



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^{ière} bande).

Nouveau catalogue de formation approfondie disponible sur la toile au **data-action-lab.com**

Combined experience: 50+ university courses, 100+ corporate workshops, 60+ projects, 35+ years.
Joint venture qualified for GoC A.I. Source List – EN578-180001/A (Band 1).

New advanced training catalogue available at **data-action-lab.com**



Training and long courses



Workshops and short courses



Knowledgebase curation



Data labs

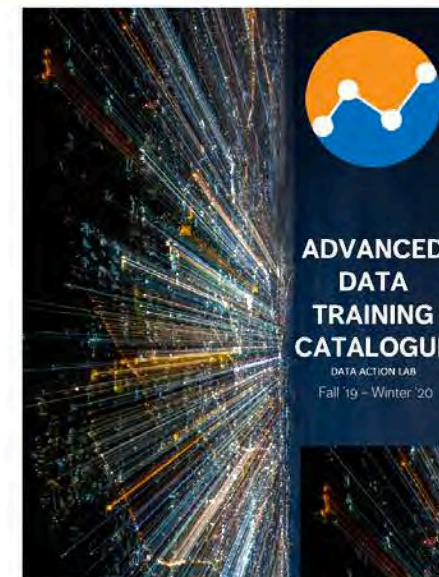


Training Paths

- Data Novice
- Data Engineer
- Data Practitioner
- Data Scientist
- Data Manager
- Data Champion

Training Learning Interests

- Visualization and Dashboards
- Introduction to Data Science
- Advanced Data Science
- Machine Learning Toolbox
- Spotlight on Classification
- Spotlight on Clustering
- Text Analysis
- Special Topics in AI and DS
- Hands on Data Analysis
- Data Strategy and Governance



**ADVANCED
DATA
TRAINING
CATALOGUE**
DATA ACTION LAB
Fall '19 - Winter '20



**DATA
CHAMPION
TRAINING
CATALOGUE**
DATA ACTION LAB
Fall '19 - Winter '20



- 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





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.

PBI-1: AN OVERVIEW OF POWER BI

DATA ACTION LAB – POWER BI SERIES



COURSE OVERVIEW

Course #: PBI-1 **Duration:** 0.5 day
Course Title: Introduction to Power BI

Description:

Getting Things Ready

- Power BI Walkthrough
- Importance of Clean Data
- Importing and Manipulating Data

A First Visualization

- Calculations
- Custom Columns
- Charts

Making Things Dynamic

- Basic Interactive Filtering
- Basic Hierarchies of Data
- Dashboard and Report Layout

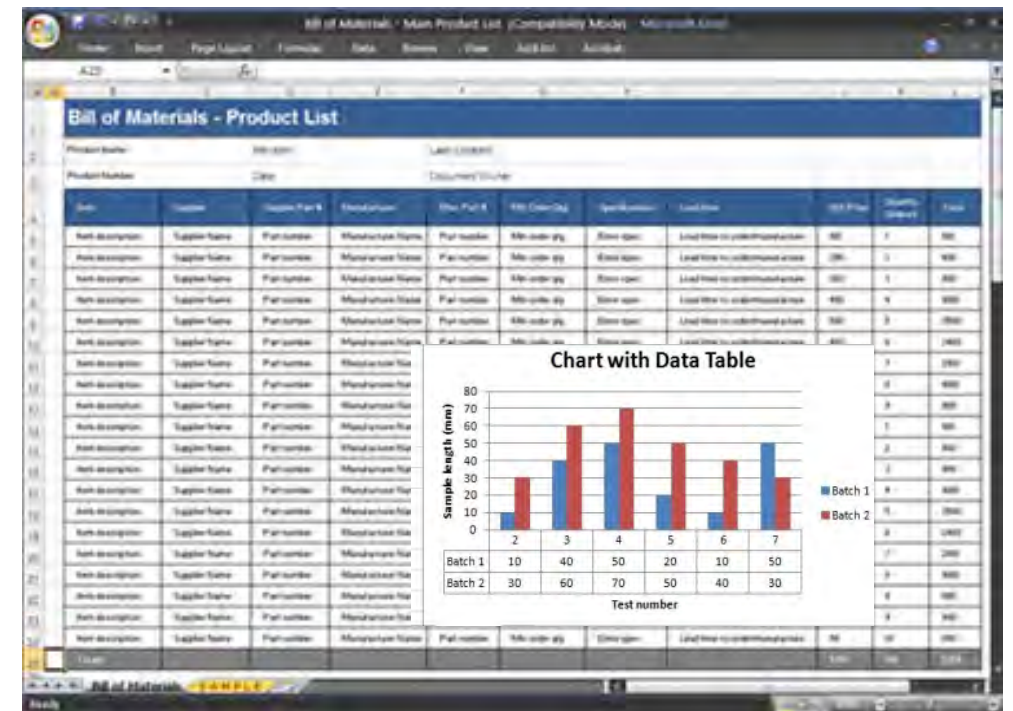
INTRODUCTION

PBI-1: AN OVERVIEW OF POWER BI

OVERVIEW

The past is **data-driven**:

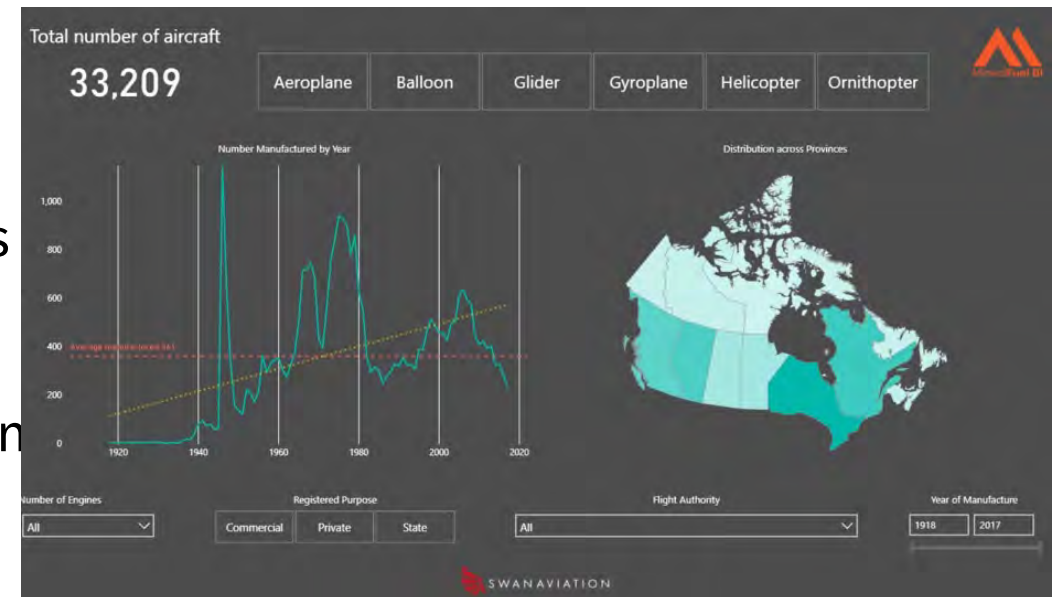
- mostly Excel (or reporting tools like Cognos)
- mostly numbers, tables and non-interactive graphs
- distributed on desktop computers, by email, in PowerPoint presentation
- static, mostly backwards looking (lagging indicators)
- KPIs and dashboards were somewhat contrived



