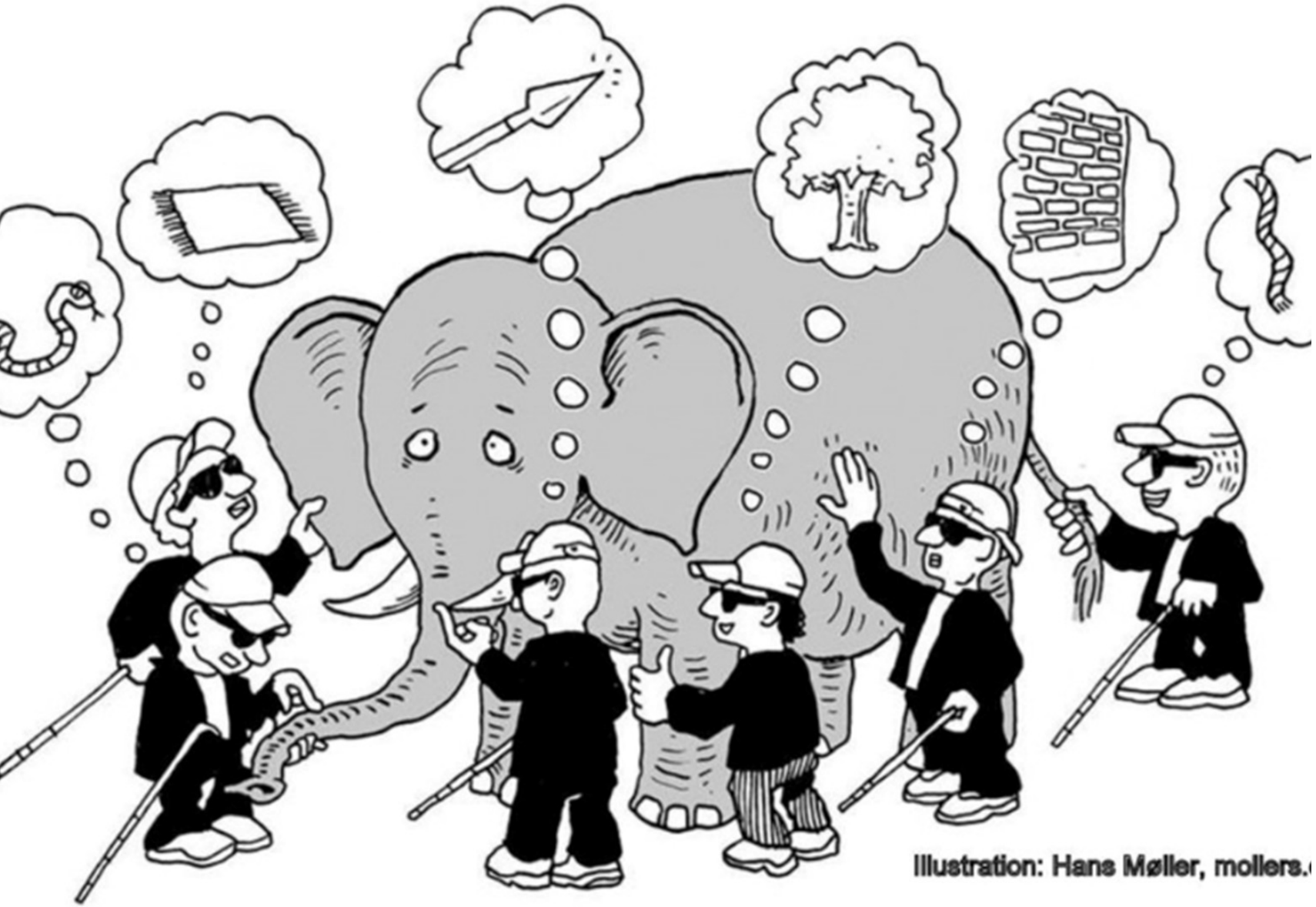
Data Visualization for Decision support (Dashboards)

Nalini Guhesh



Our relationship with data

…We are overwhelmed by information, not because there is too much, but because we haven't learned how to tame it. Information lies stagnant in rapidly expanding pools as our ability to collect and warehouse it increases, but our ability to make sense of and communicate it remains inert…

Stephen Few

Dashboards

- Language to communicate to business users.

  "The best analytics will fail if nobody acts on it"

- Make performance visible. Single source of truth.

  "We spend less time debating if the data is correct. We have to take action"

- *Reduces time in stitching and creating reports.*

  " My team can use the time to respond to the issues rather than creating Powerpoint decks to outline them"

Business impact

Figure 1: Companies That Are Highly Effective at Dashboarding Outperform

Measures of Performance	Bottom Quartile Dashboard Effectiveness	Top Quartile Dashboard Effectiveness
INTERNAL		
Percent complete on transformation	39%	63%
Percent effectiveness of the future-ready drivers	40%	78%
Effectiveness of leaders in moving orientation from Command and Control to Coach and Communicate	35%	78%
Effectiveness of leaders at holding people accountable	40%	75%
Employee experience, compared to industry	51%	65%
EXTERNAL		
Net profit margin, compared to industry[1]	-9.4 pp	8.4 pp
Revenue growth, compared to industry[1]	-13.4 pp	11.0 pp
Percentage of revenues from innovations introduced in the last three years	22%	49%
Percentage of revenues from cross-selling	20%	46%
Customer experience, compared to industry	51%	66%

Source: MIT CISR 2019 TMT and Transformation Survey (N=1311).
[1] Self reported net profit margin/revenue growth correlates significantly with actual profit margin/revenue growth at the p<.01 level.

What is a dashboard?

- Visual display of business information
- Designed to communicate. Quickly point something that requires attention or action
- May not provide all the details needed but should have some mechanism to get down to some detail

A dashboard serves us well if

a. It signals that you need to act

b. Opens the door to any additional information that you need about what you need to act on

Executive dashboards

- Monitoring health and opportunities of the business. High level measures of performance
- Contextual information – trend, Vs target
- Very simple, minimalist. Not designed for further analysis as that is not the senior person's job. Minimum learning time, straightforward view of what's happening.
- Often requires printability/ export to Powerpoint.

