

Mastering Composite Models –

Power BI for the Self-Service Developer

*Ticino Data Conference
31st Oct-2025*

*Presented by
David Kofod Hanna*



twoday



2025
TICINO DATA
CONFERENCE

SPONSORS

Brought to you by



Main sponsor



Gold sponsors



Dinner sponsor



Silver sponsors



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



twoday

Mastering Composite Models –

Power BI for the Self-Service Developer

Live connection vs. Composite Model



The Holy Grail for Self-Service BI and implications for Enterprise setup

Enriching our Semantic Model



Let's dive into what's possible for the Self-Service developer now

The Pitfall of Using Calculation Groups



How the remote and local data sources impacts our model and especially calculation groups

I'm from IT – How can I Disable it?



Depending on your setup, you can consider disabling this feature.

Final Considerations



A guide to those who consider using composite model with direct query on Power BI semantic models

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

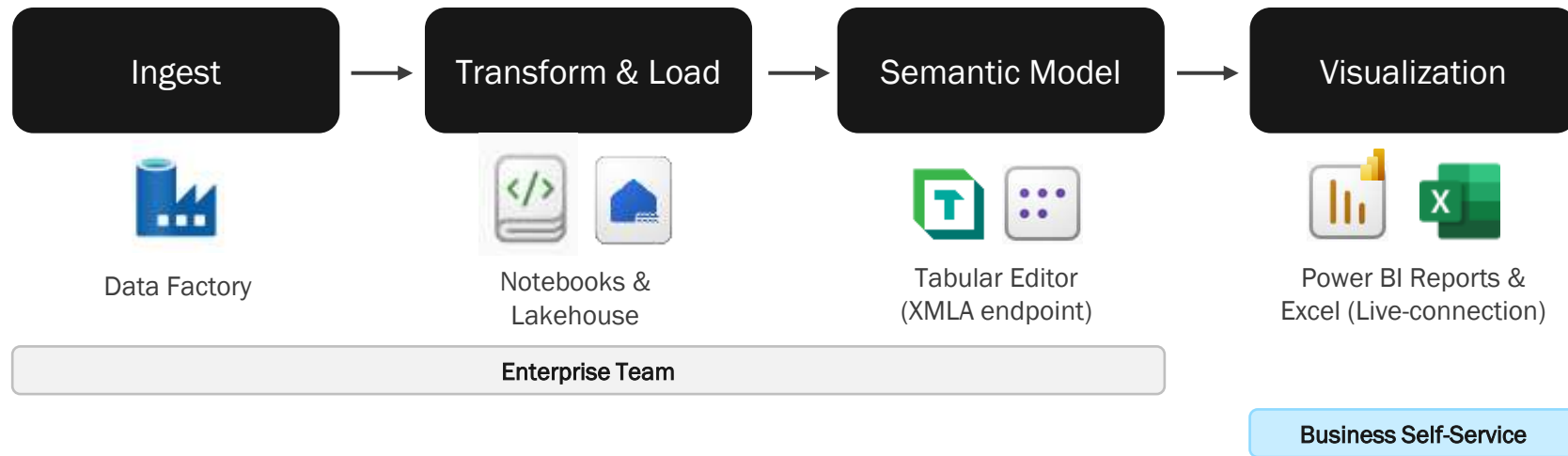


One Size Fits All?

