

Mastering Composite Models – Power BI for the Self-Service Developer

Ticino Data Conference
31st Oct-2025

Presented by
David Kofod Hanna



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EDITOR


Bi Factory
DATA KNOWLEDGE ADVISOR

David Kofod Hanna



Senior Advisor @ twoday

+200 courses as Academy Trainer and 10 years as consultant
MCT, Certified Tabular Editor 3 Trainer, DP-600, DP-700, PL-300, CPUX-F



Passionate about guiding self-service Power BI

developers for more enterprise manageable concepts in a consumable and practical way



Born on beautiful “Sunshine island”: Bornholm

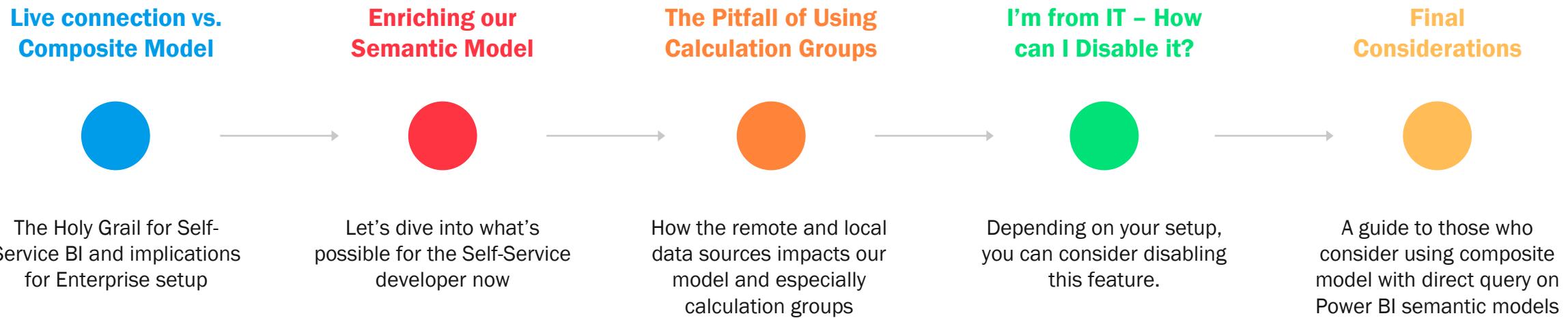
Lives in Denmark with wife and 3 kids
Love football and running half-marathons



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Mastering Composite Models –

Power BI for the Self-Service Developer

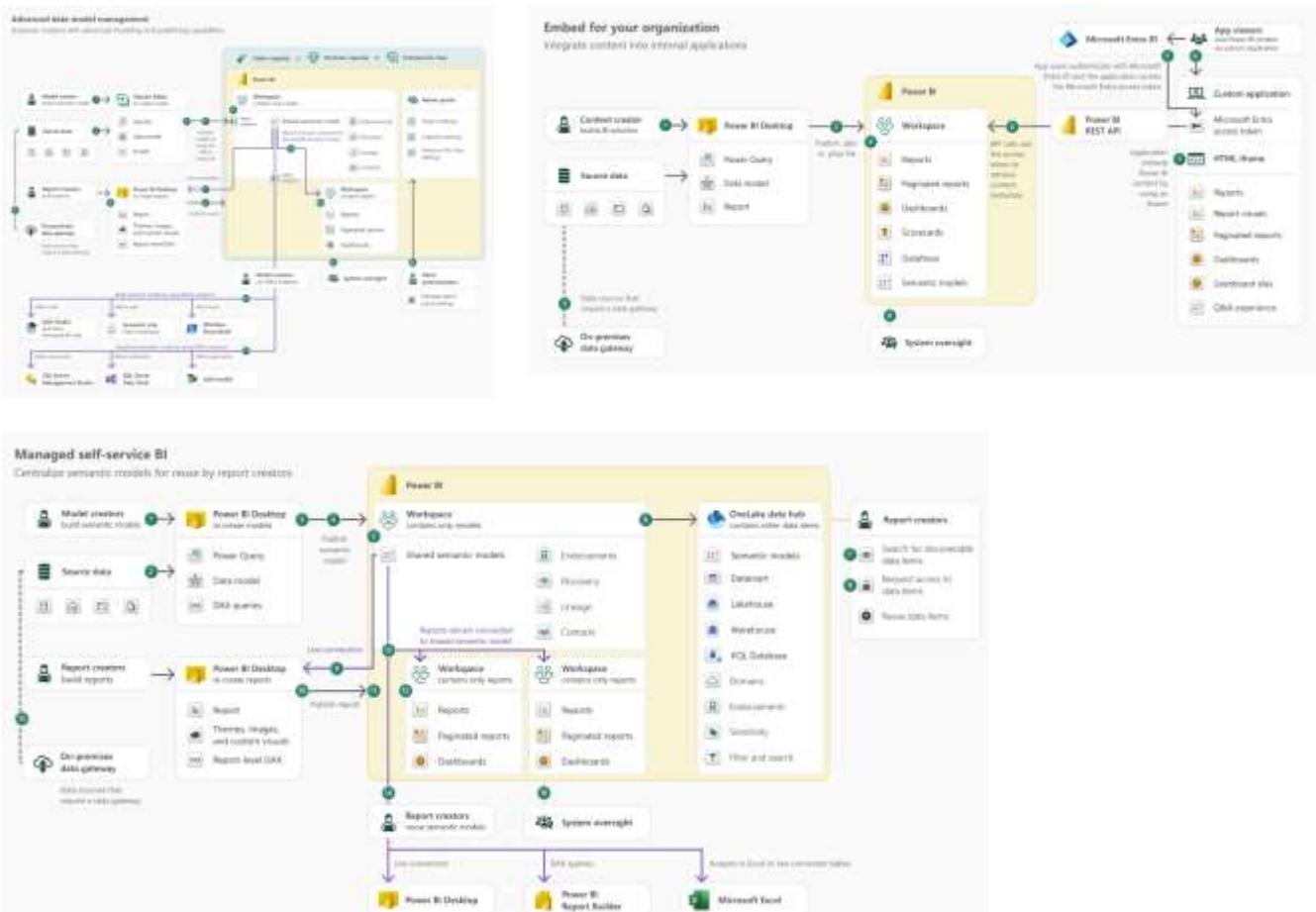


How many have explored
Composite Models with
Direct Query to Power BI Semantic
Model?