Mid level

SNAPSHOT OF PERFORMANCE

GREATER CONTEXT, HISTORY, MORE NUANCED PERFORMANCE MEASURES

HIGH INTERACTIVITY. DRILL-DOWNS ARE ESSENTIAL

ENABLE AREAS THAT REQUIRE ACTION AND DIAGNOSTICS OF POTENTIAL CAUSES OF THE ISSUE

Operational

MONITORING OPERATIONS. DYNAMIC, IMMEDIATE DECISION MAKING.

SIMPLE DISPLAY. ALERTS AND NOTIFICATIONS.

NEED TO GET TO SPECIFICS. SOME LEVEL OF DRILL-DOWN IS NECESSARY.

Process for Dashboard development

Step 1
Start-up Week

What we'll be doing?

Get alignment on kick-off, project milestones, governance needs, stakeholder identification.

Step 2
Design Workshop

What we'll be doing?

Stakeholder Interviews and a design thinking led workshop to build a prototype dashboard, with Ogilvy specialists alongside key stakeholders

Step 3
Discovery

What we'll be doing?

Information and Data Gathering
Gap analysis

Step 4
Dashboard Design

What we'll be doing?

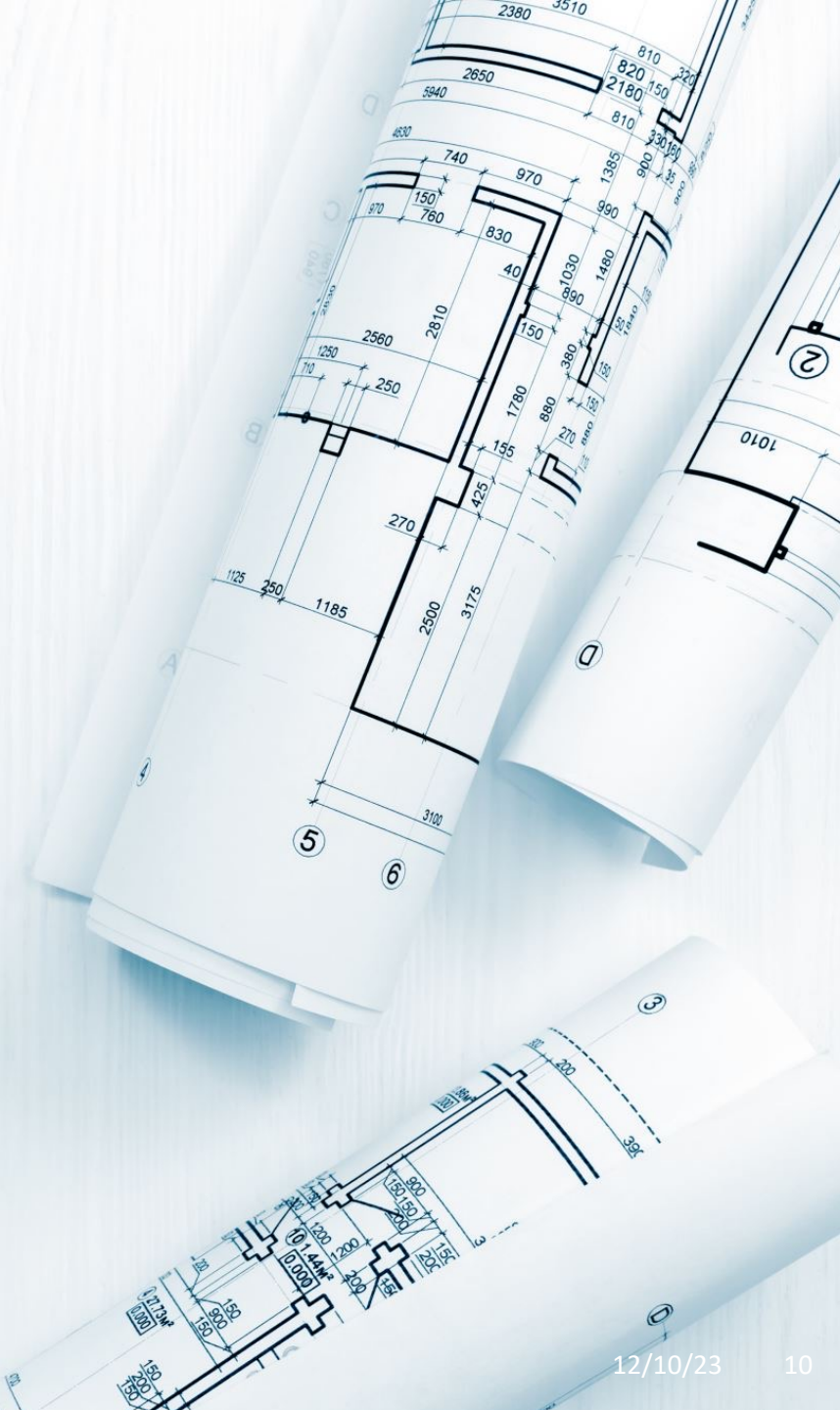
Wireframe of prototype dashboard for feedback and approval before development

Step 5-Ongoing
Agile Development

What we'll be doing?

Test the prototype with key stakeholders and build a roadmap that charts pathway for the next sprints in the agile development

How to elicit requirements?



Requirements (example)

How often should the data be updated in the dashboard?

Who will use the dashboard? Is it for a single person, a single group, or people in several different departments?

What will they use the dashboard to do? What questions will they use it to answer? What actions will they take in response to these answers?

What specific information should be displayed on the dashboard? List of all the data items that should be included on the dashboard. Also indicate the level of summary/detail at which each item should be expressed on the dashboard. Eg Country, Region, Market. Category, Sub-category, Brand, SKU.

Source: Stephen few, Information Dashboard Design

Requirements (example)

Which of the data items listed above are the key (i.e., most important) items needed to meet the objectives supported by the dashboard?

What are the logical groupings that could be used to organize these data items on the dashboard? E.g. Media, Promotions, Sales , Campaigns etc.