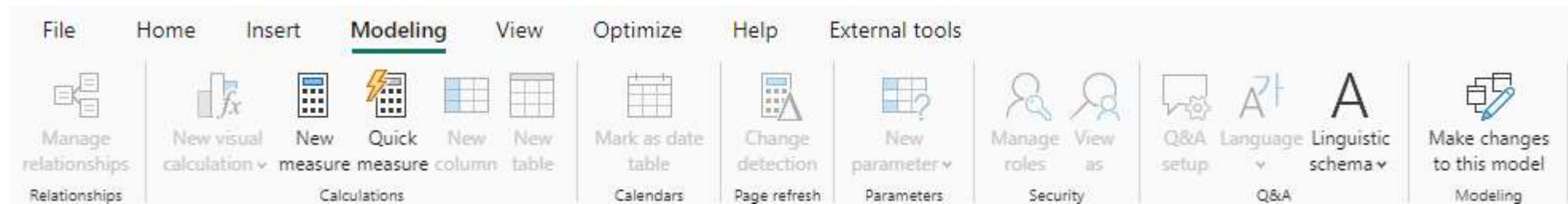
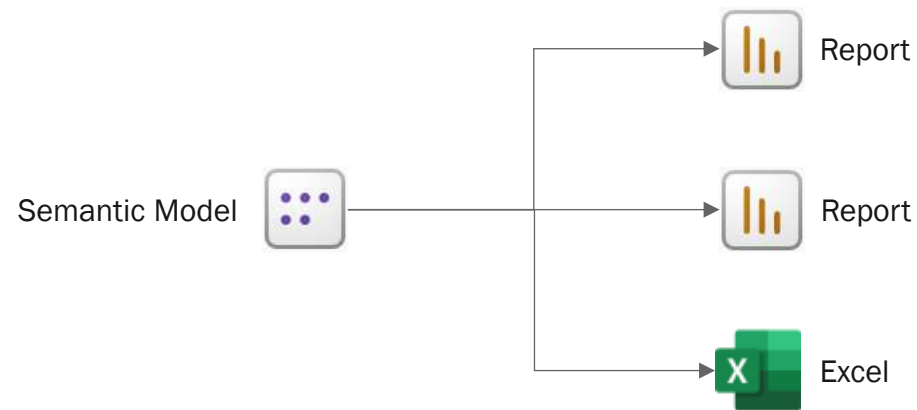
1. Advanced data model management
2. Advanced data preparation
3. Customizable managed self-service BI
4. Departmental BI
5. Embed for your customers
6. Embed for your organization
7. Enterprise BI
8. Enterprise content publishing
9. Managed self-service BI
10. On-premises reporting
11. Personal BI
12.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



Scenario



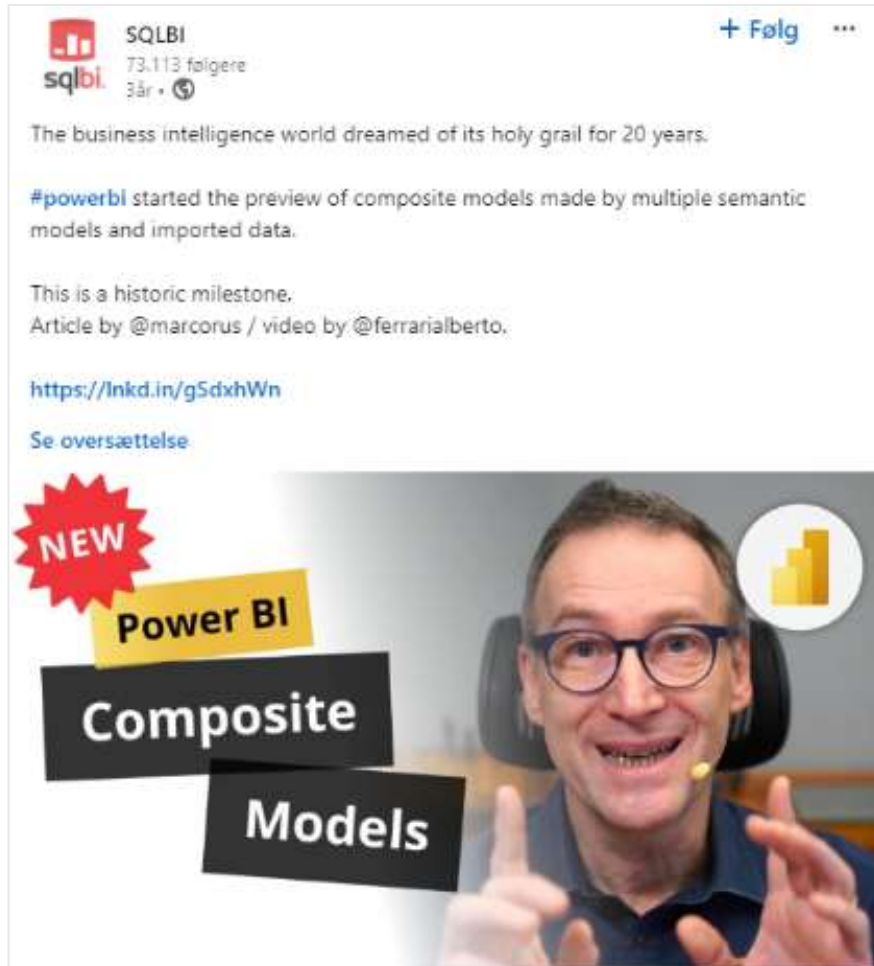
I Love Live-Connection, but ...



