

# INTRODUCTION TO MICROSOFT POWER BI

DATA ANALYTICS TRAINING AT ESDC



# DATA ACTION LAB



**Enseignement univ.:** 50+ cours; **ateliers:** 40+; **projets:** 60+; **expérience combinée:** 35+ années.  
Co-entreprise pré-qualifiée à la liste des fournisseurs I.A. du GdC – EN578-180001/A (1<sup>ière</sup> bande).

**Combined experience:** 50+ university courses, 40+ corporate workshops, 60+ projects, 35+ years.  
Joint venture qualified for GoC A.I. Source List – EN578-180001/A (Band 1).

[data-action-lab.com](http://data-action-lab.com)

## WHAT WE DO



Training and long courses



Workshops and short courses



Knowledgebase curation



Data labs

# EXPERTISE

- Business intelligence
- Data visualization design
- Data analytics and data science
- Data engineering
- Advanced statistics and machine learning
- Artificial and augmented intelligence
- Process and systems modeling
- Software implementation and integration



# VISION



Provide a space for **data consumers, producers, practitioners, scientists and champions** to make a place for themselves in the digital world.



Provide paths for **education and enrichment** for all these groups.



Keep pace with **developments** in the digital arena and keep Data Action Lab participants moving and aligned with these relevant developments.



Provide **just-in-time learning opportunities** for Data Action Lab members, focusing on their specific challenges and skillsets.

---

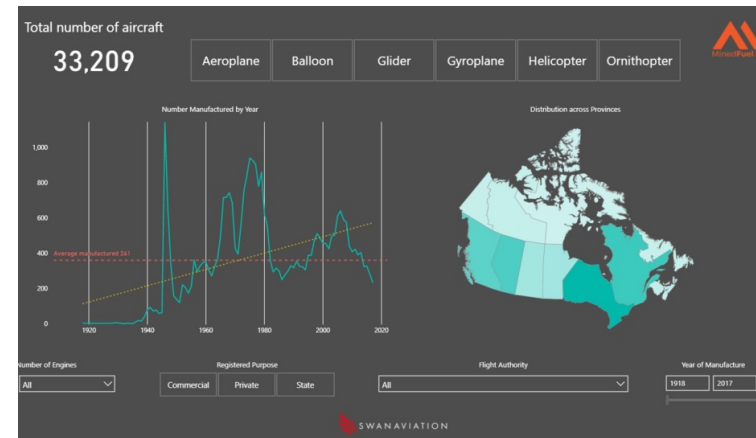
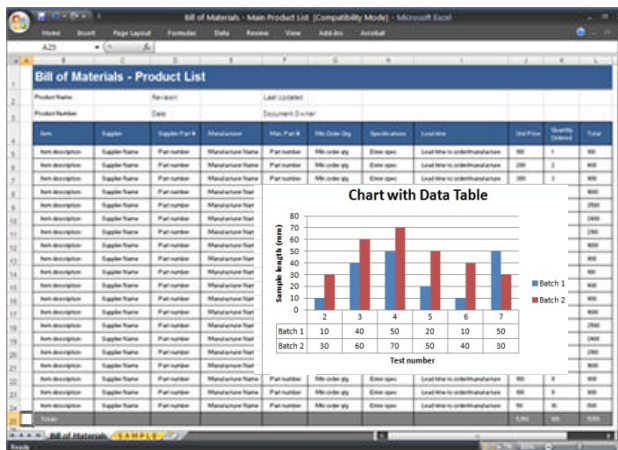
# OVERVIEW

- 
- Things are changing
  - Architecture
  - Before we start
  - Power BI – lay of the land
  - Importing and manipulating data
  - What is M?
  - What is DAX?
  - Columns v Measures
  - Power BI demo
  - Publishing to the web
  - Wrap up

# THINGS ARE CHANGING

## Past - Data driven

- Mostly Excel or reporting tools like Cognos
- Mostly numbers, tables and non-interactive graphs
- Distributed on desktop computers, emails and PowerPoint
- Static and mostly backwards looking (lagging indicators)
- Attempts at KPIs and Dashboards but tend to be contrived