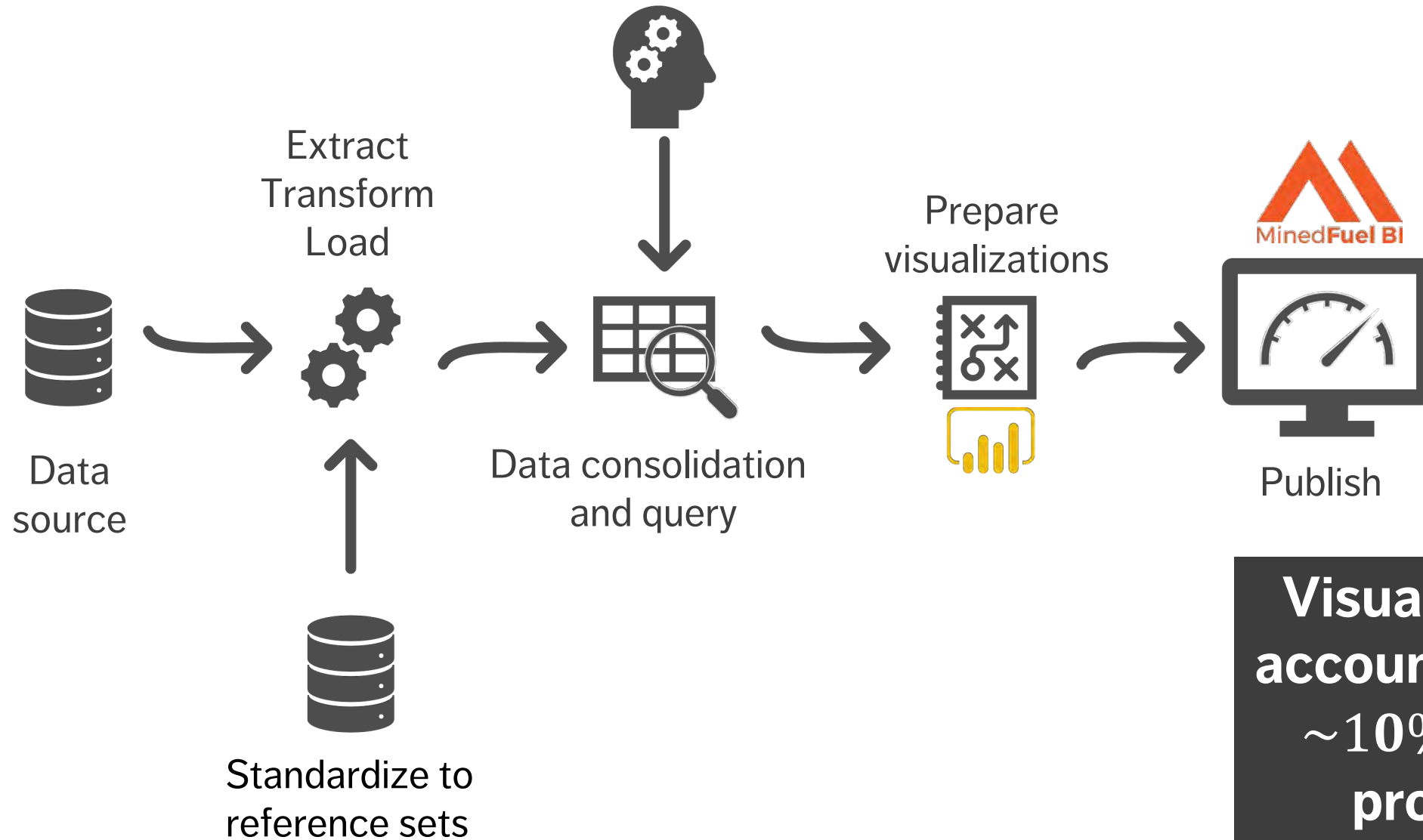
OVERVIEW

The future is **story-driven**:

- new tools: Power BI, R, Qlickview etc.
- mostly visualizations, occasional numbers and tables
- distributed on the web (internal and external)
- dynamic and both backwards and forwards looking (leading and lagging indicators)
- data is for everyone



STRUCTURE OF DATA PROJECTS



**Visualizations
account for only
~10% of the
process.**

RESOURCES

<https://www.data-action-lab.com/index.php/category/data-tools/power-bi/>

<https://www.data-action-lab.com/index.php/event-espresso-test-page/> (filter for data lab events)

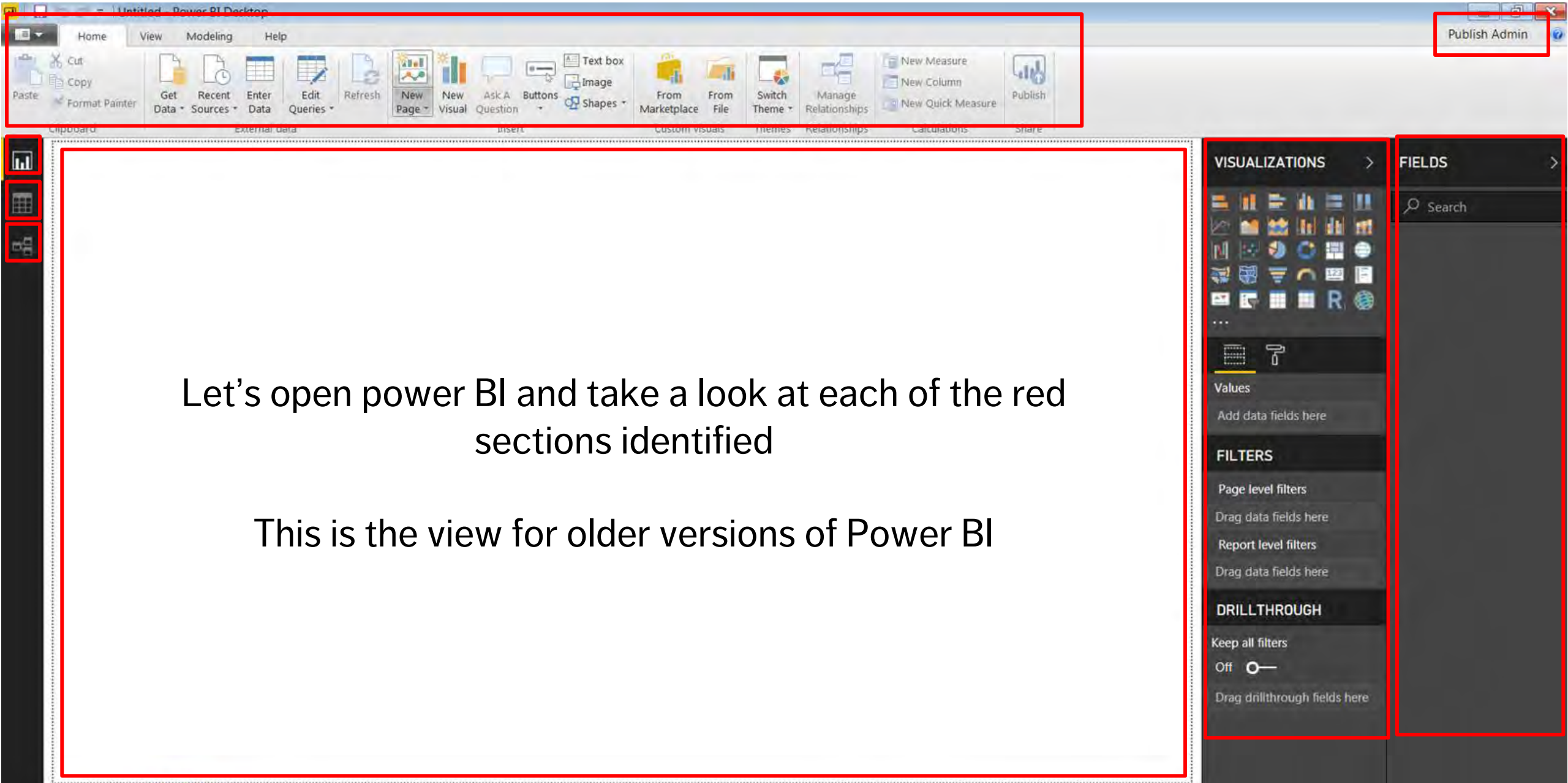
<http://www.davhill.com/free-online-training/>

<http://www.davhill.com/open-data-resources/>

<https://docs.microsoft.com/en-us/power-bi/guided-learning/>

GETTING THINGS READY

PBI-1: AN OVERVIEW OF POWER BI



Let's open power BI and take a look at each of the red sections identified

This is the view for older versions of Power BI

File Home Insert Modeling View Help

Paste Copy Paste Copy Format painter

Get data Excel Power BI datasets SQL Server Enter data Recent sources

Transform data Refresh

New visual Text box More visuals

New measure Quick measure

Publish

Clipboard Data Queries Insert Calculations Share



This is the view for newer versions of Power BI

Filters

Search

Filters on this page

Add data fields here

Filters on all pages

Add data fields here

Visualizations

Search

Values

Add data fields here

Drill through

Cross-report

Off

Keep all filters

On

Add drill-through fields he...