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/>

Storage modes for semantic model/report in Power BI



Import

Data is queried in memory locally using VertiPaq engine
RLS created on model and assigned in the Power BI Service



Import
(VertiPaq)



Import
(VertiPaq)



Live-connection

Data is queried in memory in the source



Live-connection to
semantic model



Direct Query on SQL

Data is queried in the source & security is handled at source



Direct Query to
Database



Direct Lake (SQL endpoint)

Data is queried from OneLake and DQ fallback



Direct Lake

May-2025



Direct Lake (OneLake)

Data is queried from OneLake



Direct Lake

Composite Model (“Mixed storage mode”)



Extend Enterprise Model



Direct Query on
Power BI
Semantic Model



Import
(VertiPaq)

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



I Want It All In One Page Dashboard



Direct Query on
Power BI
Semantic Model



Direct Query on
Power BI
Semantic Model



Direct Query on
Power BI
Semantic Model

Bernat Agulló Roselló: <https://www.esbrina-ba.com/i-want-it-all-in-one-page/>



Near-live + Historic analysis



Direct Query to
Database



Import
(VertiPaq)



May-2025

Direct Lake (OneLake) + Import



Direct Lake



Import
(VertiPaq)

Zoe Douglas [LinkedIn Post](#)



Hybrid Table

Import

Direct Query

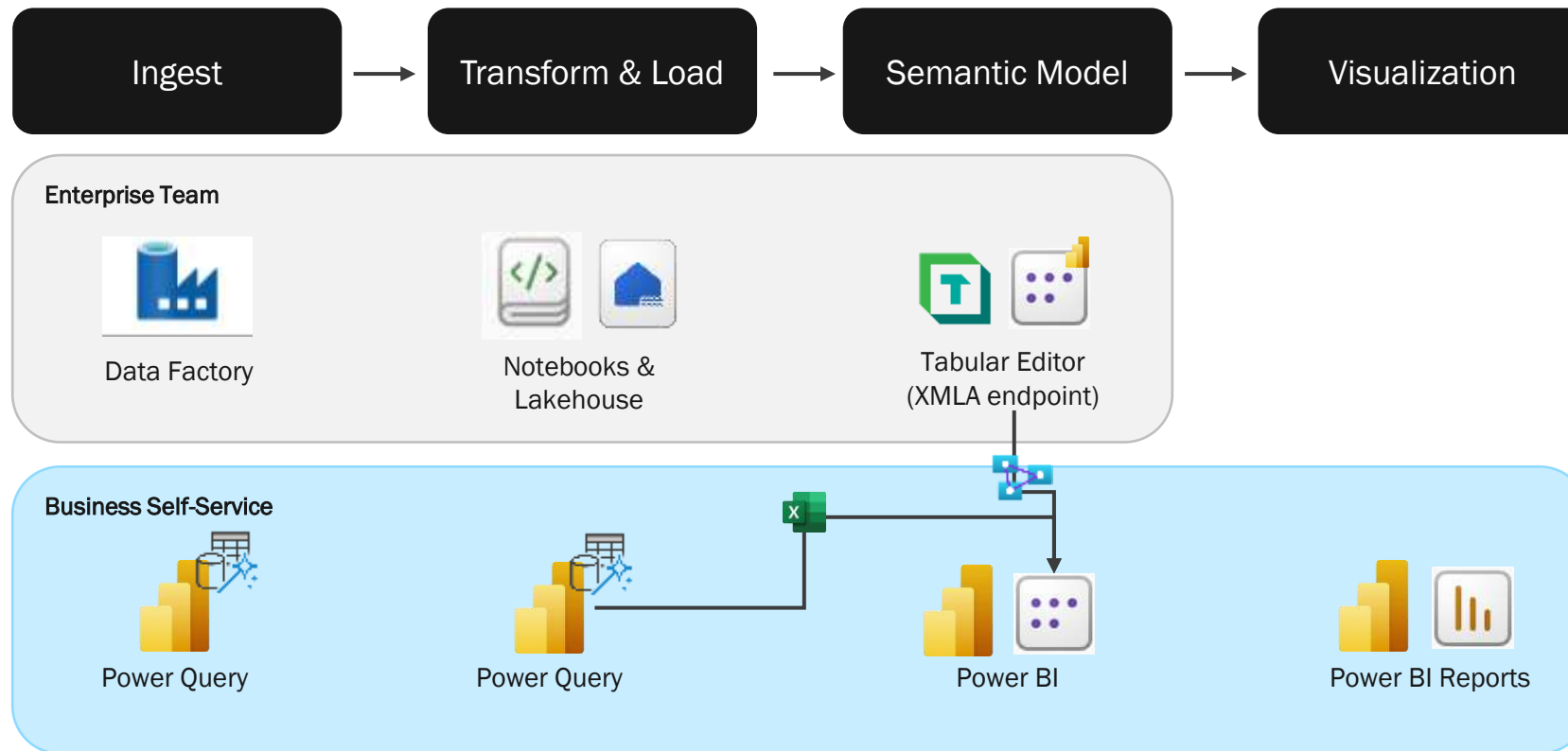


Incremental
Refresh

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



Demo

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

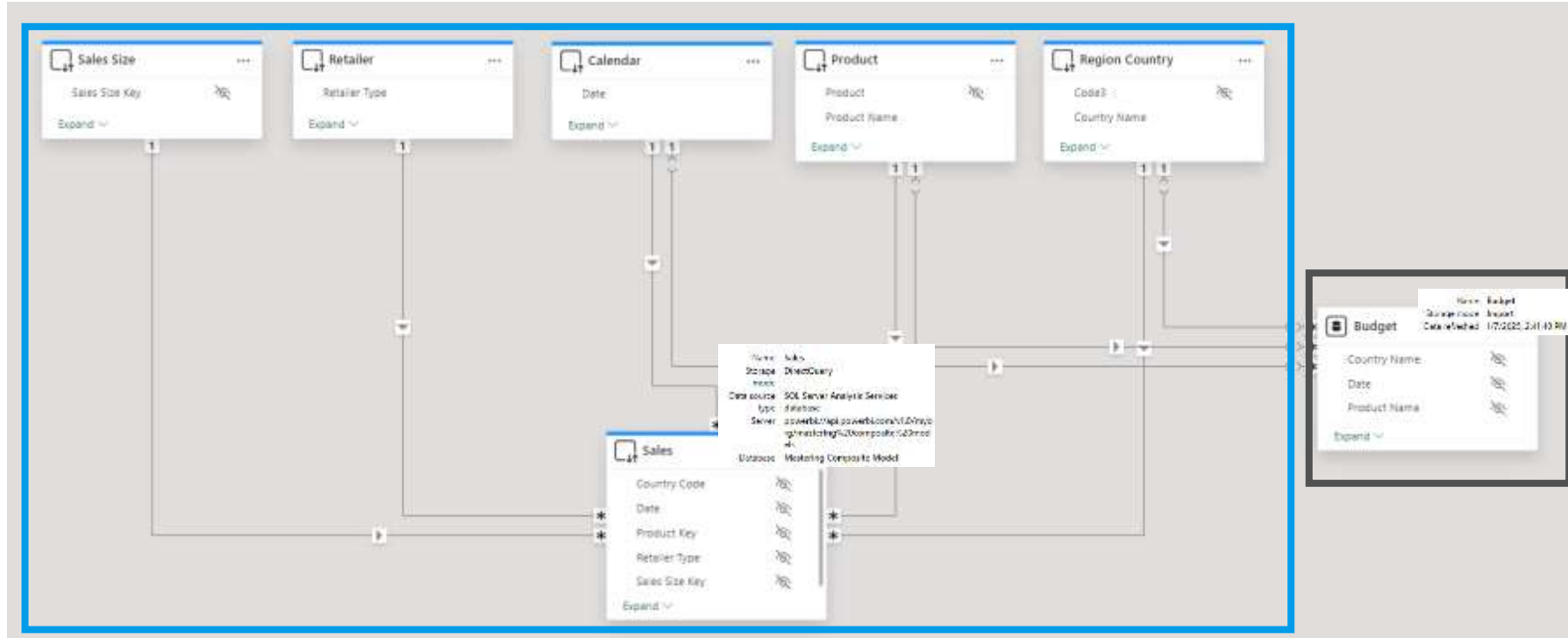


Wholesale
(Remote)
Enterprise Team



Retail
(Local)
Self-Service Business
Dev

Remote & Local



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




Calculation Group 101

SELECTEDMEASURE()

Reusable 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 (*USERRELATIONSHIP to switch between order and invoice date*)
- Custom Date or Week Periods as slicer in report
- My vs. All stats
- And more ...