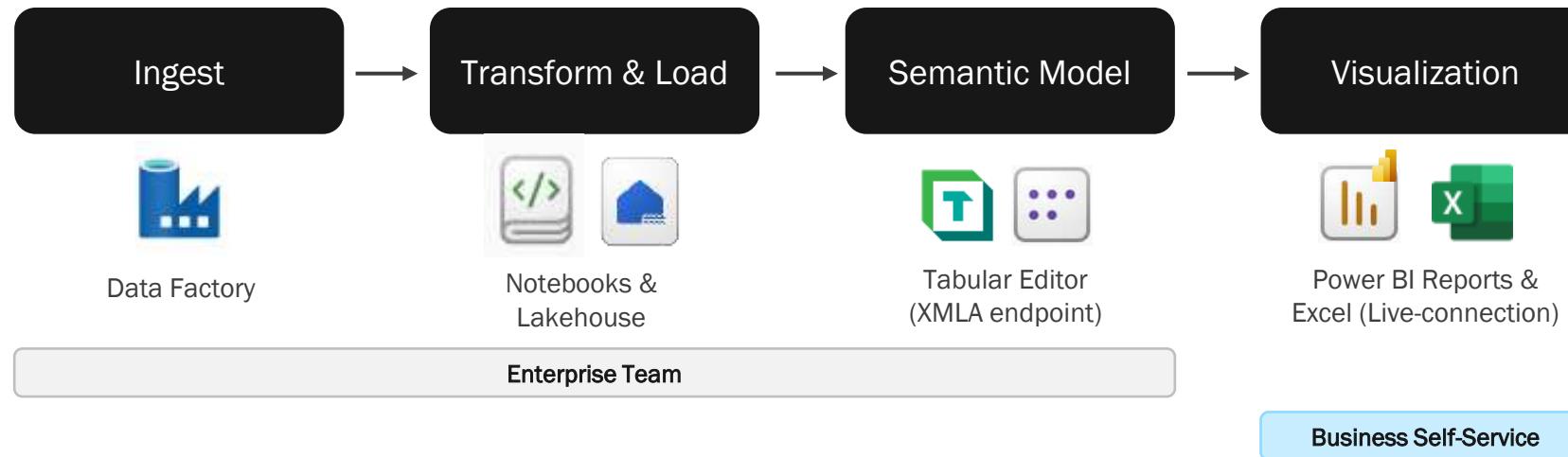
One Size Fits All?

1. Advanced data model management
 2. Advanced data preparation
 3. Customizable managed self-service BI
 4. Departmental BI
 5. Embed for your customers
 6. Embed for your organization
 7. Enterprise BI
 8. Enterprise content publishing
 9. Managed self-service BI
 10. On-premises reporting
 11. Personal BI
 12. Prototyping and sharing
 13. Self-service content publishing
 14. Self-service data preparation
 15. Self-service real-time analytics
 16. Team BI

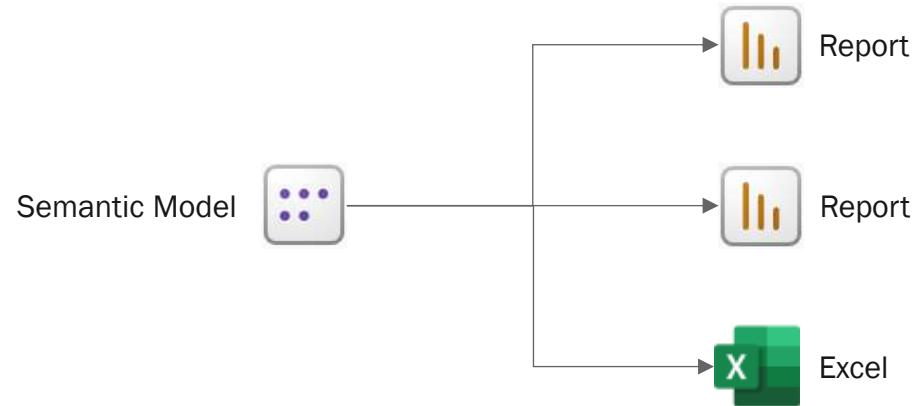


<https://learn.microsoft.com/en-us/power-bi/guidance/powerbi-implementation-planning-usage-scenario-diagrams>

Scenario



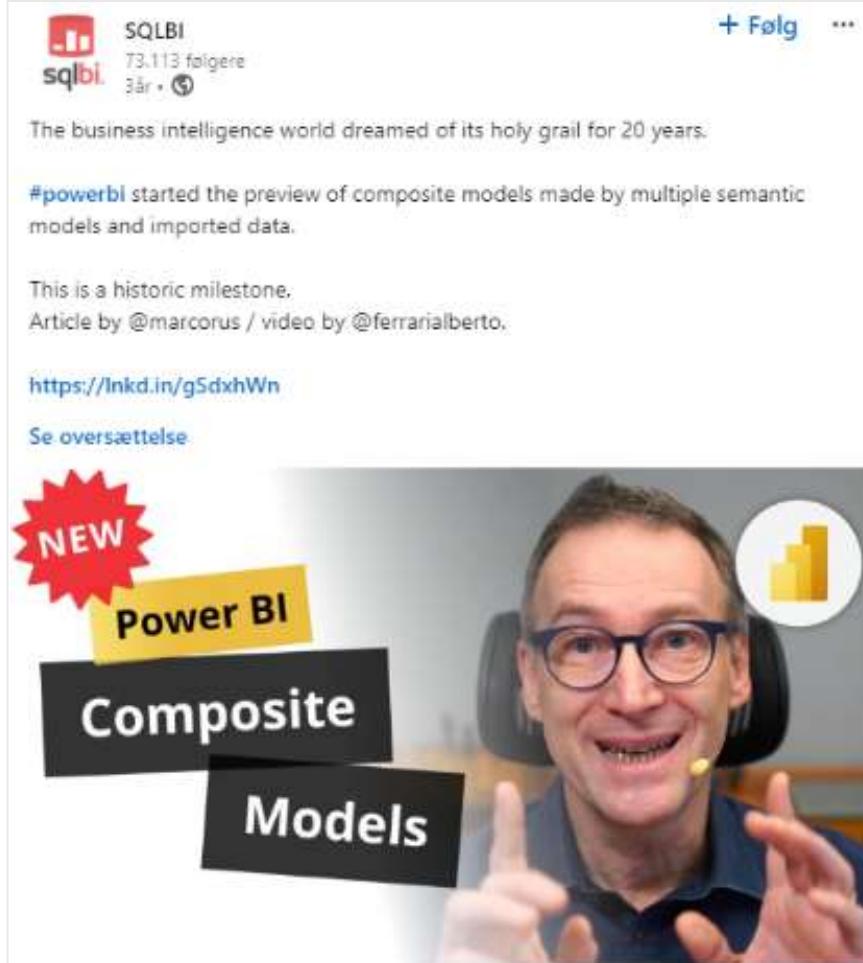
I Love Live-Connection, but ...