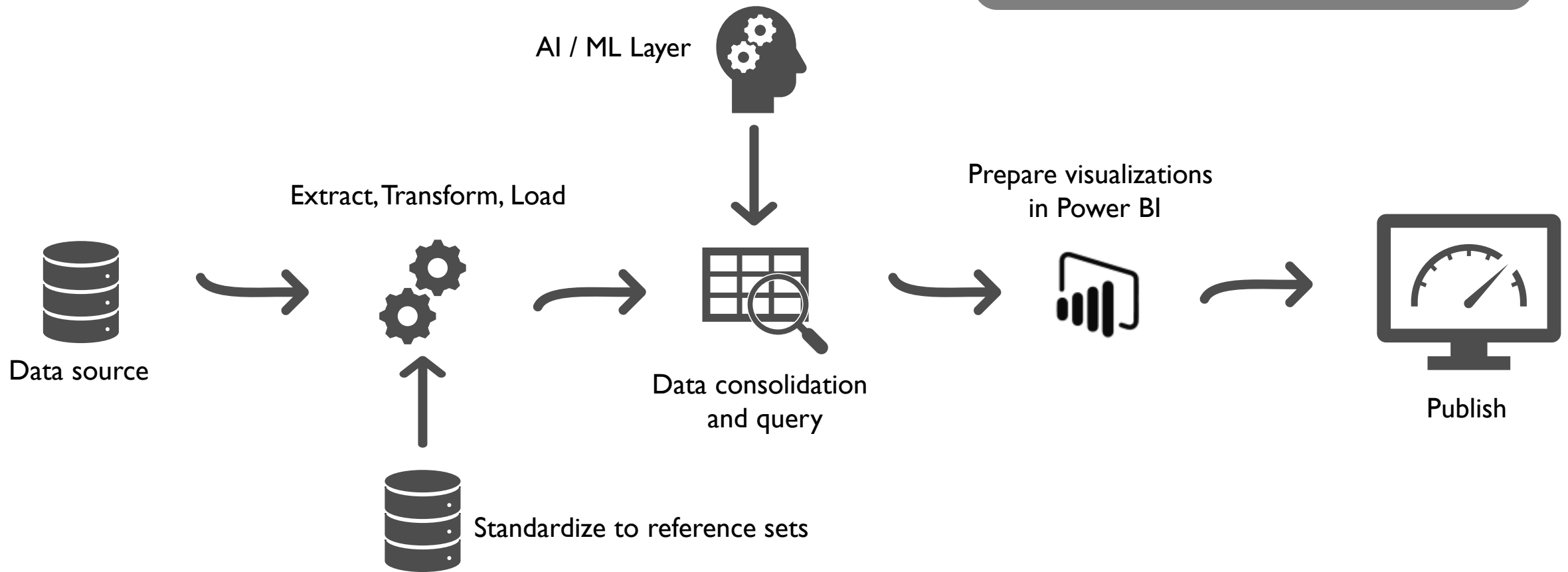


## Future – Story Driven

- New tools: Power BI
- Mostly visualizations, occasional numbers and tables
- Distributed on the web (internal and external)
- Dynamic and both backwards and forwards looking
- Data for everyone

# ARCHITECTURE

VISUALIZATIONS ARE ONLY 10%





random'missing' values	outliers	values'outside'of expected'range'4 numeric	factors' incorrectly/consiste ntly'coded	date/time'values'in' multiple'formats
impossible'numeric' values	leading'or'trailing' white'space	badly'formatted' date/time'values	non4random'missing' values	logical' inconsistencies' across'fields
characters'in' numeric'field	values'outside'of expected'range'4 date/time	DCB!	inconsistent'or'no' distinction'between' null,'0,'not'available,' not' applicable,missing	possible'factors' missing
multiple'symbols' used'for'missing' values	???	fields'incorrectly' separated'in'row	blank'fields	logical'inconsistencies' with'in'field
entire'blank'rows	character'encoding' issues	duplicate'value'in' unique'field	non4factor'values'in' factor	numeric'values'in' character'field

BEFORE WE  
START LET'S  
PLAY BINGO!!!!