Calculation Groups to the Rescue



Self-Service Power BI & Fabric Newsletter
by David K. Hanna

Last 30 Days

Last 3 Months

Last 6 Months

Current Year

Last Year


All

Custom

12.0M

Revenue

4/22/2025 - 5/21/2025



Dynamic Calculation Groups
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.

Remember to add a **Date periods** measure that shows the days included from the date slicer - again to provide clarity of what we are looking at.

Calculation Group: 'Date Slicer'

```

CALCULATIONGROUP 'Date Slicer'([Date Slicer: column])

CALCULATEINTERSECT "Last 30 Days" =
VAR __IsIntersected =
    CALCULATE( ISFILTERED( 'Date'[Date] ), ALLSELECTED() )
VAR __Day = 30
VAR __Result =
    IF(
        __IsIntersected,
        SELECTEDMEASURE(),
        CALCULATE(
            SELECTEDMEASURE(),
            ADDFILTERS(
                DATESINPERIOD( 'Date'[Date], TODAY(), -1, __Day, DAY )
            )
        )
    )
RETURN
__Result
-- Result
-- Original = 0

CALCULATEINTERSECT "Last 3 Months" =
VAR __IsIntersected =
    CALCULATE( ISFILTERED( 'Date'[Date] ), ALLSELECTED() )
VAR __Day = 90
VAR __Result =
    IF(
        __IsIntersected,
        SELECTEDMEASURE(),
        CALCULATE(
            SELECTEDMEASURE(),
            ADDFILTERS(
                DATESINPERIOD( 'Date'[Date], TODAY(), -1, __Day, DAY )
            )
        )
    )
RETURN
__Result
-- Result
-- Original = 0
```

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

Demo

Consideration ...

Create perspectives to exclude calculation group when create composite

Connect to your data

Databases

Search

Settings

Select the database or specific tables you'd like to connect to. [Learn more](#)

powerbi://api.powerbi.com/v1.0/myorg/Mastering%20Composite%20Models

Mastering Composite Model

Sales

Time Intelligence

Calendar

Product

Region Country

Retailer

Sales Size

Submit

Cancel

Connect to your data

Perspectives

Search

Settings

A perspective will connect you to the whole model, but only show you the subset of data curated by the model author for your convenience. [Learn more](#)

powerbi://api.powerbi.com/v1.0/myorg/Mastering%20Composite%20Models

Mastering Composite Model

Sales

Sales

Calendar

Product

Region Country

Retailer

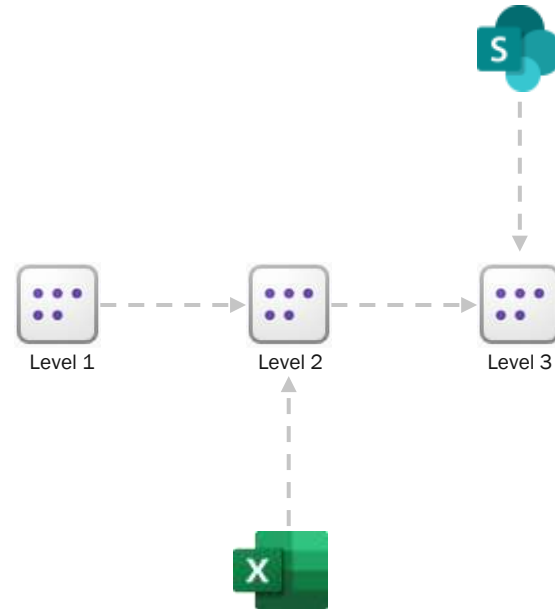
Sales Size

twoday academy

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.