Demo

The Holy Grail for self-service BI

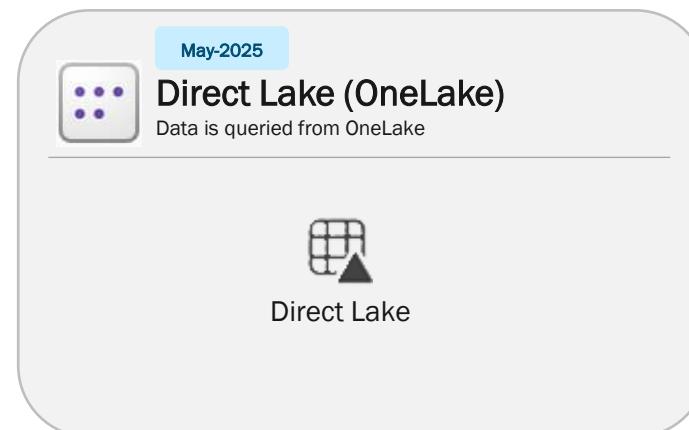
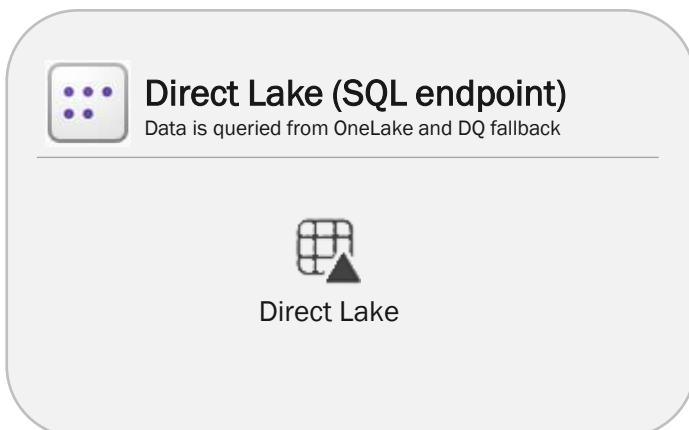
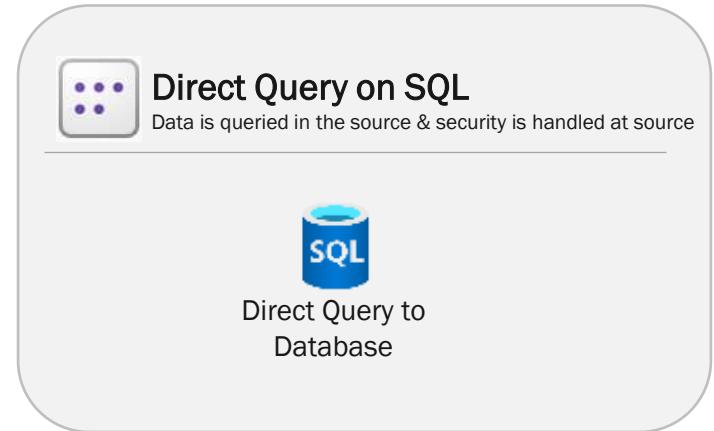
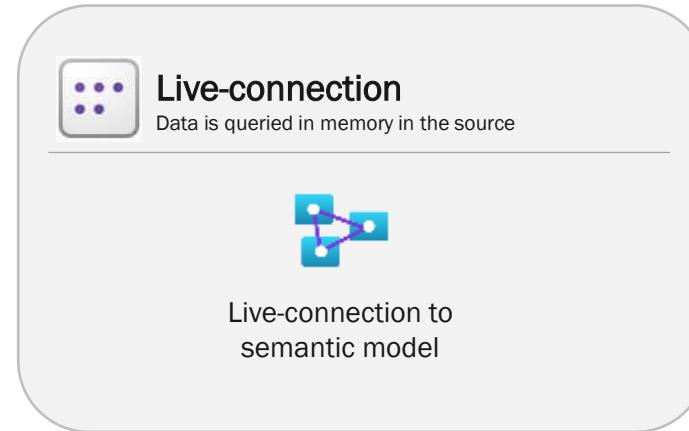
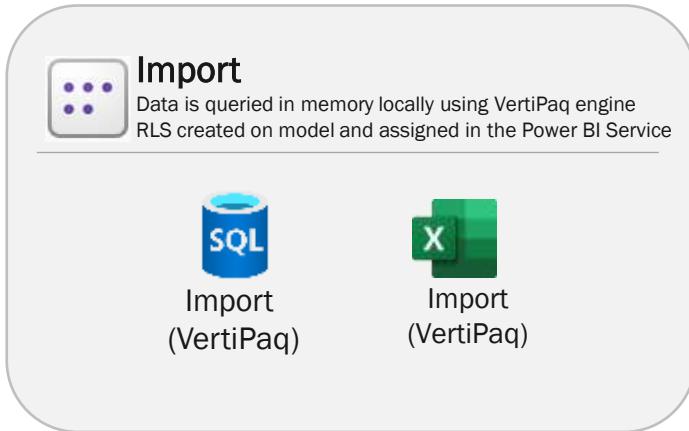
Public Preview in Dec 2020 and General Available in Apr 2023



<https://www.sqlbi.com/articles/new-composite-models-in-power-bi-a-milestone-in-business-intelligence/>

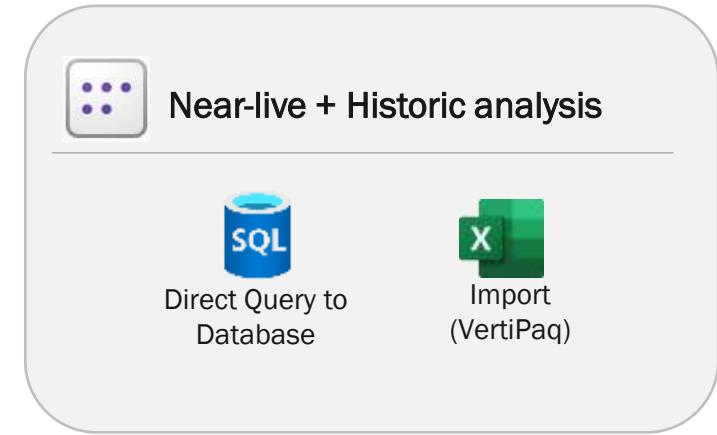
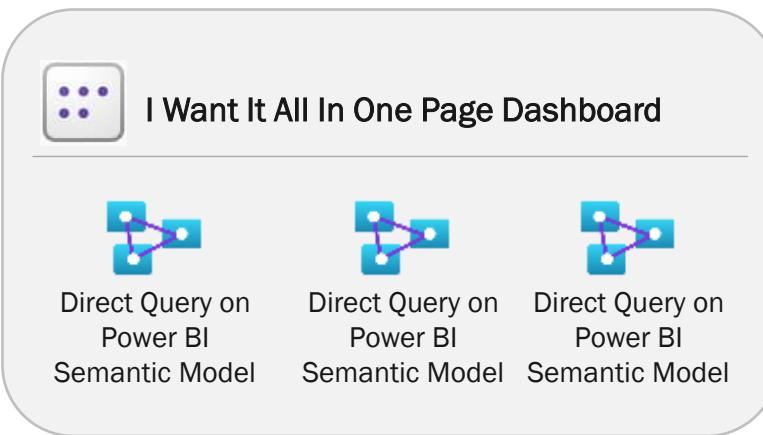
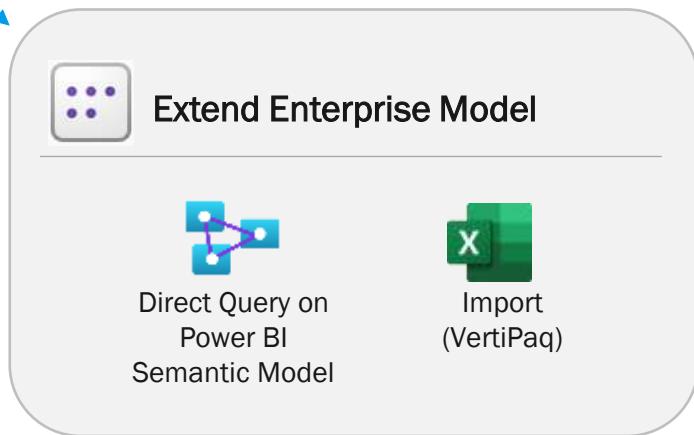
twoday academy