Fields

Search

IMPORTANCE OF CLEAN DATA

BINGO!!!!

random missing values	outliers	values outside of expected range - numeric	factors incorrectly/consistently coded	date/time values in multiple formats
impossible numeric values	leading or trailing white space	badly formatted date/time values	non-random missing values	logical inconsistencies across fields
characters in numeric field	values outside of expected range - 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 within field
entire blank rows	character encoding issues	duplicate value in unique field	non-factor values in factor	numeric values in character field

IMPORTING AND MANIPULATING DATA

Open the file “Ice_thickness.xlsx” and take a look at the data.

	A	B	C	D	E	F	G	H	I	J	K	L	M
	Station ID	Station Name	Latitude	Longitude	City	Province	Province Code	Relevant Date	Ice Thickness	Snow Depth	Surface Code	Water Feature	Method of Observation
1	LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	2002/10/16	40	0	Smooth / Lisse	No cracks or leads	Ice auger kit
2	LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	2002/10/23	48	0	Smooth / Lisse	No cracks or leads	Ice auger kit
3	LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	2002/10/30	56	3	Smooth / Lisse	No cracks or leads	Ice auger kit
4	LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	2002/11/06	67	0	Smooth / Lisse	No cracks or leads	Ice auger kit
5	LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	2002/11/13	73	14	Smooth / Lisse	No cracks or leads	Ice auger kit
6	LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	2002/11/20	75	15	Smooth / Lisse	No cracks or leads	Ice auger kit
7	LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	2002/11/27	80	25	Smooth / Lisse	No cracks or leads	Ice auger kit
8	LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	2002/12/04	85	12	Smooth / Lisse	No cracks or leads	Ice auger kit
9	LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	2002/12/11	89	10	Smooth / Lisse	No cracks or leads	Ice auger kit
10	LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	2002/12/18	95	5	Smooth / Lisse	No cracks or leads	Ice auger kit
11	LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	2003/01/01	104	20	Smooth / Lisse	No cracks or leads	Ice auger kit
12	LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	2003/01/15	114	20	Smooth / Lisse	No cracks or leads	Ice auger kit
13	LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU						

IMPORTING AND MANIPULATING DATA

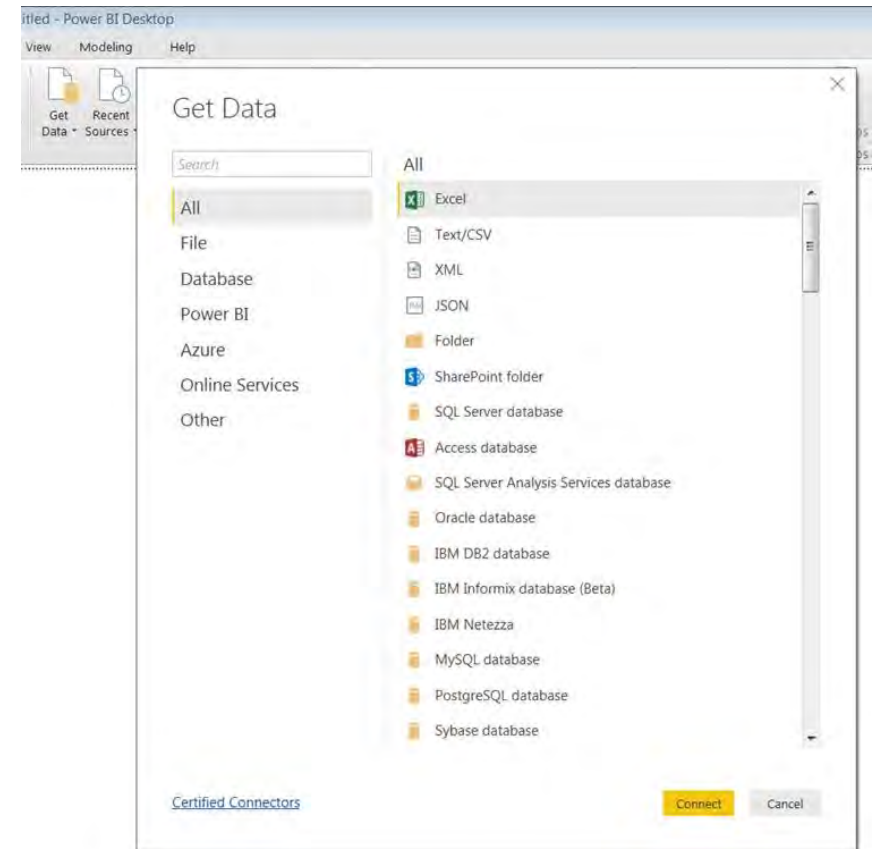
To import the data into Power BI, use:

- SQL **before** data import (not covered here)
- M **during** data import (high level look only)
- DAX **after** data import (somewhat in-depth look)

Save the Excel file and create a new Power BI file.

Click on the “Get Data” button and follow the instructions (select the “Data” tab).

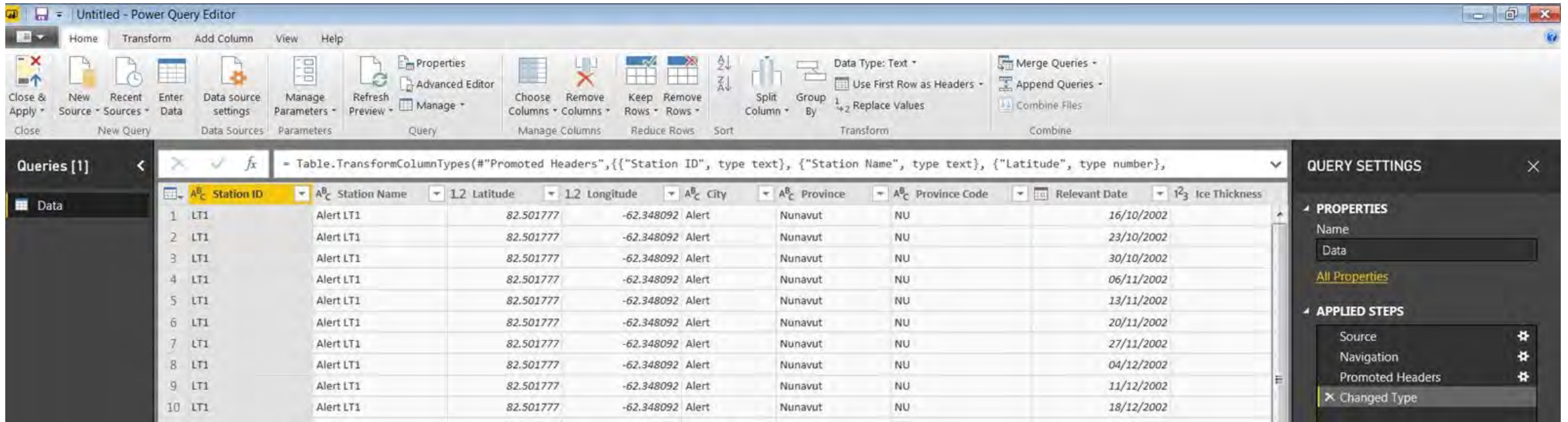
(Make sure to click on “Edit” and not on “Load”)



IMPORTING AND MANIPULATING DATA

Typically, we want to “tweak” the data before loading it into Power BI.

This can be done using the “Power Query” Interface. **NOTE:** this query IS extremely powerful, but there is NO reason to get scared as long as things are kept simple.