Untitled - Power BI Desktop

Home View Modeling Help

Cut Copy Paste Format Painter

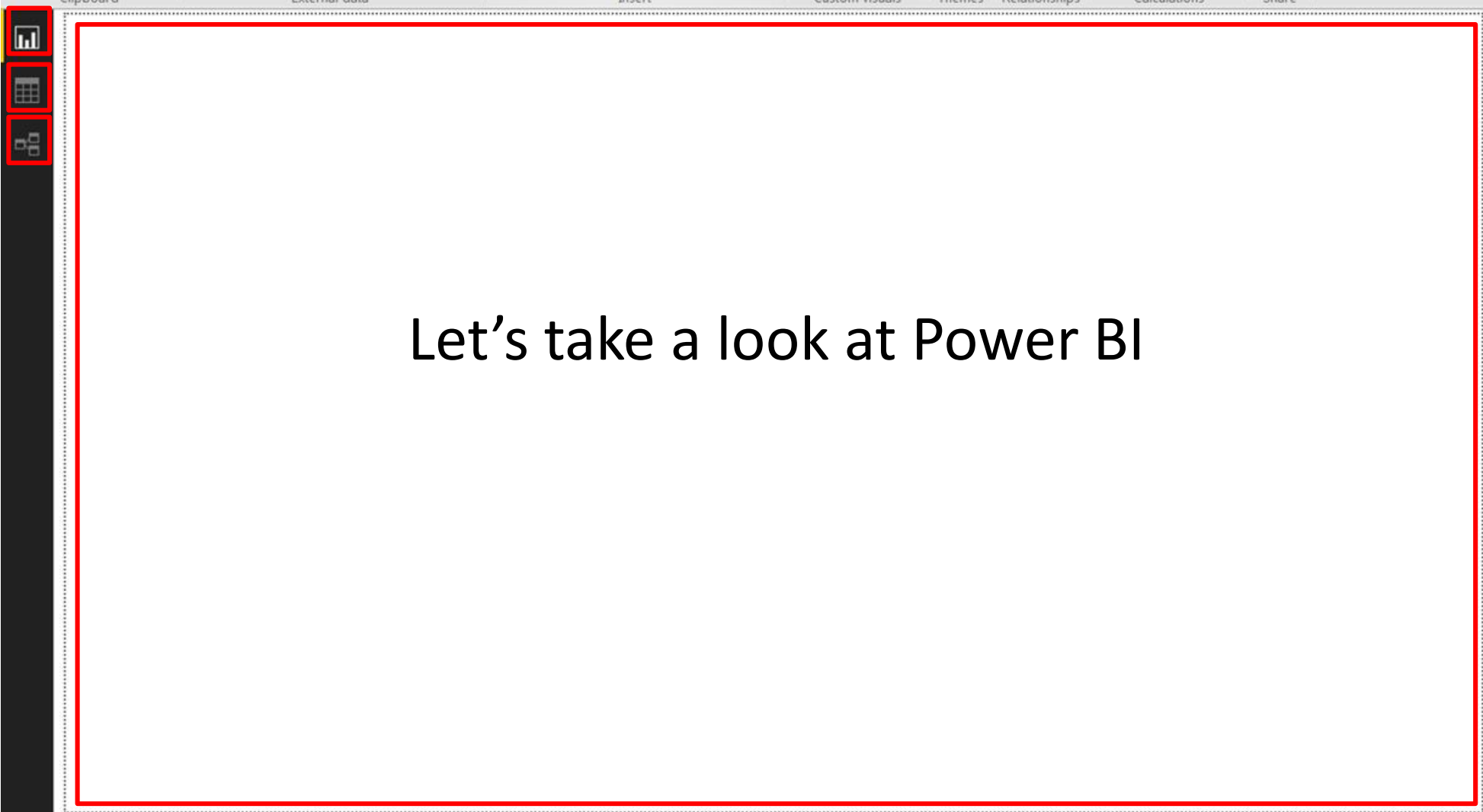
Get Data Recent Sources Enter Data Edit Queries Refresh

New Page New Visual Ask A Question Buttons Text box Image Shapes

From Marketplace From File Switch Theme Manage Relationships

New Measure New Column New Quick Measure Publish

Publish Admin



Let's take a look at Power BI

**VISUALIZATIONS**

Grid of visualization icons including bar, line, pie, map, and table charts.