Storage modes for semantic model/report in Power BI

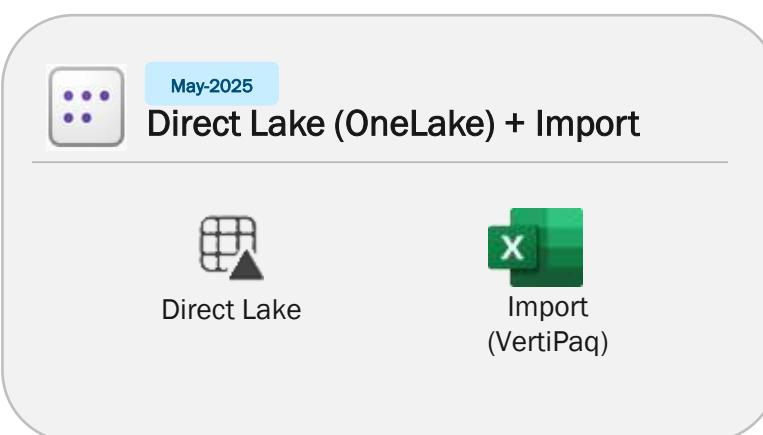


Data Mozart: [Article on comparison on Direct Lakes](#)

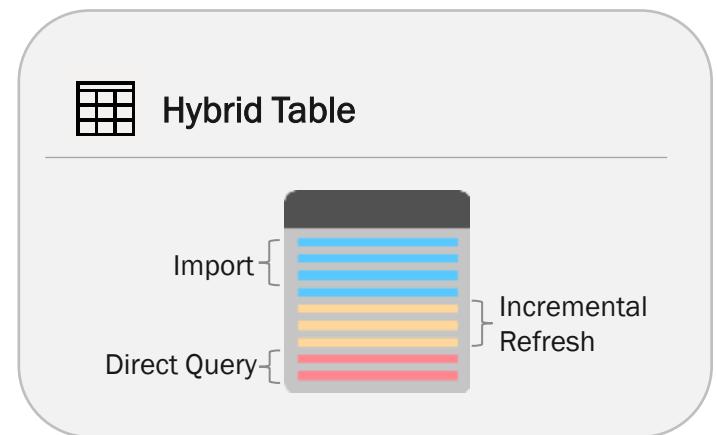
Composite Model (“Mixed storage mode”)



Using composite models with Power BI semantic models and Analysis Services, you can build a composite model using a Direct Query connection to connect to Power BI semantic models, Azure Analysis Services (AAS), and SQL Server 2022 Analysis Services



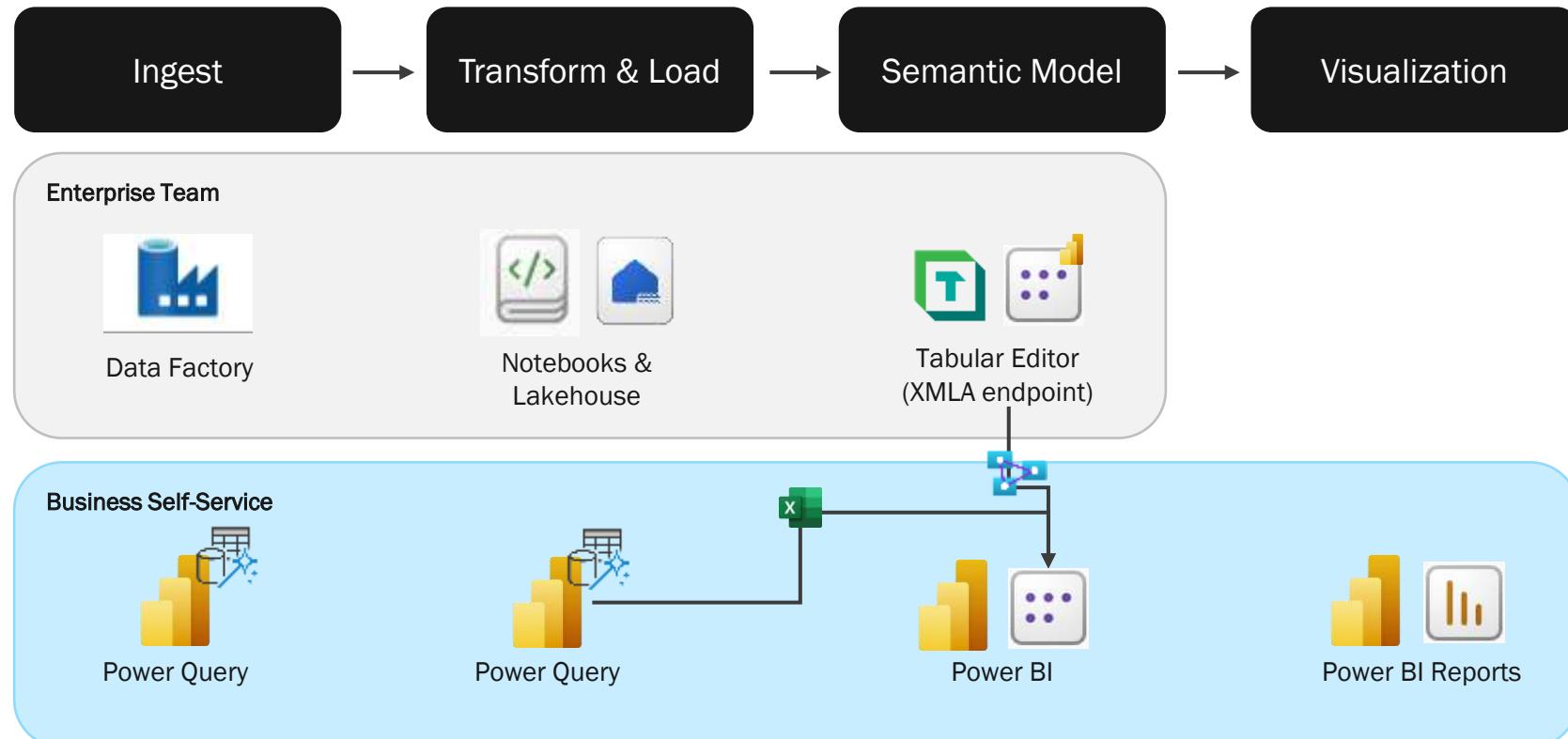
Zoe Douglas LinkedIn Post



There is also Hybrid tables that within one table have import, incremental refresh and Direct Query.