What are the useful comparisons that will allow the dashboard's users to see the data items listed above in context? Eg Targets, Benchmarks

For each of these data items, what would constitute an exception? Are there specific thresholds that represent exceptionally high or low values or will users simply be looking for values that represent statistical outliers (meaning they're abnormally high or low)?

Objectives - example

Single view of performance

Enable data driven modern marketing, digital optimization

Monitor environmental signals for upcoming trends - Search intent, Social Listening, Event tracking etc.

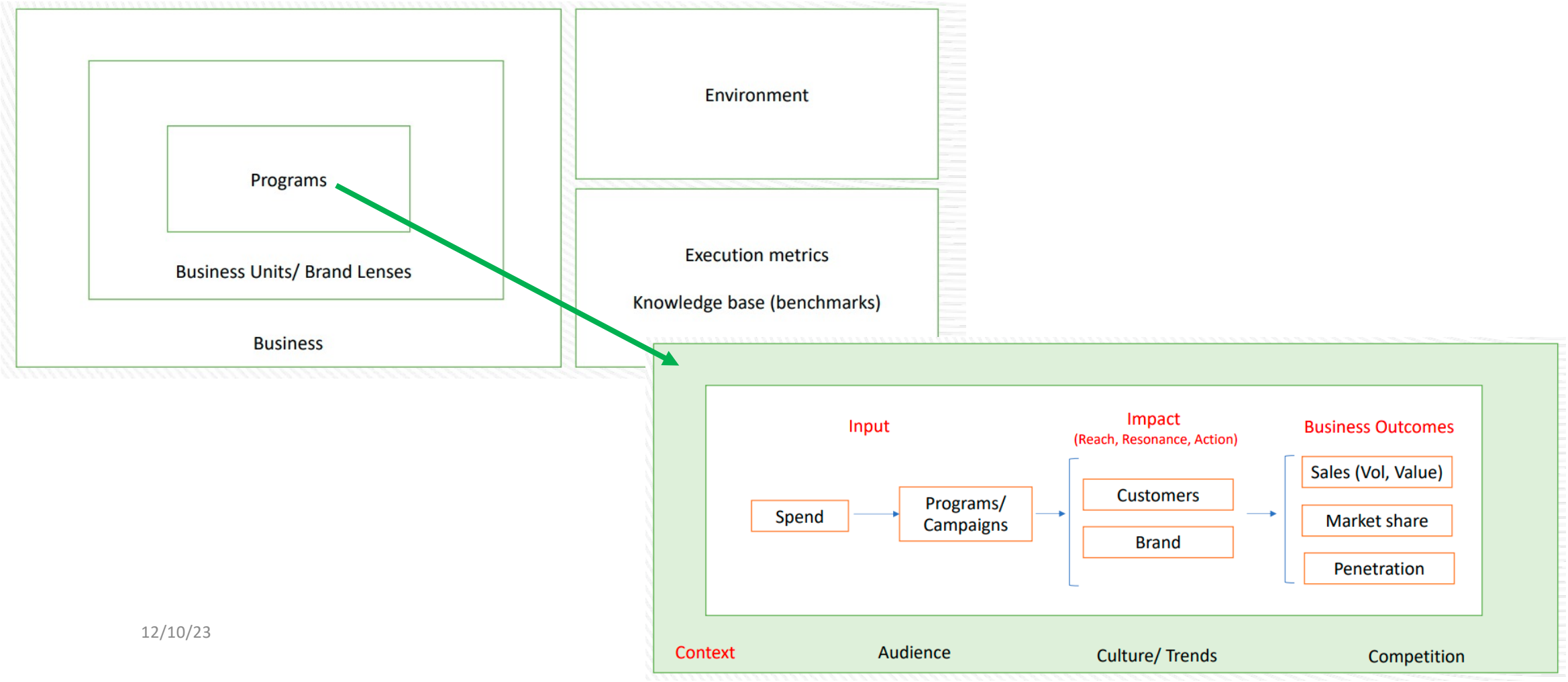
Listen to voice of the customer

Dashboard design detail

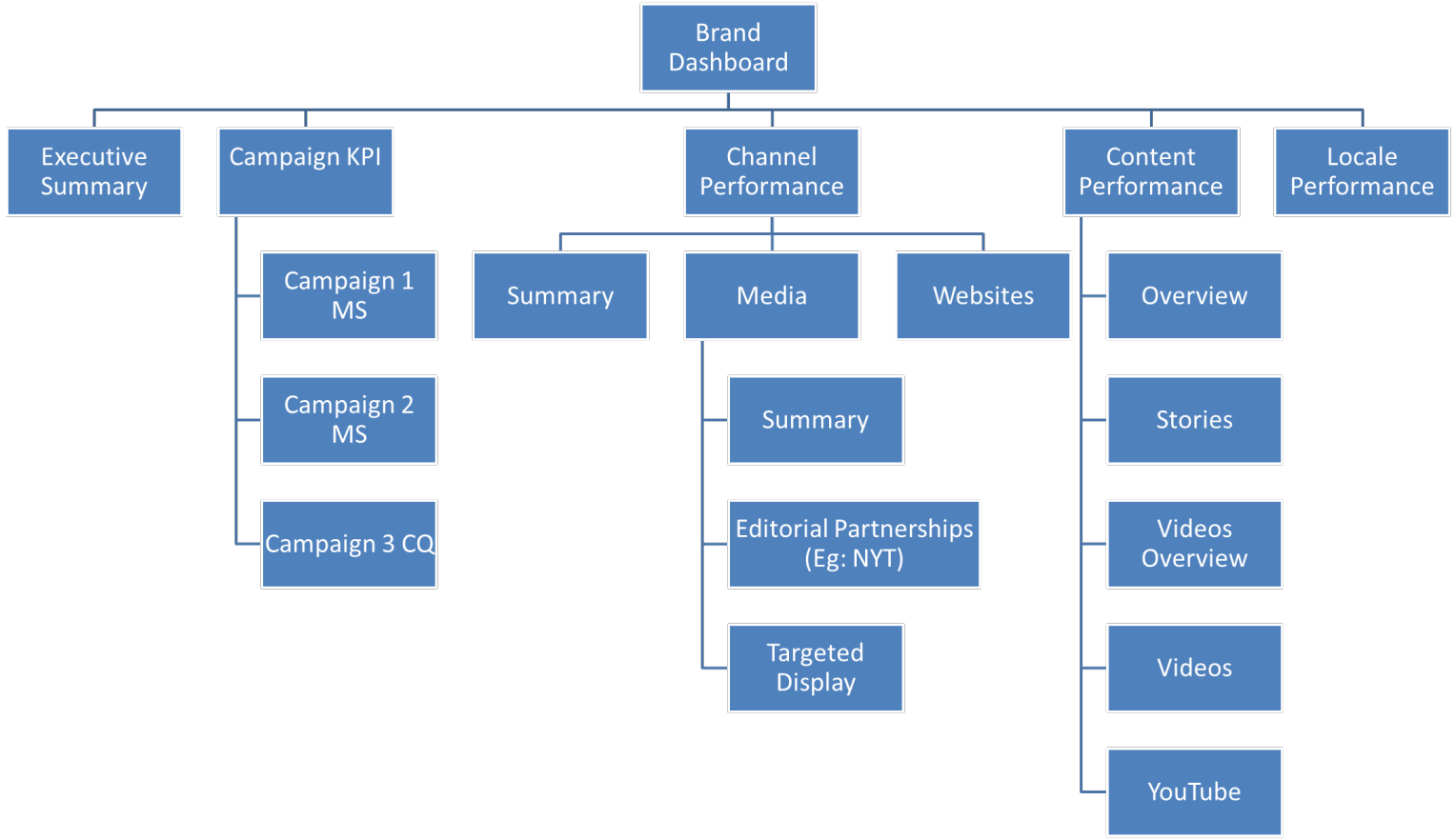
- Tabs
- Navigation
- Hierarchy
- Filters
- Charts/measures/ dimensions