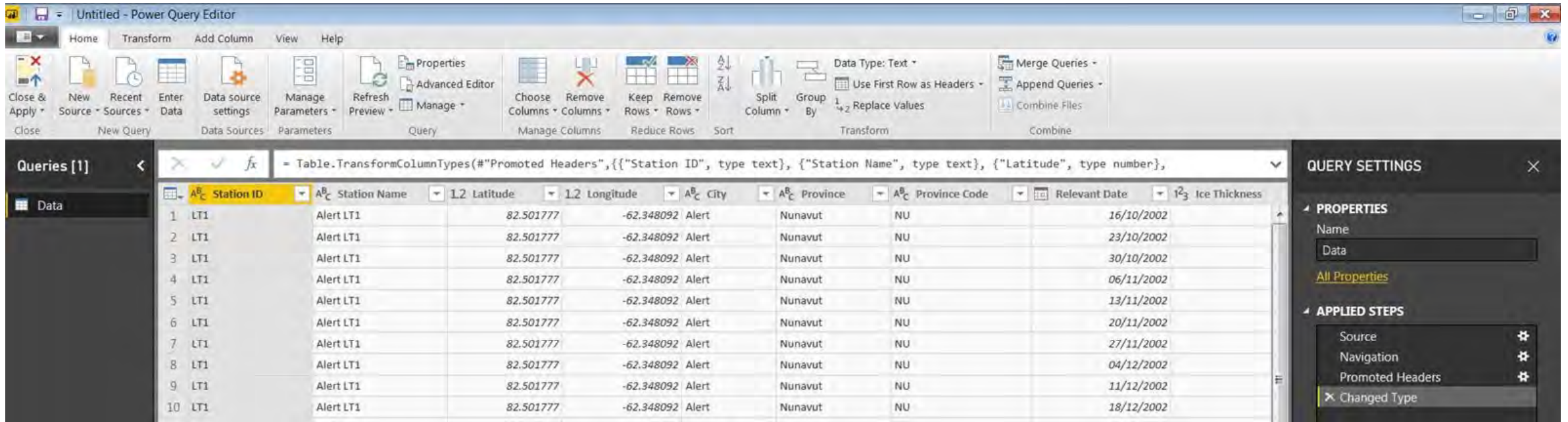
The screenshot displays the Power Query Editor interface. The main window shows a data table with the following columns: Station ID, Station Name, Latitude, Longitude, City, Province, Province Code, Relevant Date, and Ice Thickness. The data is as follows:

	Station ID	Station Name	Latitude	Longitude	City	Province	Province Code	Relevant Date	Ice Thickness
1	LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	16/10/2002	
2	LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	23/10/2002	
3	LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	30/10/2002	
4	LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	06/11/2002	
5	LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	13/11/2002	
6	LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	20/11/2002	
7	LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	27/11/2002	
8	LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	04/12/2002	
9	LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	11/12/2002	
10	LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	18/12/2002	

The interface also shows the Power Query Editor ribbon with various options like Home, Transform, Add Column, View, and Help. The Query Settings pane on the right shows the query name 'Data' and the applied steps: Source, Navigation, Promoted Headers, and Changed Type.

IMPORTING AND MANIPULATING DATA

For now, simply change the name of a column, then hit “Close and Apply”.



The screenshot displays the Power Query Editor interface. The main window shows a data table with the following columns: Station ID, Station Name, Latitude, Longitude, City, Province, Province Code, Relevant Date, and Ice Thickness. The data is as follows:

	Station ID	Station Name	Latitude	Longitude	City	Province	Province Code	Relevant Date	Ice Thickness
1	LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	16/10/2002	
2	LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	23/10/2002	
3	LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	30/10/2002	
4	LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	06/11/2002	
5	LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	13/11/2002	
6	LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	20/11/2002	
7	LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	27/11/2002	
8	LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	04/12/2002	
9	LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	11/12/2002	
10	LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	18/12/2002	

The 'QUERY SETTINGS' pane on the right shows the following details:

- PROPERTIES**
 - Name: Data
 - [All Properties](#)
- APPLIED STEPS**
 - Source
 - Navigation
 - Promoted Headers
 - Changed Type

IMPORTING AND MANIPULATING DATA

In the walkthrough, we briefly looked at the “Data”, “Model” tabs.

Let’s take another look at the data now that it is loaded in.

Station ID	Station Name	Latitude	Longitude	City	Province	Province Code	Date	Ice Thickness	Snow Depth	Surface Code	Water Feature	Method of Observation
LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	October-16-02	40	0	Smooth / Lisse	No cracks or leads	Ice auger kit
LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	October-23-02	48	0	Smooth / Lisse	No cracks or leads	Ice auger kit
LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	October-30-02	56	3	Smooth / Lisse	No cracks or leads	Ice auger kit
LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	November-06-02	67	0	Smooth / Lisse	No cracks or leads	Ice auger kit
LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	November-13-02	73	14	Smooth / Lisse	No cracks or leads	Ice auger kit
LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	November-20-02	75	15	Smooth / Lisse	No cracks or leads	Ice auger kit
LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	November-27-02	80	25	Smooth / Lisse	No cracks or leads	Ice auger kit
LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	December-04-02	85	12	Smooth / Lisse	No cracks or leads	Ice auger kit
LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	December-11-02	89	10	Smooth / Lisse	No cracks or leads	Ice auger kit
LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	December-18-02	95	5	Smooth / Lisse	No cracks or leads	Ice auger kit
LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	January-01-03	104	20	Smooth / Lisse	No cracks or leads	Ice auger kit
LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	January-15-03	114	20	Smooth / Lisse	No cracks or leads	Ice auger kit
LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	January-29-03	122	26	Smooth / Lisse	No cracks or leads	Ice auger kit
LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	February-12-03	130	30	Smooth / Lisse	No cracks or leads	Ice auger kit
LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	February-26-03	142	23	Smooth / Lisse	No cracks or leads	Ice auger kit
LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	March-05-03	147	35	Smooth / Lisse	No cracks or leads	Ice auger kit
LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	March-12-03	150	35	Smooth / Lisse	No cracks or leads	Ice auger kit

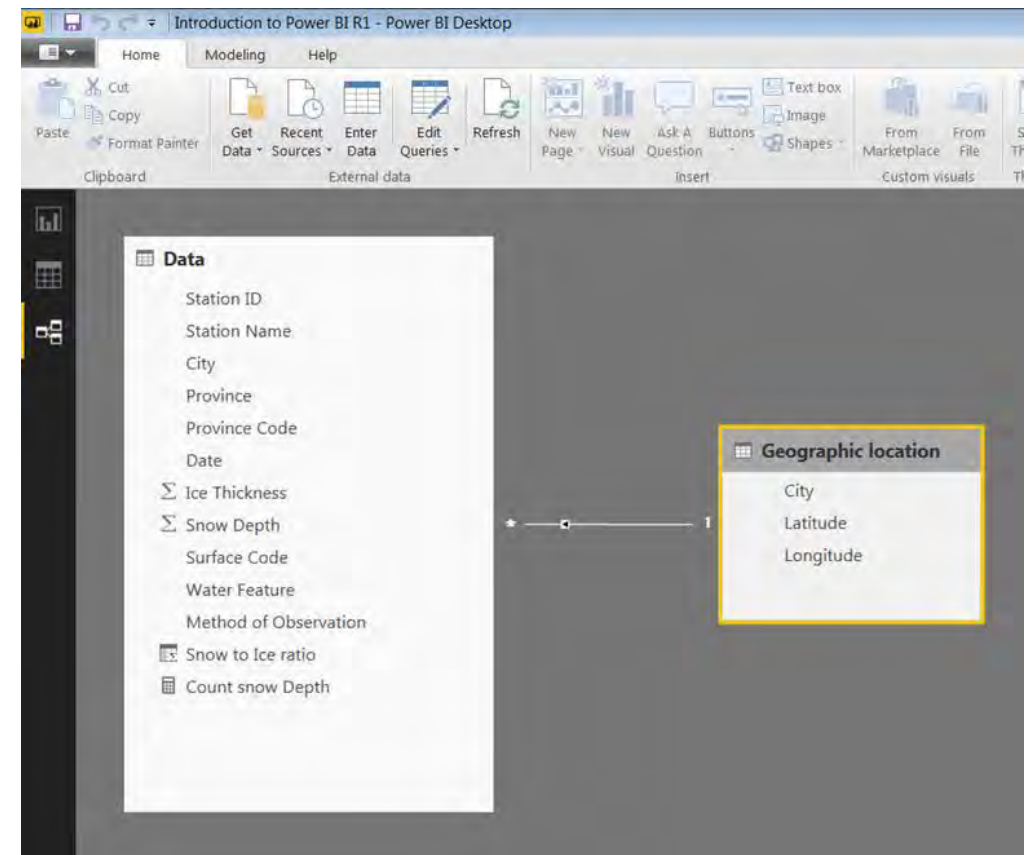
Station ID	Station Name	Latitude	Longitude	City	Province	Province Code	Date	Ice Thickness	Snow Depth	Surface Code	Water Feature	Method of Observation
LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	October-16-02	40	0	Smooth / Lisse	No cracks or leads	Ice auger kit
LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	October-23-02	48	0	Smooth / Lisse	No cracks or leads	Ice auger kit
LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	October-30-02	56	3	Smooth / Lisse	No cracks or leads	Ice auger kit
LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	November-06-02	67	0	Smooth / Lisse	No cracks or leads	Ice auger kit
LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	November-13-02	73	14	Smooth / Lisse	No cracks or leads	Ice auger kit
LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	November-20-02	75	15	Smooth / Lisse	No cracks or leads	Ice auger kit
LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	November-27-02	80	25	Smooth / Lisse	No cracks or leads	Ice auger kit
LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	December-04-02	85	12	Smooth / Lisse	No cracks or leads	Ice auger kit
LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	December-11-02	89	10	Smooth / Lisse	No cracks or leads	Ice auger kit
LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	December-18-02	95	5	Smooth / Lisse	No cracks or leads	Ice auger kit
LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	January-01-03	104	20	Smooth / Lisse	No cracks or leads	Ice auger kit
LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	January-15-03	114	20	Smooth / Lisse	No cracks or leads	Ice auger kit
LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	January-29-03	122	26	Smooth / Lisse	No cracks or leads	Ice auger kit
LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	February-12-03	130	30	Smooth / Lisse	No cracks or leads	Ice auger kit
LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	February-26-03	142	23	Smooth / Lisse	No cracks or leads	Ice auger kit
LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	March-05-03	147	35	Smooth / Lisse	No cracks or leads	Ice auger kit
LT1	Alert LT1	82.501777	-62.348092	Alert	Nunavut	NU	March-12-03	150	35	Smooth / Lisse	No cracks or leads	Ice auger kit

