenshot of a graph

Description automatically generated

Look at the product page, then select the product subcategory box on the product hierarchy

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Uncheck category

Click the table and look at the visualisations pane, there should be drill through settings at the bottom

Drag product category into the drill through field

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Description automatically generated

Go back to overview page, clear the slicers, right click highest bar on the category barchart > drill through to product sales details

We want people to only access the product sales details table via drilling through, so right click the product sales details table and hide page

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Apply conditional formatting to the product sales details table

Remember the yoy% we made where it showed the sales made the year before, and then a percentage was made that showed if the sales increased or decreased

Can we make this more visual, have an icon to represent increase in percentage, red for decrease, yellow for not.

Go to the product sales details table > format > visual > cell elements > series is yoy% > enable icons

Press the icon image to get details

A screenshot of a computer

Description automatically generated

He did this formatting, with percent and **number**

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Building order date hierarchies

In the year graph we made, we cant to drill down to months and days

Essentially, we need to turn our dates table into a hierarchy

Go to the model view > click order date table > right click year > create hierarchy > properties pane > select a column to add level > add month > then add order date > apply changes

Hide the other columns

Go to the visual, remove the old order date and replace it with the whole date hierarchy

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On the visuals page we have slicers, we choose the filter, and it applies. But not perfectly, if we change year to 2021 only, all the graphs are fine accept the year graph which has a single dot.

How do we have a filter that doesn’t affect all the visuals.

Press the slicer > format > edit interactions > little sign on top of the time graph

When you press bars on the bar chart, it also filters by that thing you pressed. i.e. you press north America it shows the categories sales with a highlighted part of the bar representing American sales.

What if you don’t want this highlighted part, but just show American sales only. Press the regions visual, then press the little icon on the categories visual

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Selection pane

View > selection

For those who need to press the tab button to navigate around the visual need to be considered

If tab through our work, it has an illogical order

We can set the order of visuals so top left is first, and bottom right is last

Make sure to press the tab order, not layer order

In the selection pane you can also hide visuals too, we will see how this can be used in conjunction with bookmarks in the next episode

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Bookmarks allow you to essentially make a powerpoint presentation in powerbi, you save individual slides, a snapshot of you dashboard at particular points and flick through thoses bookmarks likes slides, but you can also drill down and up on those visuals

View > bookmarks

We cant a default bookmark, dashboard with no filters on, then north America 2021, then north America 2022

Don’t press filters > add bookmark

Then change on the slicers, continent and year. Also remember the sales performance line graph with the year on it

If you make a mistake, like forgot to change a visual, make the change so the bookmark is how you actually want it, right click the bookmark and press update

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Now we just publish the pbix file to powerbi online to actually get the dashboard

I can’t actually upload due to my kings account, but if, in the future, you have a paid account, you can upload it

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A diagram of a workflow

Description automatically generated

We want to build another report using the dataset called sales map, to put in the dashboard. We can also link an entirely different dataset and report (orange) to our dashboard

The sales map is sales mapped onto a global map

My workspace (where you ideally saved your work) > press the sales dataset > create a report > from scratch

A screenshot of a computer

Description automatically generated

Youre essentially put back into the powerbi desktop

Choose map

A screenshot of a computer

Description automatically generated

Put sales territory country into the location part of the visual

Product category into legend

Total margin percentage into bubble size

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Build a dashboard

My workspace > new > new dashboard

Go back to the sales map > top right, pin visual > existing dashboard

Total sales > pin the total sales KPI > sales by year and continent

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Configure the dashboard

Should sort of look like this

A screenshot of a graph

Description automatically generated

Change names and subtitles of visuals

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Set an alert

We set alerts to go off when data on our dashboard goes above or below a limit we set (but only on gauge visualisation, kpi visual, or card visualisation). Alerts only work on data that is refreshed

Right click the visual, like the KPI, on the dashboard > manage alerts > add alert rule

A screenshot of a computer screen

Description automatically generated

You can link this work power automate

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Using the Q&A dialogue box

You can ask English like questions to it about the data, this is helpful if you’ve got good naming conventions

A screenshot of a computer

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Top left of the dashboard

Say you write **total** **sales** by **product name**

It knows total sales, and knows product name, it will produce a visual just for this

A screenshot of a computer

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A pie chart with many colors

Description automatically generated

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Implementing security access

Say you want people to access only a certain continent of data

Go to the report view > modelling > manage roles

New role > select sales territory > filter data, new > sales continent equal Canada, and do another one for united states

Can do another for Australia

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Now you need to **validate** those rules

Modelling view > view as

Now you can choose an account you want to view as and you will only see that data for that controller

Now you need to republish the model so it has these accounts on it

De select all the filters accounts you’ve got on, then republish

Home > publish > my workspace

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Replace

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Assign and validate roles in powerbi service

We want to assign people to the roles

My workspace > sales dataset > elipses > security

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A screenshot of a computer

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Add person