- Skin, font, Logo, Color palette

Organizing levels - example

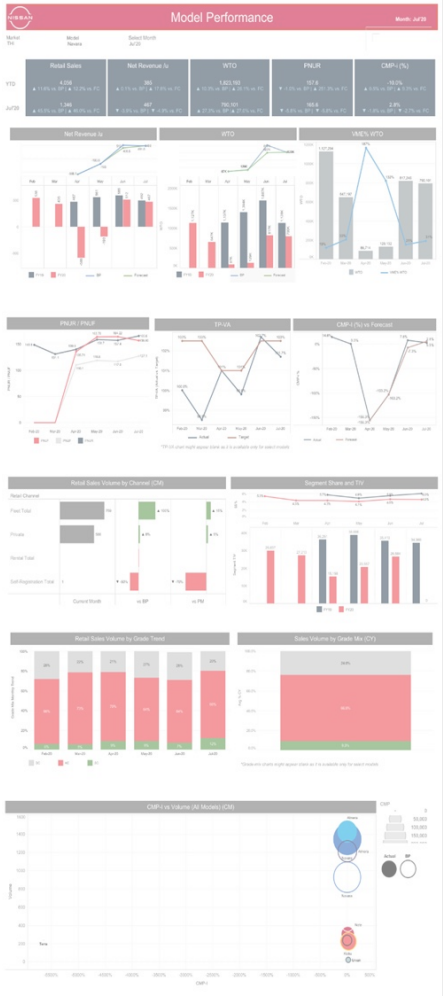


Hierarchy and Navigation

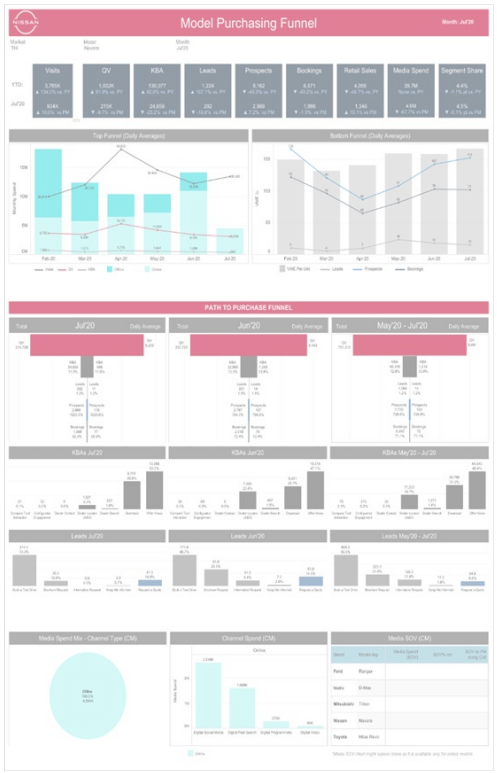


Automotive business

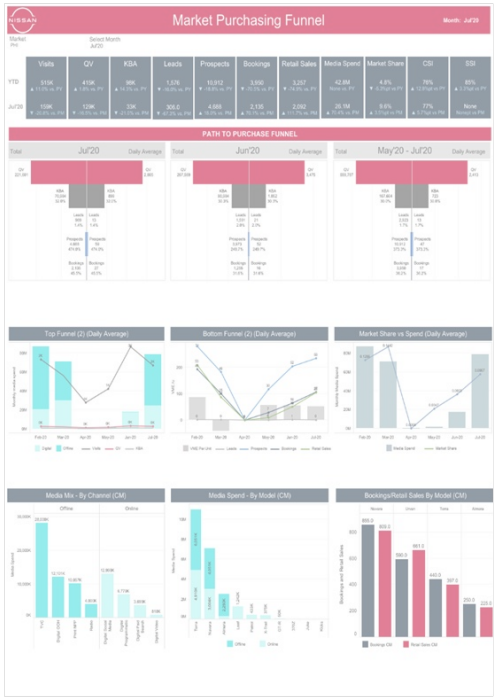
Model performance – Category managers



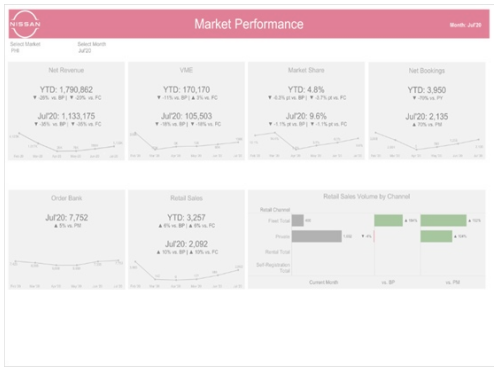
Model funnel – Category managers

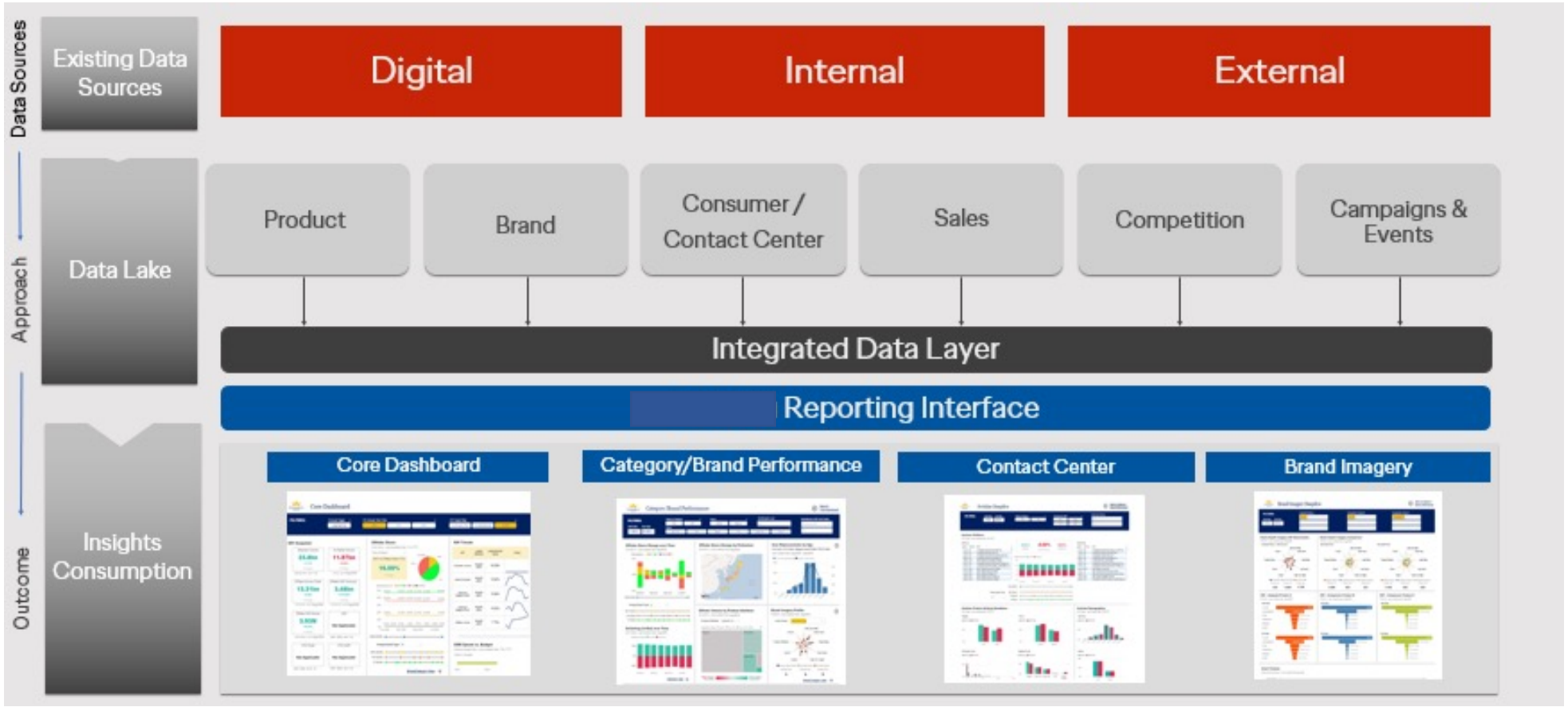


Market funnel – Market leads, VP



Market performance – VP Marketing





Architecture - Example

Data backend design and operations

Data model to fuel the dashboard
Data sources – How to get clean source data?
For each source: Is an API possible? If not, who will upload the data? How frequently? Where? What will the QC process be?
What automation is needed for ETL/ standardization?
How will exceptions be handled?
What if people upload wrong data? Will corrections be allowed?
How will data be merged to form the data model?

Challenges

- Data
  - Standardization of nomenclature and format, accuracy, inconsistency
  - Timely updates
  - Availability itself may be an issue
- Design
  - Users unable to articulate needs
  - Too many needs. Making choices
  - Changing needs
- Adoption and usage
  - Transparency may lead to resistance
  - Blaming source data issues
  - Resistance to change