IMPORTING AND MANIPULATING DATA

A useful functionality of Power BI is the ability to **“link” tables of data.**

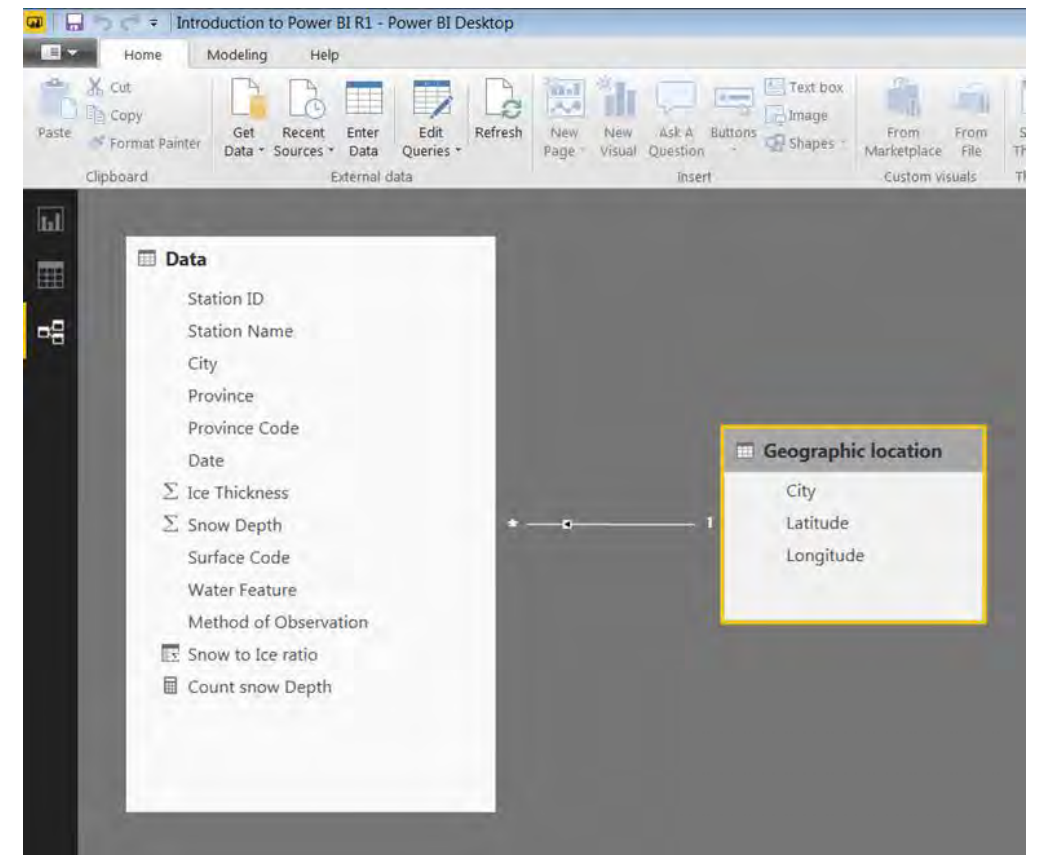
To add a Latitude/Longitude cross-reference table (see tab in the spreadsheet):

- click “Get Data”, then “Excel”, then select “Ice_thickness.xlsx”;
- Next, select the “Geographic Location” tab and hit “Load”.



IMPORTING AND MANIPULATING DATA

Looking at look at the “Model” tab, we can see that Power BI has **automatically detected** the link between the 2 tables using the “City” field.



IMPORTING AND MANIPULATING DATA

We will revisit this much more in detail later in the course and in subsequent courses.

Creating and linking cross tables like this gives Power BI **MUCH** more analytic power than Excel...

... but we need to make sure (as per the cleaning data section) that **EVERY** data source is squeaky clean otherwise the relationships will break.

A FIRST VISUALIZATION

PBI-1: AN OVERVIEW OF POWER BI

CALCULATIONS

In Excel, formulas are entered in cells; in Power BI, only columns can be worked with. In Power BI, the language that is used for calculations is called **DAX**.

DAX is a collection of

- functions, operators, and constants
- that can be used in a formula, or expression, to calculate and return one or more values.

DAX helps create new information from data already found in the model.

Great resource:

- <https://docs.microsoft.com/en-us/power-bi/guided-learning/introductiontodax>

CALCULATIONS – SYNTAX

This formula's syntax includes the following elements:

```
Total Sales = SUM(Sales[SalesAmount])
```

- the measure name is `Total Sales`
- the operator “=” indicates the beginning of the formula; when calculated, it returns a result
- the DAX function `SUM` adds 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, which 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

CALCULATIONS

Follow along to create your first simple calculation, the total number of Snow Depth Records:

- click on “New Measure”
- in the text field add the following DAX code:

```
Count snow Depth = count(Data[Snow Depth])
```

To verify that the calculation is working, add a card to the display.



CALCULATIONS – ARITHMETIC FUNCTIONS

The previous slide shows a standard use of SUM; DAX has the expected standard arithmetic expressions (SUM, DIVIDE, PRODUCT, MAX, MIN, AVERAGE, etc.)

But don't give in to the temptation to manually divide using a “/” operation, say (although everybody does and sometimes it is ok) – there is a failure option built into (for example) DIVIDE (or an alternate result, such as “0” for a “divide by 0” error).

```
DIVIDE(<numerator>, <denominator> [, <alternateresult>])
```

Spend a few minutes on a new tab playing around with these expressions; we will see them in action in a short while.

CUSTOM COLUMNS

We just created a “**Measure**”, namely a calculation that does not relate to any specific row of data.

It changes as the data gets filtered.

In order to add a specific piece of new information to each ROW of data, we may need to add a **custom COLUMN**.

We can still use DAX to do this.

Note that adding a new column will increase the overall size of our dataset, but using a measure does not.

CUSTOM COLUMNS

Let's consider the **ratio between snow depth and ice depth** in the dataset.

That is, let's **divide** snow depth by ice depth: click on “new column” and add in the following DAX code:

```
Snow to Ice ratio = divide(Data[Snow Depth],Data[Ice Thickness],0)
```

Follow along to modify the number of significant digits and to change the value type from number to percentage.