**VALUES**

Add data fields here

**FILTERS**

Page level filters

Drag data fields here

Report level filters

Drag data fields here

**DRILLTHROUGH**

Keep all filters

Off

Drag drillthrough fields here

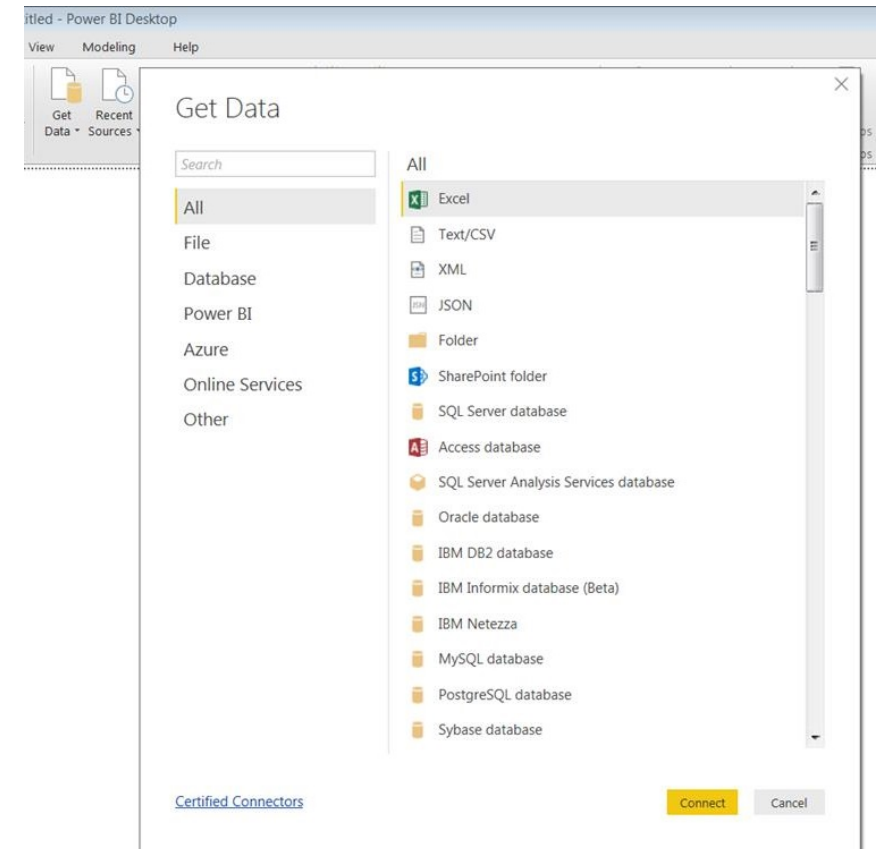
**FIELDS**

Search

# IMPORTING AND MANIPULATING DATA

What does it look like getting data into Power BI

- SQL *before* data import
- M *during* data import
- DAX *after* data import



# WHAT IS M?

## What is M?

- M is Data Transformation engine in Power BI
- M Query is a mashup query language used to query multiple sets of data sources.
- Contains commands to transform data and can return the results of the query and transformations to Power BI data model
- Normally we use M Query to query data sources, clean and load data
- You can use M for doing any data preparation and data transformation before loading that into your model.
- For example instead of bringing three tables into Power BI, you can remove unneeded columns and merge them all together using M, and create a single table to load into the model.
- This can reduce load and improves performance once the data model is loaded

# WHAT IS DAX?

## What is DAX?

- DAX: Data Analysis eXpression Language
- This is the common language used by SQL Server Analysis Services Tabular, Power BI, and Power Pivot in Excel
- DAX is the analytical engine in Power BI
- You use it once the data is loaded for example by creating custom columns, tables or measures
- Unlike M, it has some similarities to Excel functions
- However DAX is much more powerful than Excel formula in many ways

# WHAT IS DAX?

**Syntax** (this is taken from Microsoft Power BI quickstart guide)

Total Sales = SUM(Sales[SalesAmount])

- The measure name **Total Sales**.
- The equals sign operator (=) indicates the beginning of the formula. When calculated, it will return a result.
- The DAX function **SUM** adds up all of the numbers in the **Sales[SalesAmount]** column.
- Parenthesis **()** surround an expression containing one or more arguments. All functions require at least one argument. An argument passes a value to a function.
- The referenced table **Sales**.
- The referenced column **[SalesAmount]** in the Sales table. With this argument, the SUM function knows on which column to aggregate a SUM.

# COLUMNS V MEASURES

In Excel we can add calculated columns, in Power BI we can do this but we can also use measures

Put simply Calculated columns (and tables) are:

- Evaluated for each row in your table, immediately after you hit 'Enter' to complete the formula
- Saved back into the model so take up space

Calculated Measures are:

- Evaluated when you use it in a visual or when the visual is rendered
- Not saved anywhere (aside from cache)

Measures are generally used more than calculated columns but there are trade-offs with performance (report runtime vs. pre-processed), storage space, and the type of expressions you can use.

Calculated columns are often used when you want to filter on the result rather than just as a calculated result (for example in slicers)

# POWER BI DEMO

In the following demo we will demonstrate the following:

- Getting data into Power BI
- Data modeling - making relationships
- Creating custom columns
- Creating custom measures
- Creating visualizations
- Making our visualizations interactive



# PUBLISHING POWER BI TO THE WEB

The following are different ways of getting other people to use our dashboards:

1. Sharing pbix/pbit files
2. Using shared workspaces
3. Sharing through a public link
4. Sharing using PBI Embedded (simplified using [www.minedfuel.com](http://www.minedfuel.com))
5. Sharing using PBI Premium

## WRAP UP

- Many government departments are now using Power BI as default BI self service
- Power BI doe NOT replace Excel, use together
- Maximum benefit if we can share our dashboards with others
  - Consider Protected B
  - Consider how the end user will access the dashboards
- Power BI is part of a much bigger system
- We can embed R and Python script in Power BI to get even more value

THANK YOU!

POWER BI LABS 3<sup>RD</sup> WEDNESDAY OF EACH MONTH  
(EMAIL ME TO SIGN UP)

ANY QUESTIONS?

STEPHEN.DAVIES@DAVHILL.COM | 613 8629086 | WWW.DAVHILL.COM

[www.data-action-lab.com](http://www.data-action-lab.com)