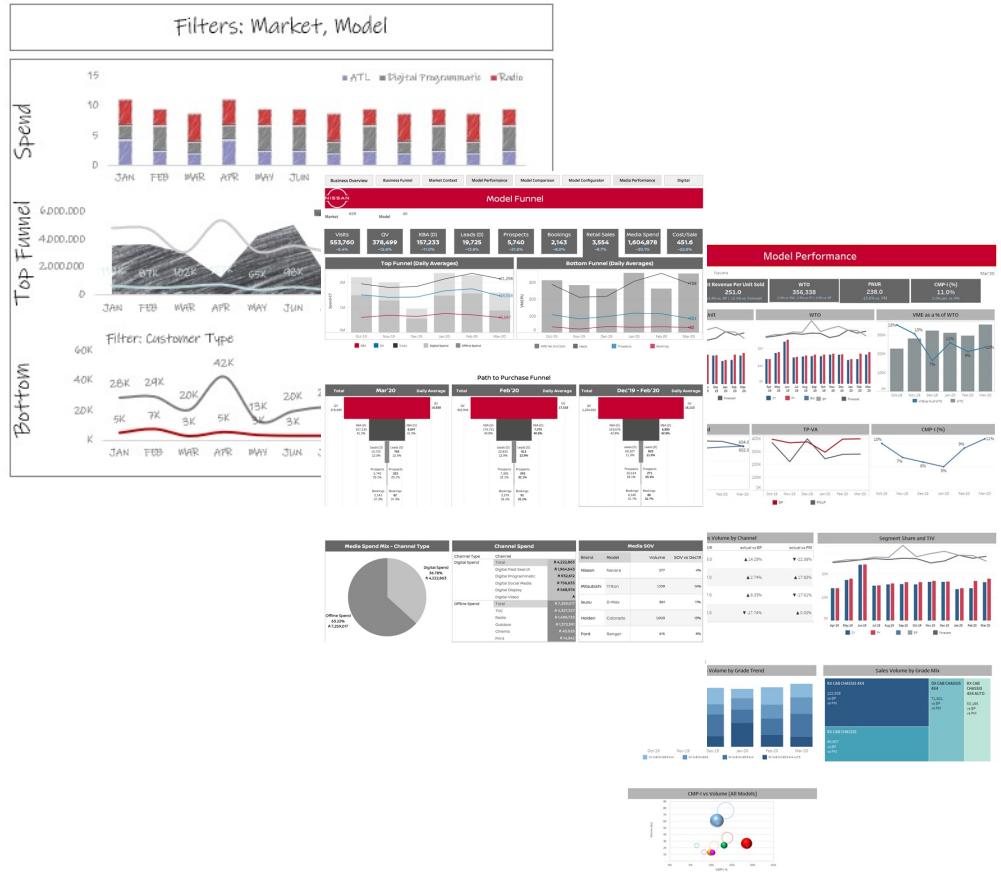
…. In dashboarding, like many other digital initiatives, seeking perfection is the enemy of progress. The data won't be perfect or even agreed-upon in the first few rounds of creating your dashboard.

Even more challenging will be changing the culture to use a central dashboard rather than local numbers.

Plus changing how you do management reviews with real-time dashboards will take time and reinforcement.

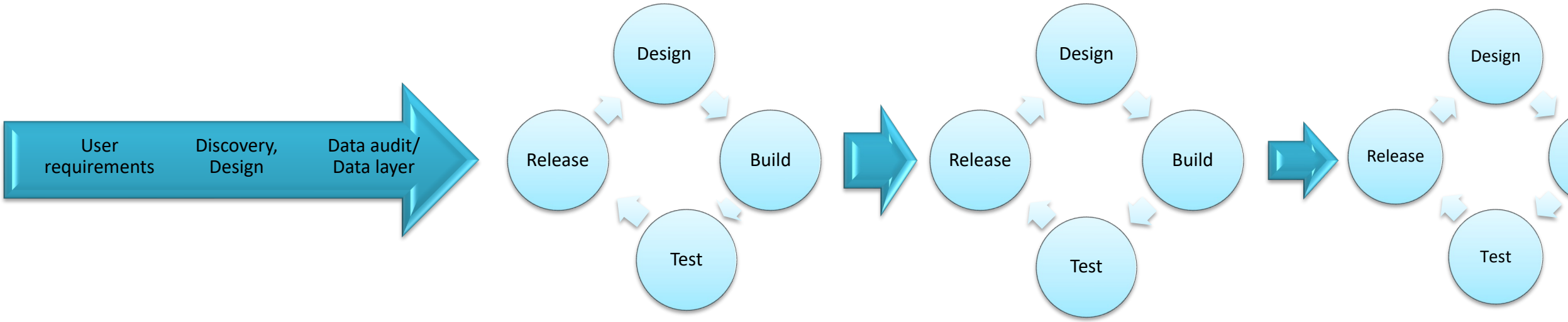
Mock-ups are an important part of design process

- Sketch
- Excel sometimes
- With Mock data
- With live data



Adaptive design

- User requirements will unfold progressively with use of dashboard.
- Availability of data is also expected to evolve over time
- With use, issues on data quality will continue to surface. An agile process can help improve data quality over time
- This allows expansion to other sets of users and divisions



Best practice

Change management – Top management sponsors

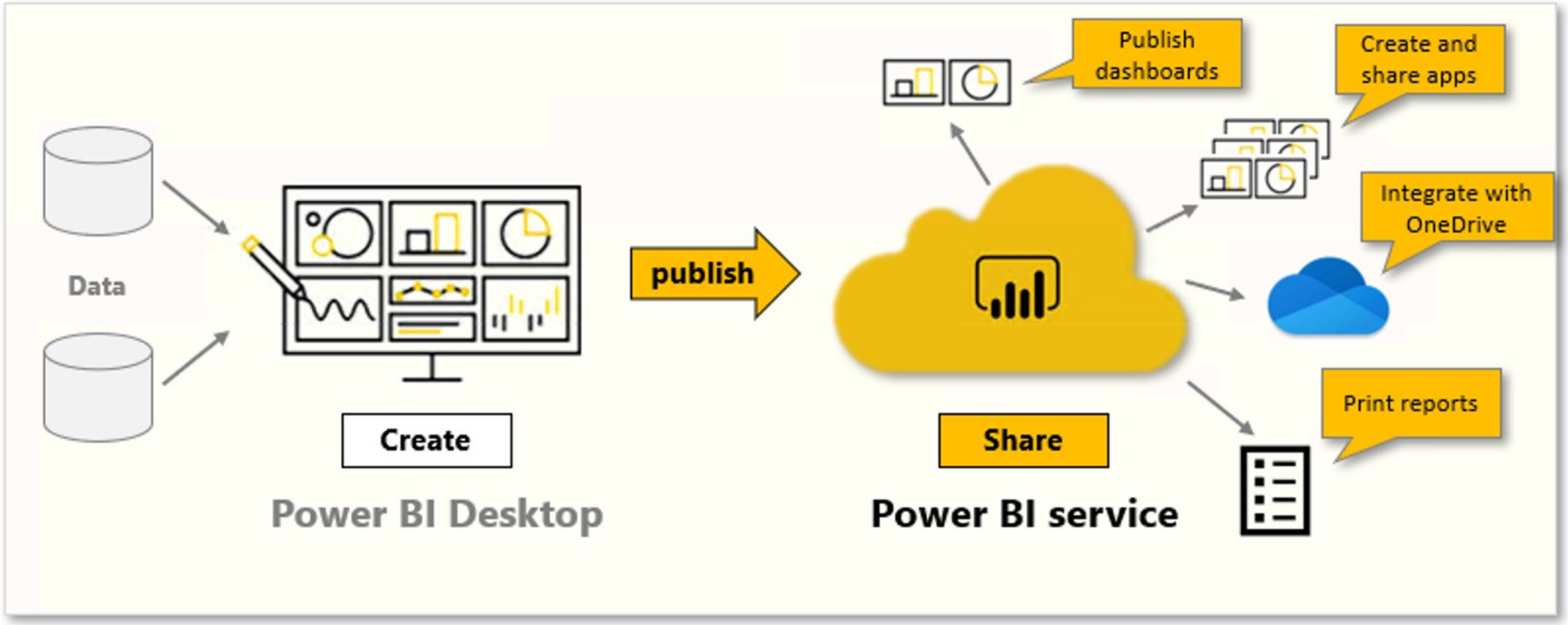
Agile development along with a core set of users. Allow for unfolding needs