Introduction to Power BI R1 - Power BI Desktop

Home Modeling Help Publish Admin

Clipboard External data Insert Custom visuals Themes Relationships Calculations Share

1 Snow to Ice ratio = `divide(Data[Snow Depth],Data[Ice Thickness],0)`

Station ID	Station Name	City	Province	Province Code	Date	Ice Thickness	Snow Depth	Surface Code	Water Feature	Method of Observation	Snow to Ice ratio
LT1	Alert LT1	Alert	Nunavut	NU	October-16-02	40	0	Smooth / Lisse	No cracks or leads	Ice auger kit	0.00 %
LT1	Alert LT1	Alert	Nunavut	NU	October-23-02	48	0	Smooth / Lisse	No cracks or leads	Ice auger kit	0.00 %
LT1	Alert LT1	Alert	Nunavut	NU	October-30-02	56	3	Smooth / Lisse	No cracks or leads	Ice auger kit	5.36 %
LT1	Alert LT1	Alert	Nunavut	NU	November-06-02	67	0	Smooth / Lisse	No cracks or leads	Ice auger kit	0.00 %
LT1	Alert LT1	Alert	Nunavut	NU	November-13-02	73	14	Smooth / Lisse	No cracks or leads	Ice auger kit	19.18 %
LT1	Alert LT1	Alert	Nunavut	NU	November-20-02	75	15	Smooth / Lisse	No cracks or leads	Ice auger kit	20.00 %
LT1	Alert LT1	Alert	Nunavut	NU	November-27-02	80	25	Smooth / Lisse	No cracks or leads	Ice auger kit	31.25 %
LT1	Alert LT1	Alert	Nunavut	NU	December-04-02	85	12	Smooth / Lisse	No cracks or leads	Ice auger kit	14.12 %
LT1	Alert LT1	Alert	Nunavut	NU	December-11-02	89	10	Smooth / Lisse	No cracks or leads	Ice auger kit	11.24 %
LT1	Alert LT1	Alert	Nunavut	NU	December-18-02	95	5	Smooth / Lisse	No cracks or leads	Ice auger kit	5.26 %
LT1	Alert LT1	Alert	Nunavut	NU	January-01-03	104	20	Smooth / Lisse	No cracks or leads	Ice auger kit	19.23 %
LT1	Alert LT1	Alert	Nunavut	NU	January-15-03	114	20	Smooth / Lisse	No cracks or leads	Ice auger kit	17.54 %
LT1	Alert LT1	Alert	Nunavut	NU	January-29-03	122	26	Smooth / Lisse	No cracks or leads	Ice auger kit	21.31 %
LT1	Alert LT1	Alert	Nunavut	NU	February-12-03	130	30	Smooth / Lisse	No cracks or leads	Ice auger kit	23.08 %
LT1	Alert LT1	Alert	Nunavut	NU	February-26-03	142	23	Smooth / Lisse	No cracks or leads	Ice auger kit	16.20 %
LT1	Alert LT1	Alert	Nunavut	NU	March-05-03	147	35	Smooth / Lisse	No cracks or leads	Ice auger kit	23.81 %
LT1	Alert LT1	Alert	Nunavut	NU	March-12-03	150	35	Smooth / Lisse	No cracks or leads	Ice auger kit	23.33 %
LT1	Alert LT1	Alert	Nunavut	NU	March-19-03	152	28	Smooth / Lisse	No cracks or leads	Ice auger kit	18.42 %
LT1	Alert LT1	Alert	Nunavut	NU	March-26-03	156	34	Smooth / Lisse	No cracks or leads	Ice auger kit	21.79 %
LT1	Alert LT1	Alert	Nunavut	NU	April-02-03	174	22	Smooth / Lisse	No cracks or leads	Ice auger kit	12.64 %
LT1	Alert LT1	Alert	Nunavut	NU	April-30-03	176	29	Smooth / Lisse	No cracks or leads	Ice auger kit	16.48 %

FIELDS

Search

Data

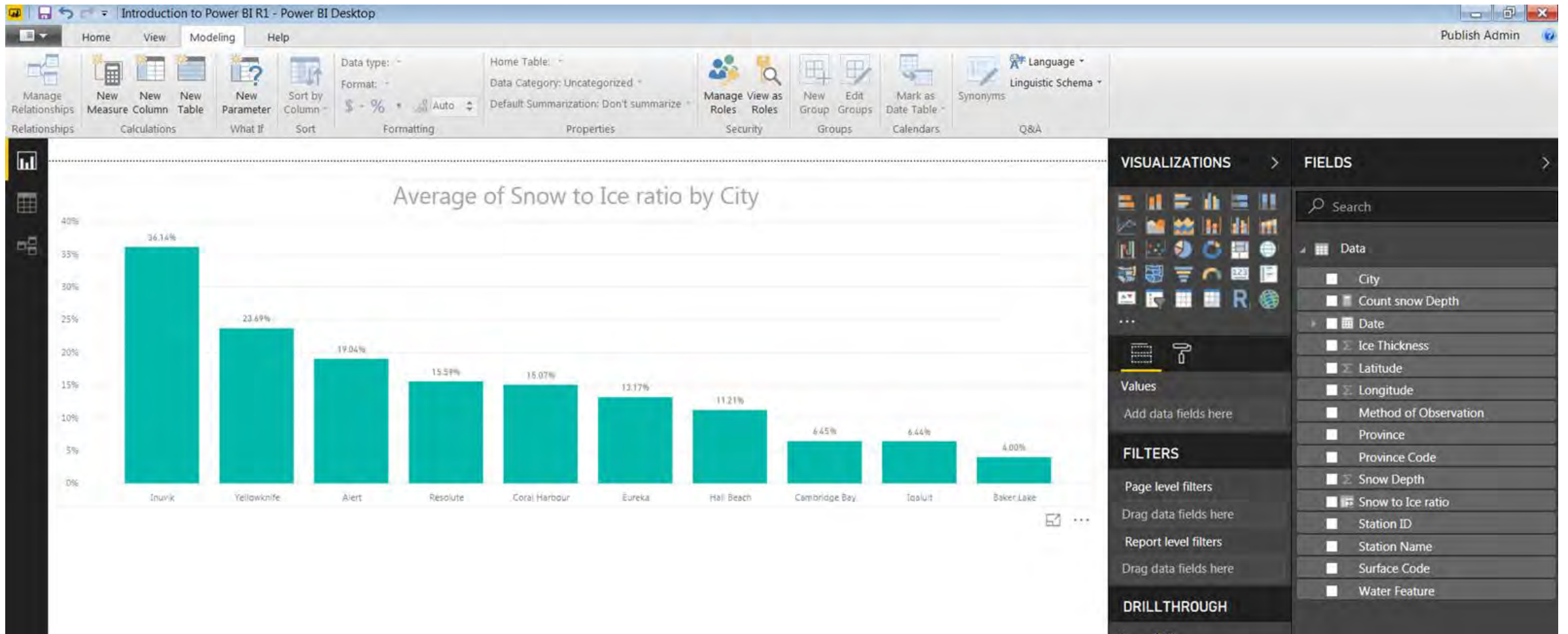
- City
- Count snow Depth
- Date
- Ice Thickness
- Method of Observat...
- Province
- Province Code
- Snow Depth
- Snow to Ice ratio
- Station ID
- Station Name
- Surface Code
- Water Feature
- Water Feature Hi...
- Water Feature
- Method of Observ...

CHARTS

How do we incorporate this new measure and this new column into a chart?

- click on the “Visualization” tab
- click on “Stacked Column Chart”
- drag “City” onto the axis
- drag “Snow to Ice Ratio” onto the values, click on the arrow to change from “Sum” to “Average”

Once you get to know the formatting options, play around and see what you can produce – how many new charts can you add to the dashboard?