Customizable managed self-service BI

*discipline at the core and **flexibility** at the edge*



Microsoft Usage Scenario: <https://learn.microsoft.com/en-us/power-bi/guidance/powerbi-implementation-planning-usage-scenario-customizable-managed-self-service-bi>

Demo

discipline at the core and **flexibility** at the edge

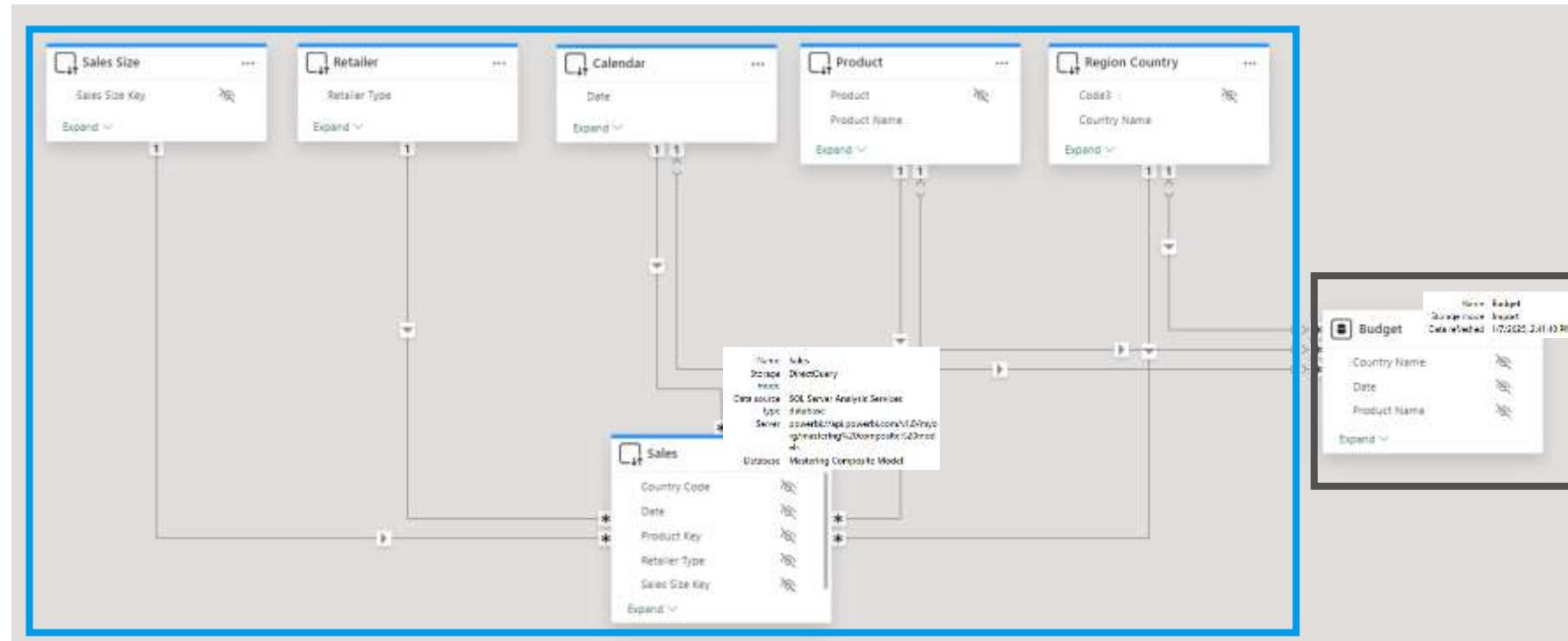


Wholesale
(Remote)
Enterprise Team



Retail
(Local)
Self-Service Business
Dev

Remote & Local



Who loves to include a
calculation group in their
semantic model?



Calculation Group 101

SELECTEDMEASURE()

Reuseable calculation items based on measures in the report canvas

- Time Intelligence (*MTD, QTD, YTD, LY, YOY %*)
- Unit conversion (*show figures in abs, in k, in m*)
- Format String Expressions (*like dynamic format string for measures*)
- Handling Multiple Dates (*USERELATIONSHIP to switch between order and invoice date*)
- Custom Date or Week Periods as slicer in report
- My vs. All stats
- And more ...

The screenshot shows a Power BI report interface. On the left, there is a date slicer with options: Last 30 Days, Last 3 Months, Last 6 Months, Current Year, Last Year, All, and Custom. The 'Last 30 Days' option is selected. In the center, there is a card displaying '12.0M Revenue' with the date range '4/22/2025 - 5/21/2025'. To the right of the card is a smiling emoji wearing sunglasses. On the far right, there is a sidebar titled 'Calculation Groups to the Rescue' featuring a photo of David K. Harris and some text. Below the sidebar, there are two large snippets of DAX code. The top snippet is for 'Date.Slicer' and the bottom snippet is for 'Date.Slicer[Date.slicer_value]'. Both snippets include comments explaining the logic, such as 'Our slicer default in Power BI should have the UX as this option, but until then let's make it easy for our end users with a click of a button.'