Feedback mechanisms

Automation to the extent possible. Onboarding for people handling manual uploads

Measure adoption and usage

Power BI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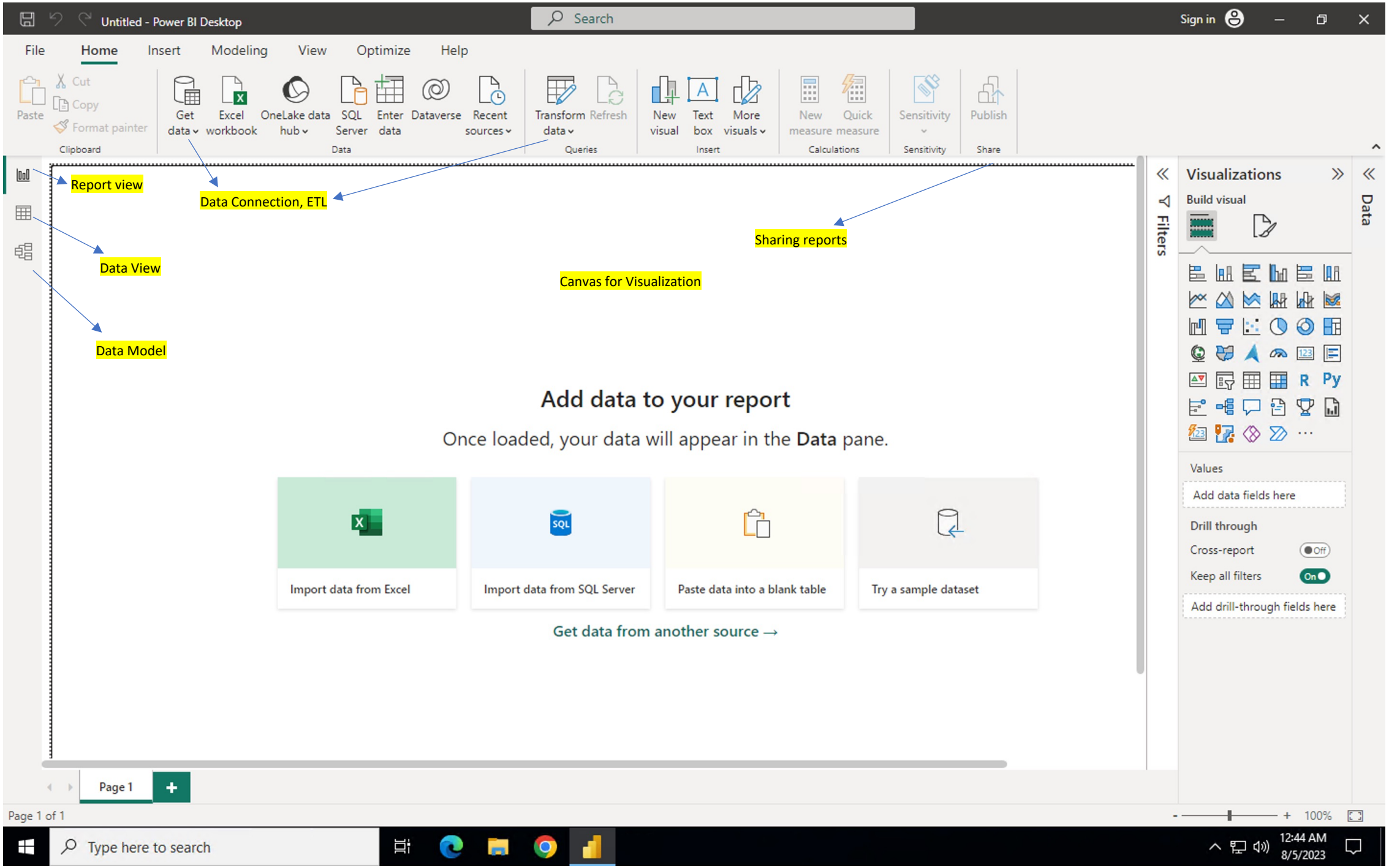
Publish dashboards
Create and share apps
Integrate with OneDrive
Print reports
Share
Power BI service