MAKING THINGS DYNAMIC

PBI-1: AN OVERVIEW OF POWER BI

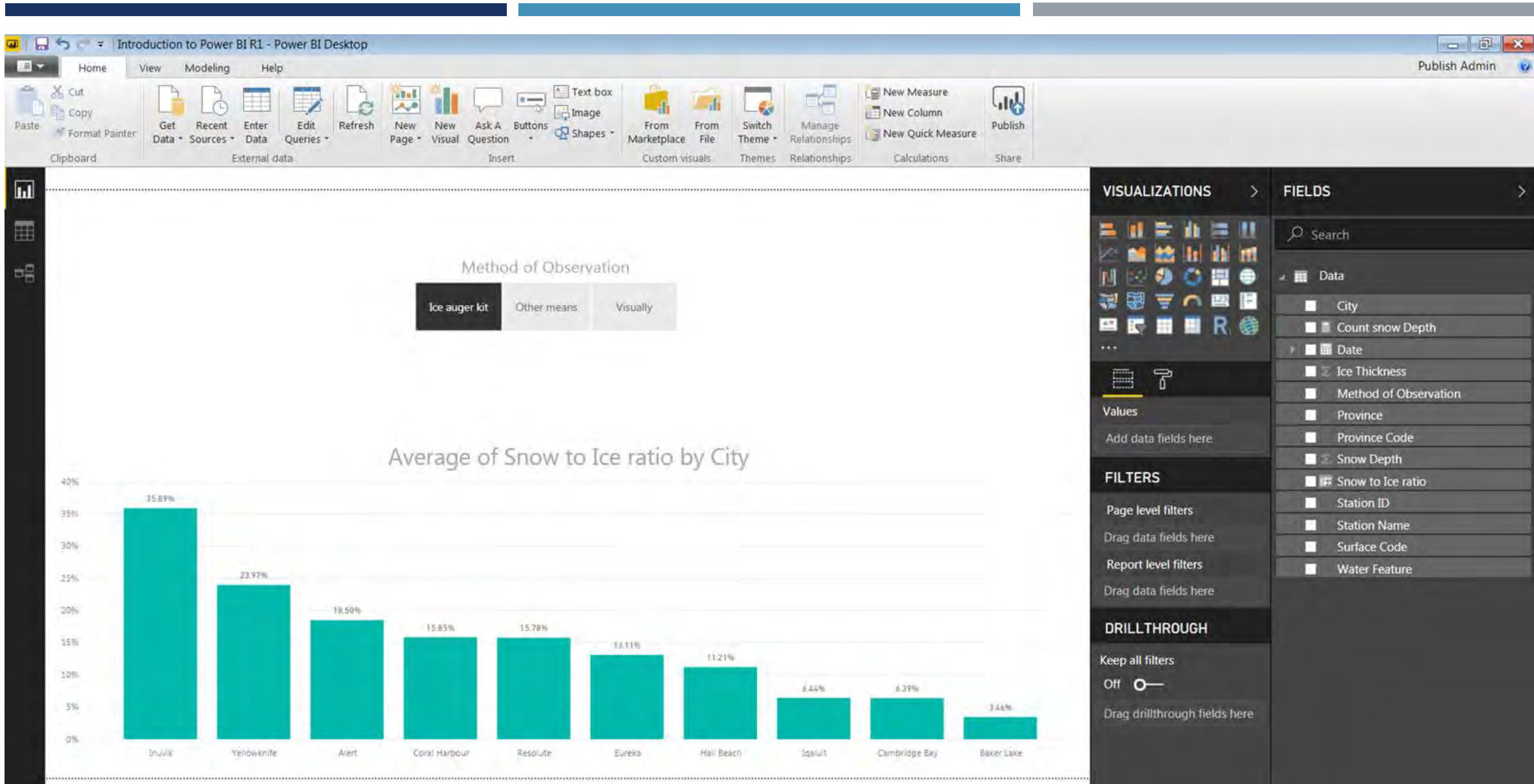
BASIC INTERACTIVE FILTERING

The true power of Power BI is found in the ability to use **dynamic filters**.

The simplest dynamic filter is the “ **slicer**”; charts can act as slicers as well (default).

Example:

- click on the “Slicer” button
- drag in “Method of Observation” over the field space
- change the format as you see fit (see options)
- click on the slicer and see the data change



BASIC INTERACTIVE FILTERING

Let's do some more filtering, but this time using another chart:

- move your first slicer out of the way
- add another chart into the report
- click on column chart
- drag "Date" onto the axis
- drag "Ration of Snow to Ice" into the values and set to average
- change the format as desired
- click on either graph and/or the slicer and see how things change!

Introduction to Power BI R1 - Power BI Desktop Publish Admin

Home View Modeling Help

Clipboard External data Insert Custom visuals Themes Relationships Calculations Share

Method of Observation: Ice auger kit, Other means, Visually

Average of Snow to Ice ratio by Year

Year	Average Ratio (%)
2002	~9.0
2003	~10.0
2004	~13.0
2005	~17.0
2006	~15.0
2007	~12.0
2008	~13.0
2009	~14.0
2010	~16.0
2011	~13.0
2012	~15.0
2013	~15.0
2014	~14.0
2015	~14.0
2016	~15.0

Average of Snow to Ice ratio by City

City	Average Ratio (%)
Inuvik	36.14%
Yellowknife	23.69%
Alert	19.04%
Resolute	15.59%
Coral Harbour	15.07%
Eureka	13.17%
Hall Beach	11.21%
Cambridge Bay	6.45%
Iqaluit	6.44%
Baker Lake	4.00%

VISUALIZATIONS

FIELDS

Search

Data

- City
- Count snow Depth
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- Ice Thickness
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- Station Name
- Surface Code
- Water Feature

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

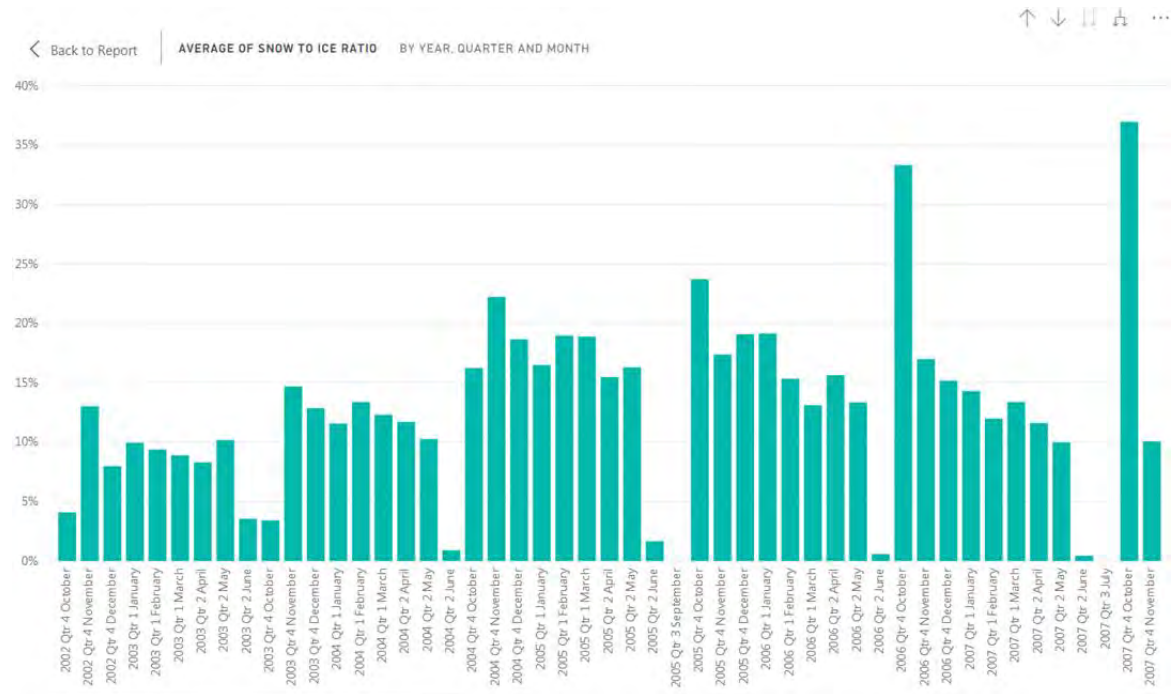
BASIC HIERARCHIES OF DATA

Hierarchies provide a way to order data levels. They let us **summarize** the data in different ways, with GREAT flexibility.

Power BI automatically creates a Date hierarchy, for instance:

- Year > Quarter > Month > Week > Day

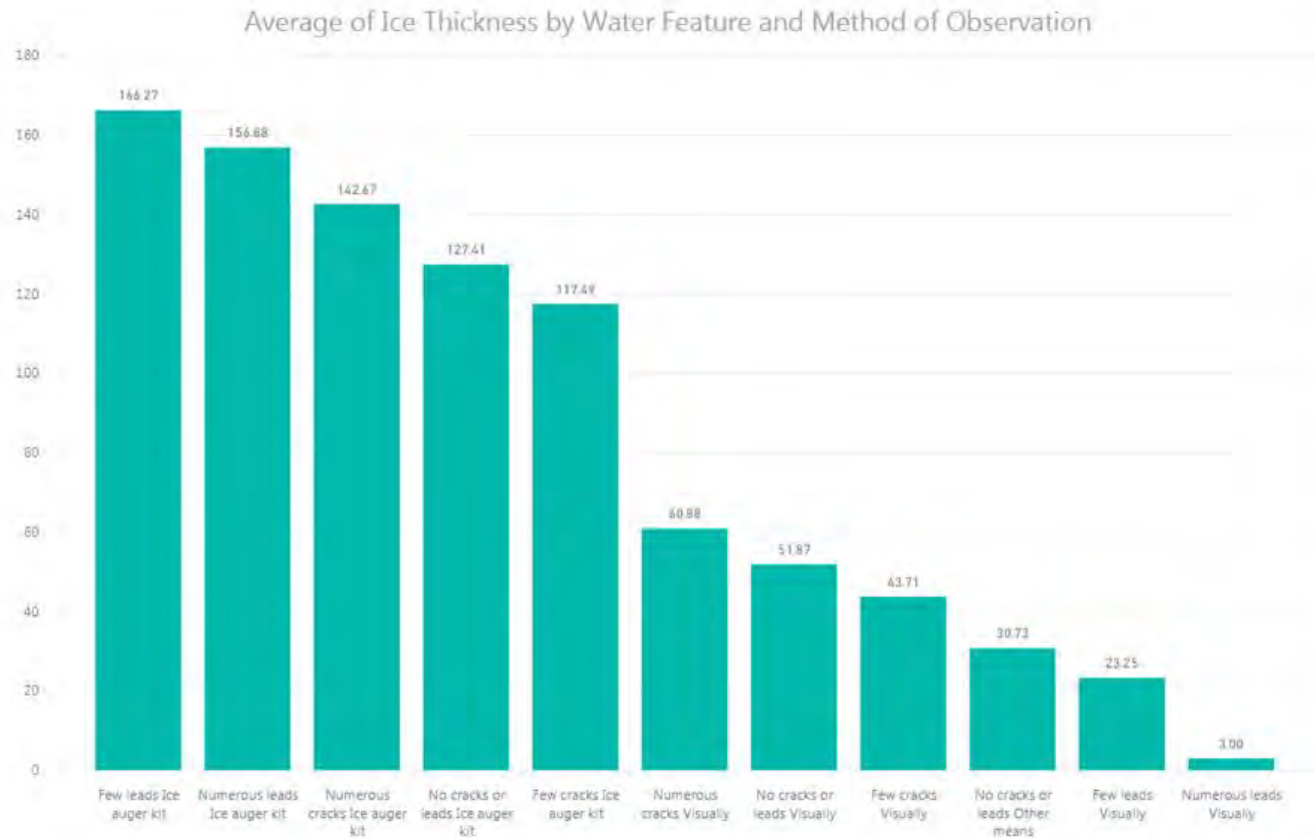
The hierarchies can be navigated up and down in the date chart we created.



BASIC HIERARCHIES OF DATA

Power BI makes it easy to create custom Data hierarchies:

- in the Fields area, drag “Method of Observation” over “Water Feature”
- this will create a new hierarchy called “Water Feature Hierarchy”
- create a new chart with “Water Feature Hierarchy” as the axis and “Ice Thickness” (set to average) as the value
- play around with the hierarchy controls in the chart and see what happens



VISUALIZATIONS

Grid of visualization icons (Bar, Line, Pie, etc.)

Values

Add data fields here

FILTERS

Page level filters

Drag data fields here

Report level filters

Drag data fields here

DRILLTHROUGH

Keep all filters

On

Drag drillthrough fields here

FIELDS

Search

Data

- City
- Count snow Depth
- Date
- Ice Thickness
- Method of Observation
- Province
- Province Code
- Snow Depth
- Snow to Ice ratio
- Station ID
- Station Name
- Surface Code
- Water Feature
- Water Feature Hierarchy
 - Water Feature
 - Method of Observation

DASHBOARD AND REPORT LAYOUT

We are not going into the same detail as the “Data Visualization courses that DAL offers” course, so please refer to those notes re: layout

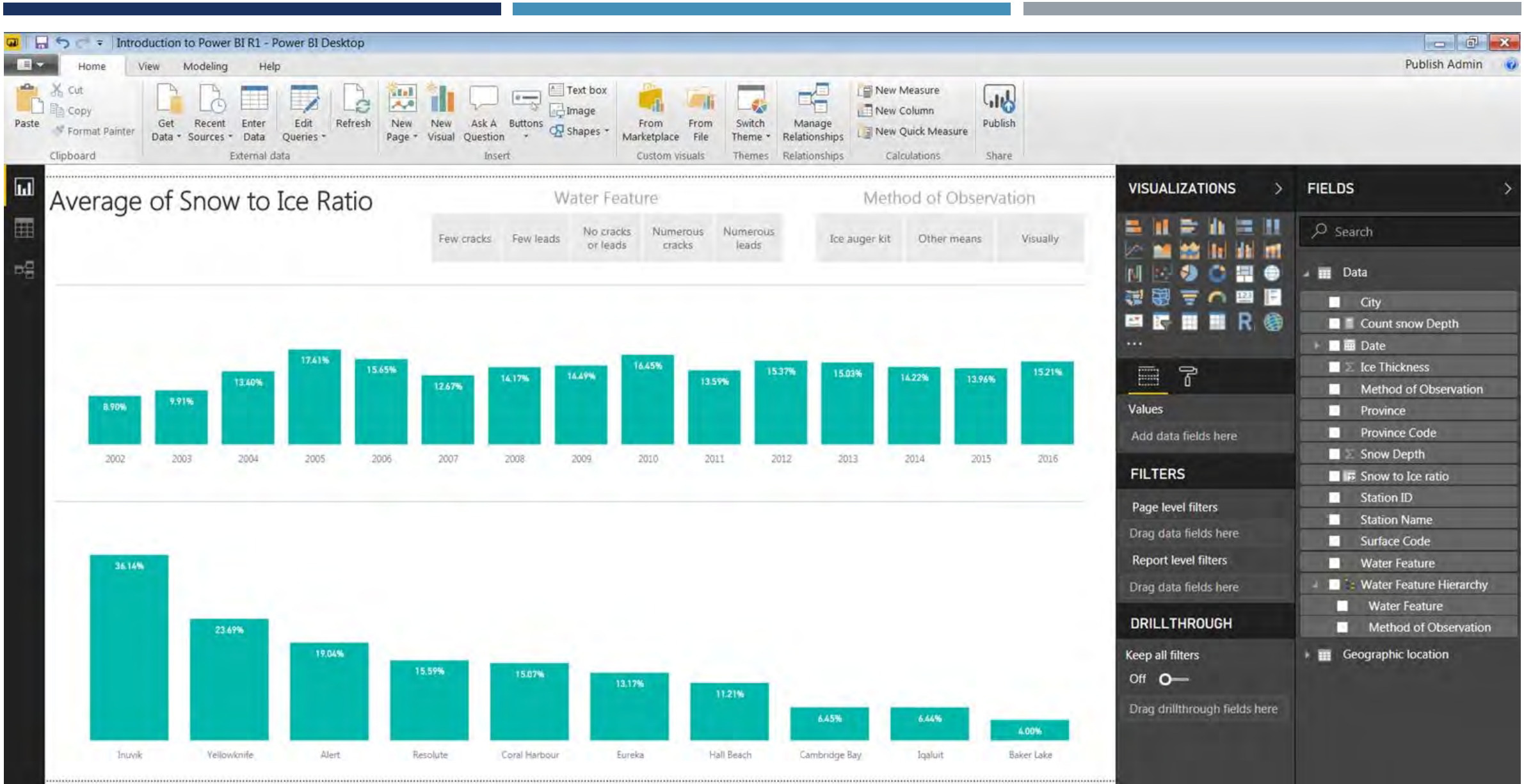
Things to remember:

- to select multiple items, use “Ctrl” left click, NOT “Shift” left click
- use cards in place of text to make dynamic text boxes
- use shapes to create different spaces in which to place charts and text elements

DASHBOARD AND REPORT LAYOUT

Things to remember (continued):

- clicking on an item makes the “Visual Tools” ribbon appear, in which we can find
 - alignment
 - push item forwards/back
 - distribute vertically/horizontally
 - edit how filters and slicers effect each element



VISUALIZATIONS

Search

- Data
- City
- Count snow Depth
- Date
- Ice Thickness
- Method of Observation
- Province
- Province Code
- Snow Depth
- Snow to Ice ratio
- Station ID
- Station Name
- Surface Code
- Water Feature
- Water Feature Hierarchy
 - Water Feature
 - Method of Observation
- Geographic location

FILTERS

Page level filters
Drag data fields here

Report level filters
Drag data fields here

DRILLTHROUGH

Keep all filters
Off

Drag drillthrough fields here

DASHBOARD AND REPORT LAYOUT

We are going to spend the rest of the session playing around with the elements that you have created.

Don't hesitate to ask for help.

Try the following:

- create a map using latitude and longitude
- create some new measures and columns of data
- map these new elements to create a story
- play around with formatting to pull everything together

Questions?