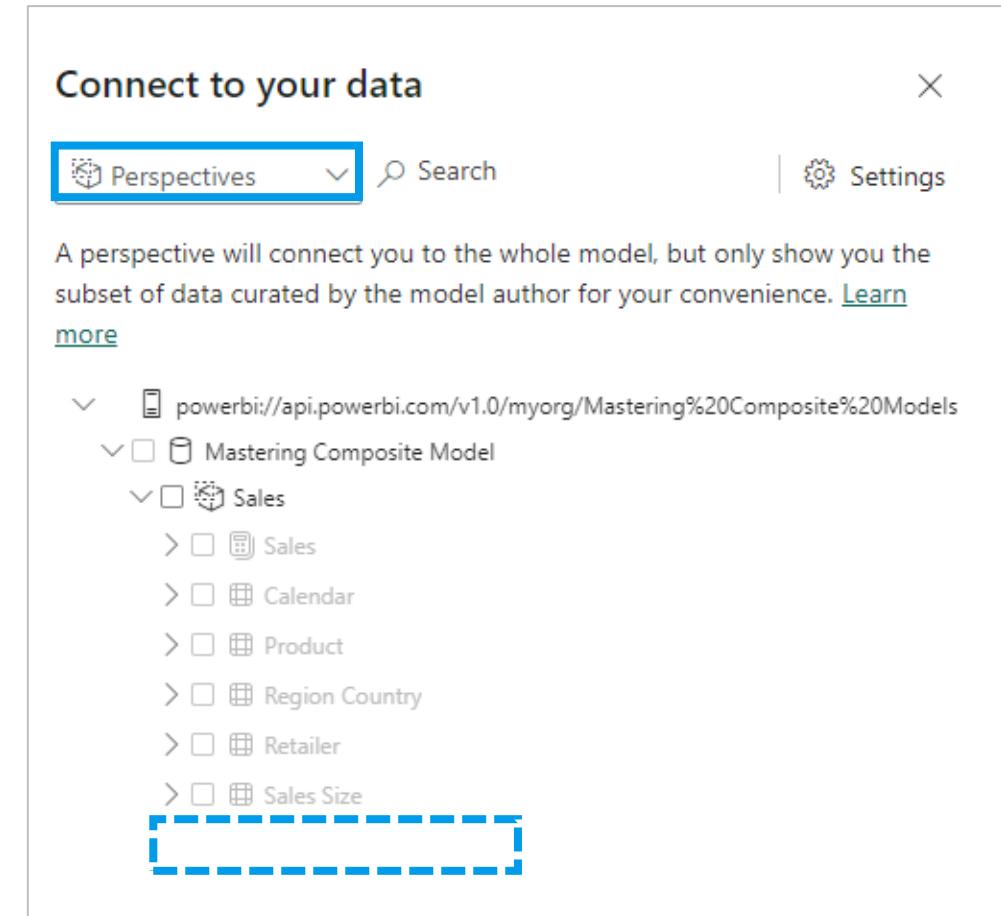
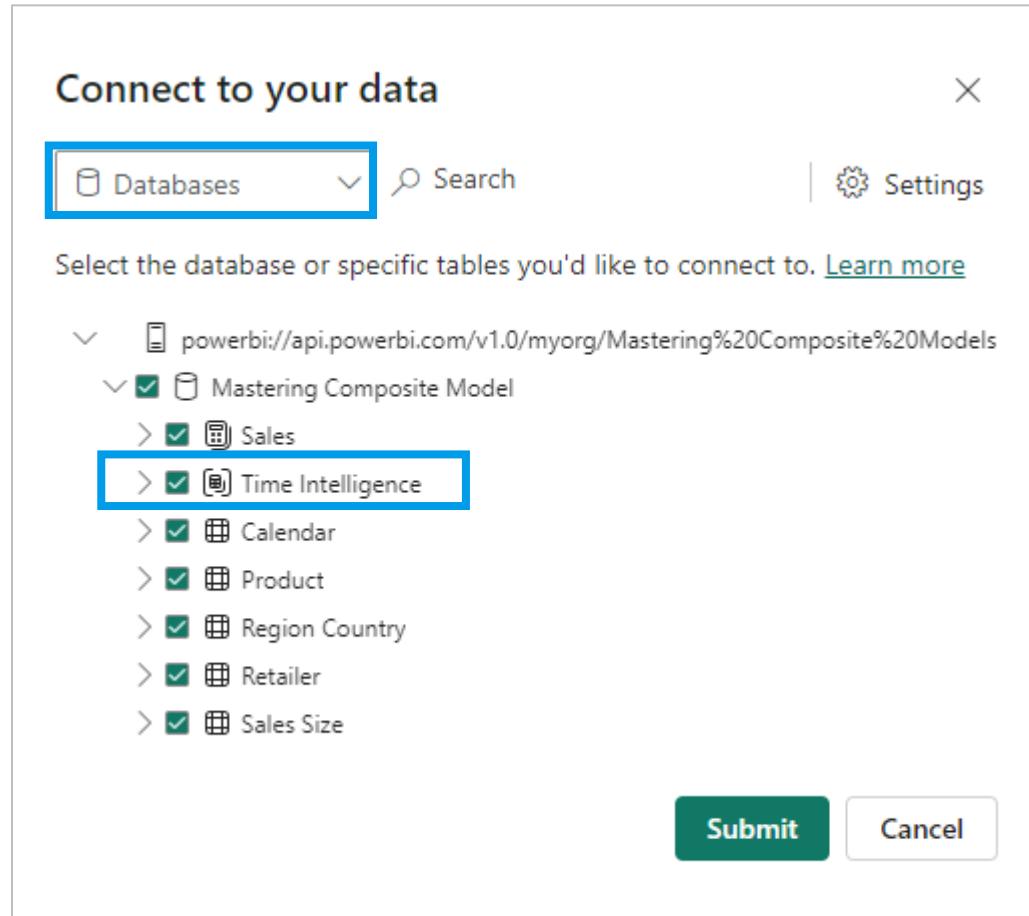
```
CALCULATIONITEM "Date.Slicer" =  
VAR _date = FILTERED  
CALCULATE ISFILTERED("Date[Date]"), ALLSELECTED()  
VAR _day = #  
VAR _month =  
IF  
    ISBLANK(_date),  
    SELECTEDVALUE("Date[Date]"),  
    CALCULATE  
        ISBLANK(_date),  
        SELECTEDVALUE("Date[Date]"),  
        DATEFROMPARTS(YEAR([Date]), MONTH([Date]), #)  
    RETURN  
    _month  
END  
  
CALCULATIONITEM "Date.Slicer[Date.slicer_value]" =  
VAR _date = FILTERED  
CALCULATE ISFILTERED("Date[Date]"), ALLSELECTED()  
VAR _day = #  
VAR _month =  
IF  
    ISBLANK(_date),  
    SELECTEDVALUE("Date[Date]"),  
    CALCULATE  
        ISBLANK(_date),  
        SELECTEDVALUE("Date[Date]"),  
        DATEFROMPARTS(YEAR([Date]), MONTH([Date]), #)  
    RETURN  
    _month
```

<https://www.linkedin.com/feed/update/urn:li:activity:7331027969357824000/>

Demo

Consideration ...

Create perspectives to exclude calculation group when create composite

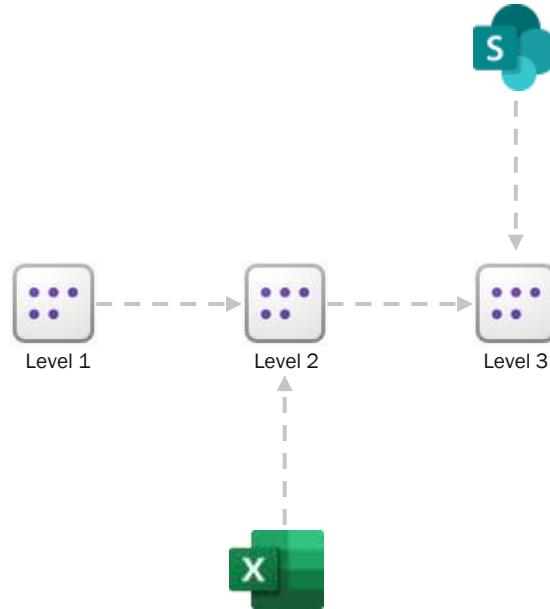


A Dream in a Dream in A Dream



The maximum length of a chain of models is three.

Extending beyond the chain length of three isn't supported and results in errors.