OVERVIEW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Data Model
Add data to your report
Once loaded, your data will appear in the Data pane.
Import data from Excel
Import data from SQL Server
Paste data into a blank table
Try a sample dataset
Get data from another source →
Visualizations
Build visual
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Drill through
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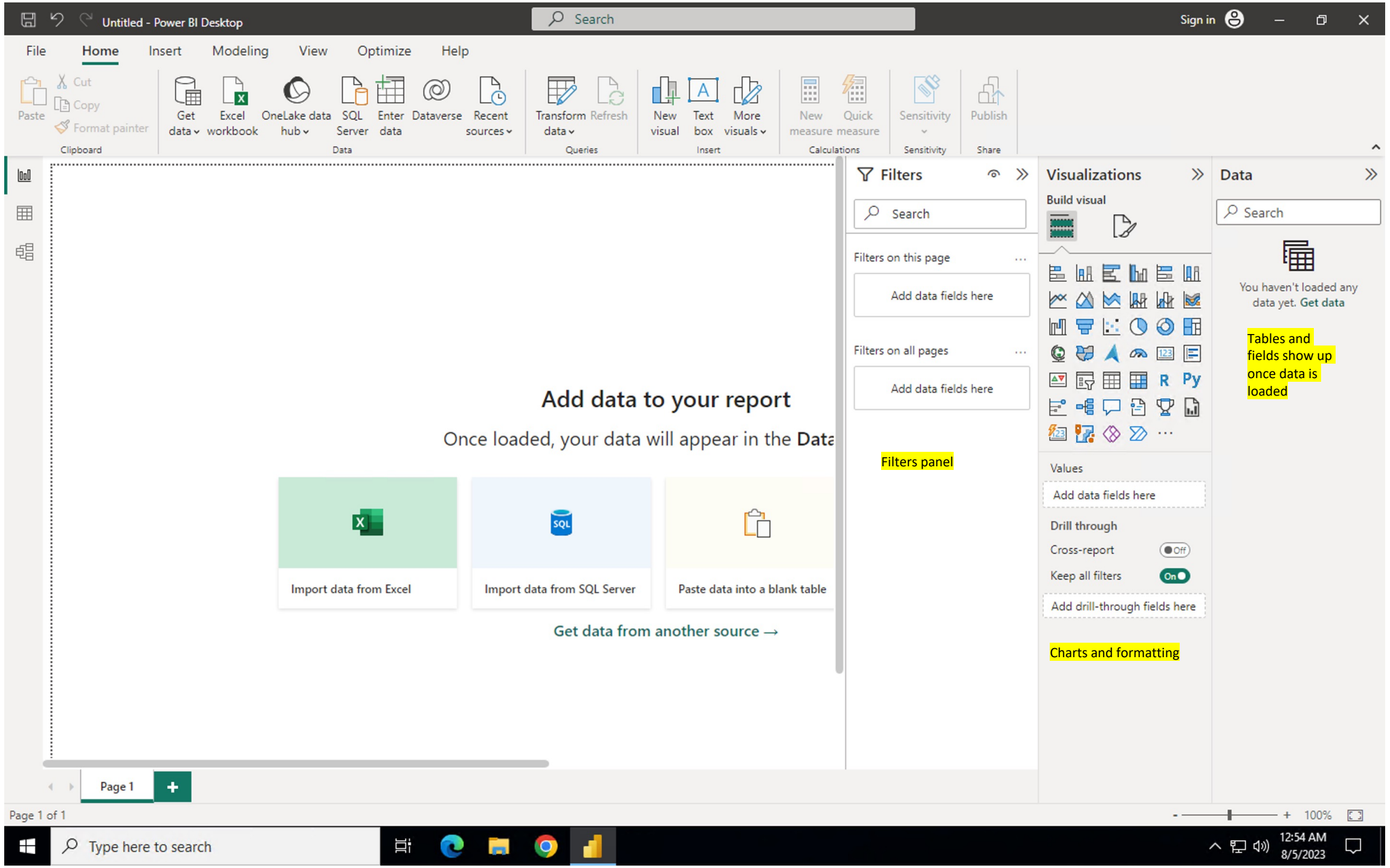
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Add data to your report
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Import data from SQL Server
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Get data from another source →
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Page 1 of 1
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Filters on all pages
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Visualizations
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Typical steps in Power BI

1 Data Discovery/ Data shaping

- Get Data – Connect to your data set
- Transform data – Data cleaning, manipulation (Shaping). Launches Power Query editor.

2 Data Modeling

- Creating relationships between source tables
- Building hierarchies
- Dax (Data analysis Expressions) calculations – to create new metrics

3 Data Visualization

- Report building (Same as dashboards?)
- Dashboards

4 Data Sharing

- Publish your work (use Power BI service on cloud)
- Schedule data refreshes/ manage security

PowerBI Hands-on

Superset Dataset

- Dataset containing Sales & Profits of a Superstore

Row ID	Order ID	Order Date	Ship Date	Ship Mode	Customer I	Customer Name	Segment	Country	City	State	Postal Co	Region	Product ID	Category	Sub-Categor	Product Name	Sales	Quantity	Discount	Profit
1	CA-2017-1	11/8/17	11/11/17	Second Class	CG-12520	Claire Gute	Consumer	United States	Henderson	Kentucky	42420	South	FUR-BO-10001798	Furniture	Bookcases	Bush Somerset Collection Bookcase	261.96	2	0	41.9136
2	CA-2017-1	11/8/17	11/11/17	Second Class	CG-12520	Claire Gute	Consumer	United States	Henderson	Kentucky	42420	South	FUR-CH-10000454	Furniture	Chairs	Hon Deluxe Fabric Upholstered Stackir	731.94	3	0	219.582
3	CA-2017-1	6/12/17	6/16/17	Second Class	DV-13045	Darrin Van Huff	Corporate	United States	Los Angeles	California	90036	West	OFF-LA-10000240	Office Supplies	Labels	Self-Adhesive Address Labels for Type	14.62	2	0	6.8714
4	US-2016-1	10/11/16	10/18/16	Standard Clas	SO-20335	Sean O'Donnell	Consumer	United States	Fort Lauderdale	Florida	33311	South	FUR-TA-10000577	Furniture	Tables	Bretford CR4500 Series Slim Rectangul	957.5775	5	0.45	-383.031
5	US-2016-1	10/11/16	10/18/16	Standard Clas	SO-20335	Sean O'Donnell	Consumer	United States	Fort Lauderdale	Florida	33311	South	OFF-ST-10000760	Office Supplies	Storage	Eldon Fold 'N Roll Cart System	22.368	2	0.2	2.5164
6	CA-2015-1	6/9/15	6/14/15	Standard Clas	BH-11710	Brosina Hoffman	Consumer	United States	Los Angeles	California	90032	West	FUR-FU-10001487	Furniture	Furnishings	Eldon Expressions Wood and Plastic De	48.86	7	0	14.1694

- Metadata or Dimensions : Descriptors to slice and dice
  - Eg Citywise Sales
  - Profits by Category