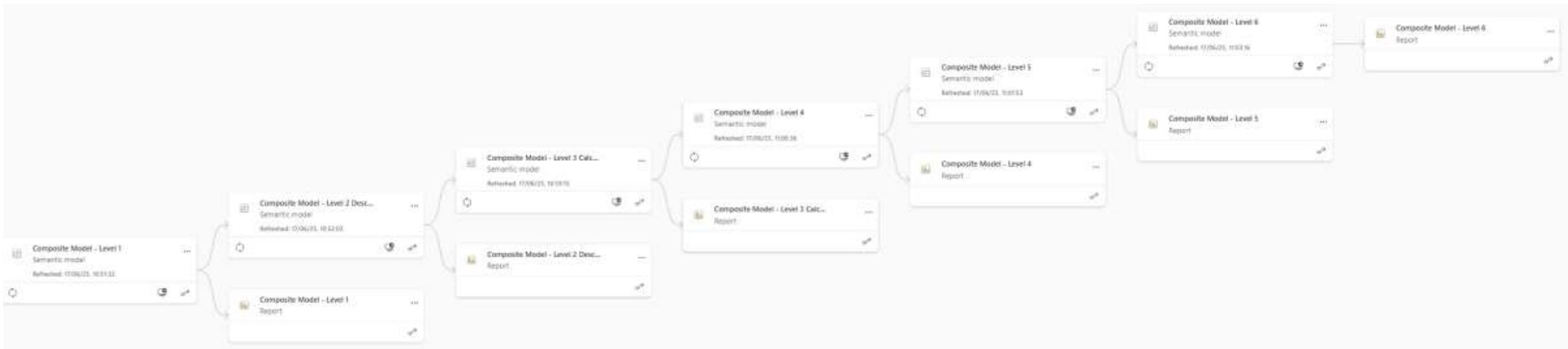
A Dream in a Dream in A Dream



~~The maximum length of a chain of models is three.~~

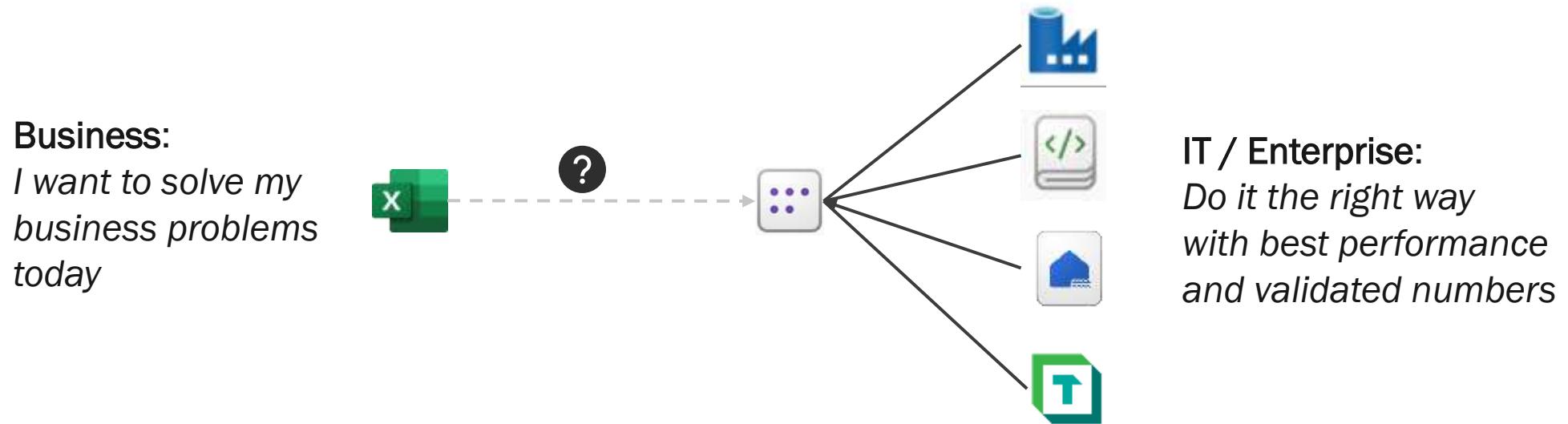
~~Extending beyond the chain length of three isn't supported and results in errors.~~

Well I have a bit more

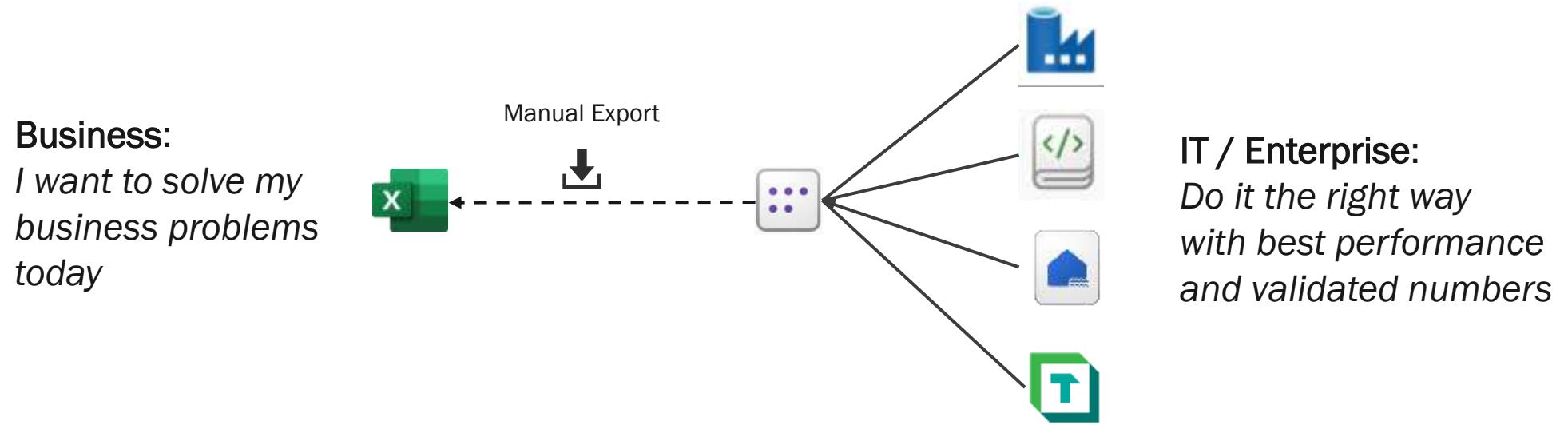


Who owns the data?

- Who owns the semantic model?
- Who supports it?
- What about scheduled refresh?
- Do you have an agreed data contract?
- Would enterprise modelers even accept integrating an important Excel-file into an enterprise setup?



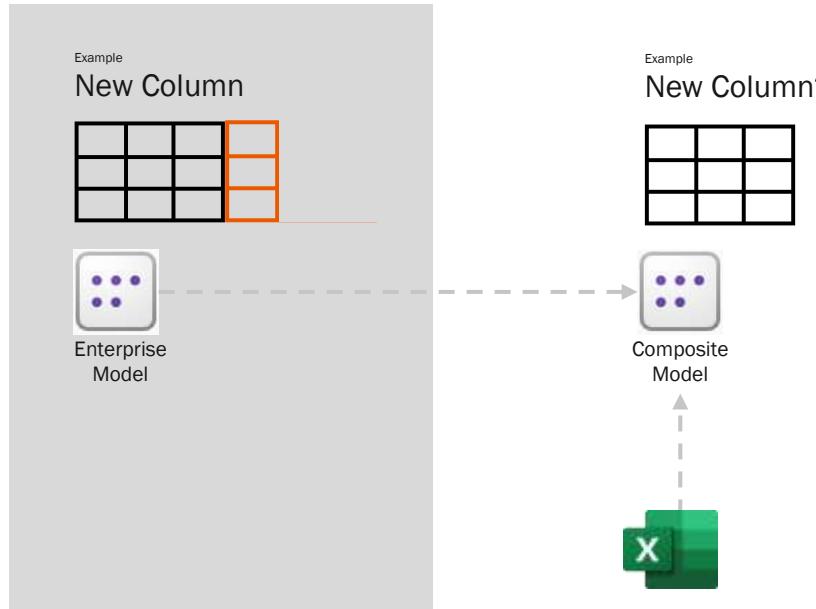
Well then – I will **Export your Enterprise data to Excel** and continue my work to solve my business problems



Handling Schema Changes in Enterprise Model



Once changes to an enterprise semantic model are published,
they are **not** automatically propagated to the composite model!



A screenshot of the 'Connect to your data' dialog in Power BI. It shows a list of databases and tables under 'Mastering Composite Model'. To the right, a 'Settings' dialog is open with the following configuration:

- Automatically connect to tables added later
- When items from different sources have duplicate names, add text so you can tell them apart
 - Add this text:
 - To:
 - When:

Buttons at the bottom include 'Submit', 'Cancel', 'Save', and 'Cancel'.

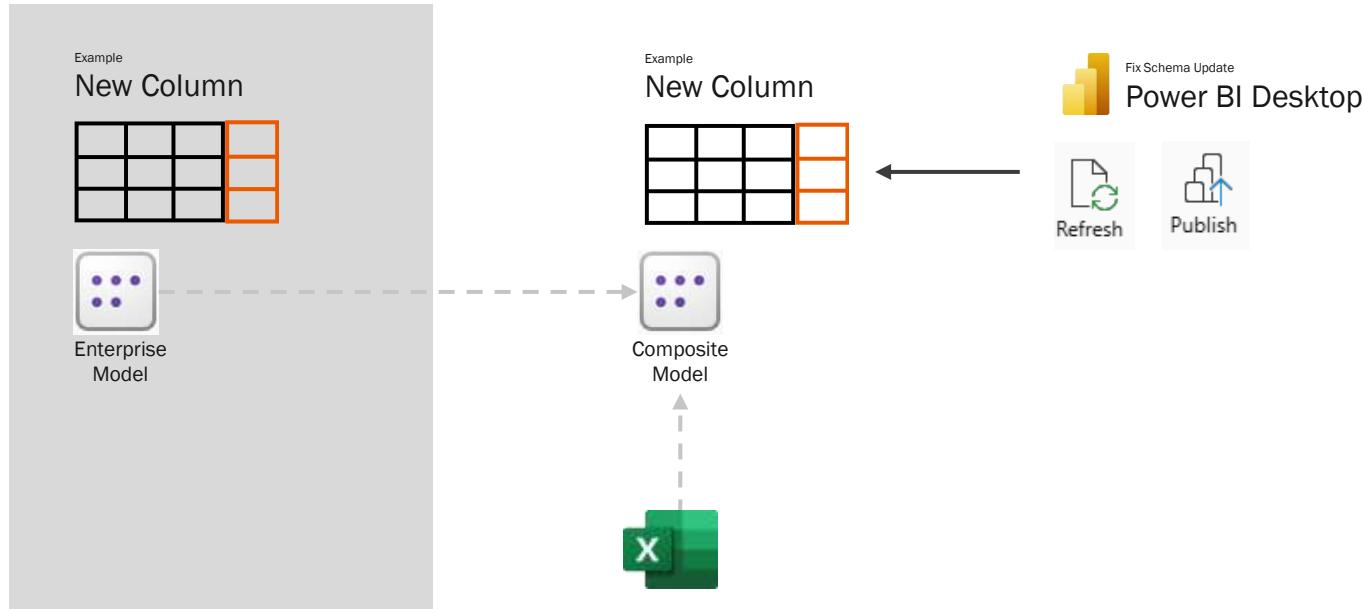
Handling Schema Changes in Enterprise Model

For schema changes propagated to the composite model, you must:

- open the composite semantic model in Power BI Desktop

- manually refresh

- Republish the composite model



I'm from IT or Enterprise team: How can I **disable** this?



[Individual model]

Power BI Desktop settings before publishing

CURRENT FILE

- Data Load
- Regional Settings
- Privacy
- Auto recovery
- Published semantic model settings**
- Query reduction
- Report settings

DirectQuery connections to this semantic model

This prevents users from creating DirectQuery connections to this semantic model in Power BI Desktop. If you change this setting, you'll need to republish your report to save it.

Discourage DirectQuery connections [Learn more](#)



[Tenant]

Admin Portal in Tenant Settings

Export and sharing settings

- Allow **DirectQuery** connections to Power BI semantic models

Enabled for the entire organization

DirectQuery connections allow users to make changes to existing semantic models or use them to build new ones. [Learn More](#)

 Enabled

Summary of Considerations for Composite Models

- ⚠ Choose the right storage mode for your need and whenever possible add to existing shared model and create live-connection*
- Composite models are NOT for the enterprise team to create and deliver large models with relationships
- Composite models are for the business self-service developers to provide flexibility at the edge (explore, ad-hoc, Pilot, POC, let's go fast and solve business problems today)
- Be aware of implications of composite models when using calculation groups and calculating measures between remote and local data source groups
- Calculation group with format string expression or measures with dynamic format string works only for model measures in remote – even in live connection
- Be aware of security implications of a query sent to remote model can include data values from local model
- Be aware of performance as composite models will not benefit from visual caches across reports as with live-connection, assume referentially integrity and multiple query types
- You should not use composite models with relationships that have 10,000 unique values or more. For example, create relationship on year or month instead of date
- Be aware of ownership (read access to semantic model in Power BI workspace app vs. Org App in Fabric) and avoid creating chain-on-chain-on-chain models
- Shared expressions (parameters in Power Query), Translations and RLS are not imported from the remote model nor possible to add for remote model objects
- Consumers of a composite model see the results of the OLS rules that were applicable to the author of the composite model when they created the model
- Potential break connection to composite model if renaming semantic model or workspace (hard coded for name and not ID)
- Once schema changes to an enterprise semantic model are published, they are not automatically propagated to the composite model!
- As default enabled, but based on your scenario you can disable it on individual semantic models or at tenant level (and in addition investigate external semantic models)
- Naming convention “Local” if duplicates and Enterprise team semantic model owner can utilize Perspectives to share subsets of model excl. remote calculation groups
- As with Live-connection, add model documentation with INFO.VIEW functions or measure expression as description field for self-service developers

*Tools for migrating report-level objects:

-  Notebooks in Fabric (Michael Kovalsky's Semantic Link Labs)
-  Tabular Editor (C# Scripts and copy M code from local model)
-  ALM Toolkit (Compare and merge .bim)

”

Roche's Maxim of Data Transformation:

Data should be transformed
as far upstream as possible, and
as far downstream as necessary.

Thank you!



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Self-Service Developer