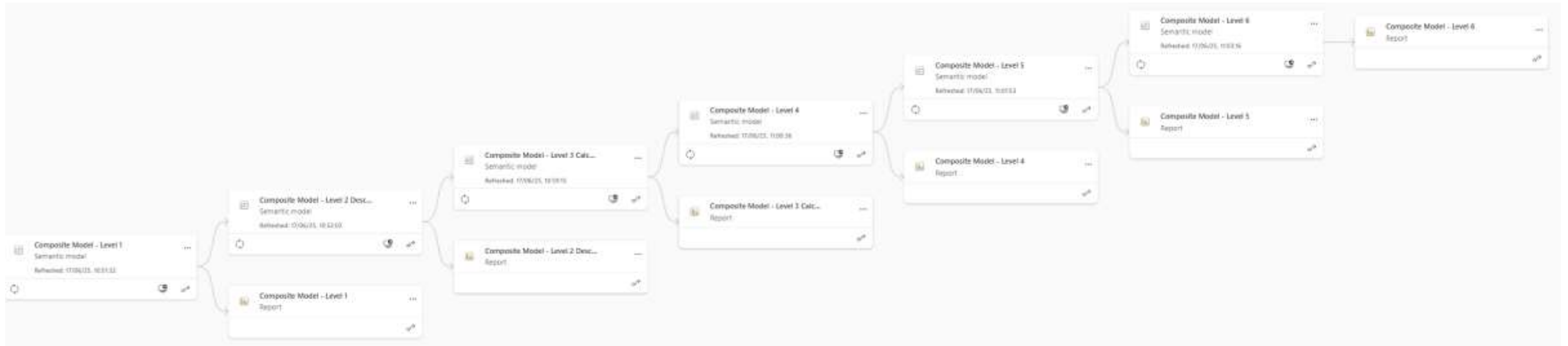


A Dream in a Dream in A Dream 🧠

~~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

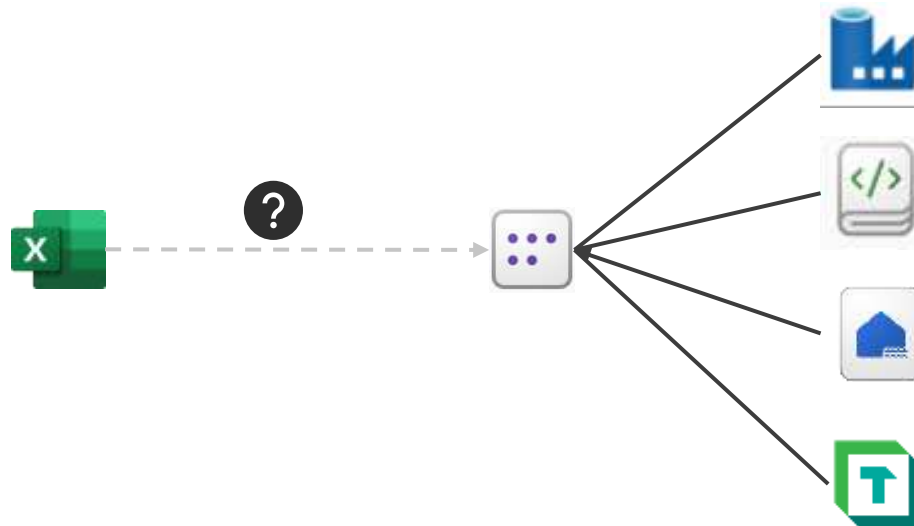


Who owns the data?

- 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?

Business:

I want to solve my business problems today



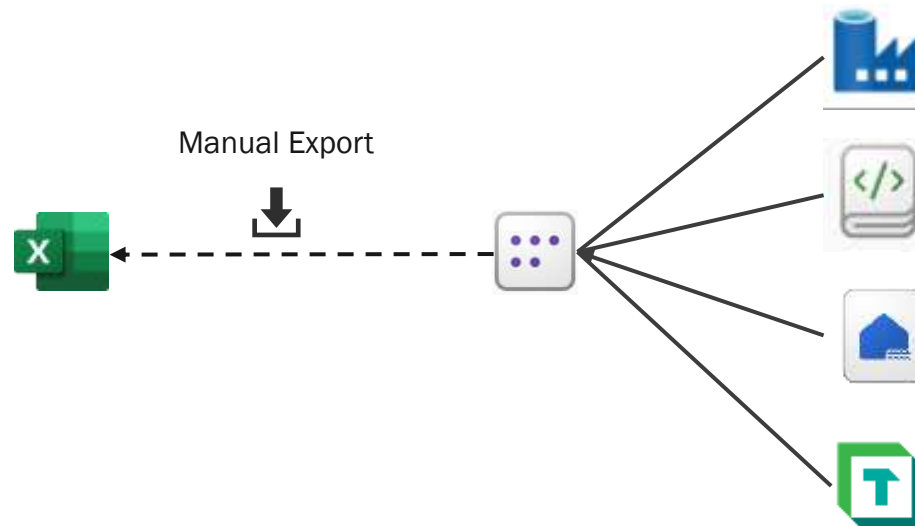
IT / Enterprise:

Do it the right way with best performance and validated numbers

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

Business:

I want to solve my business problems today



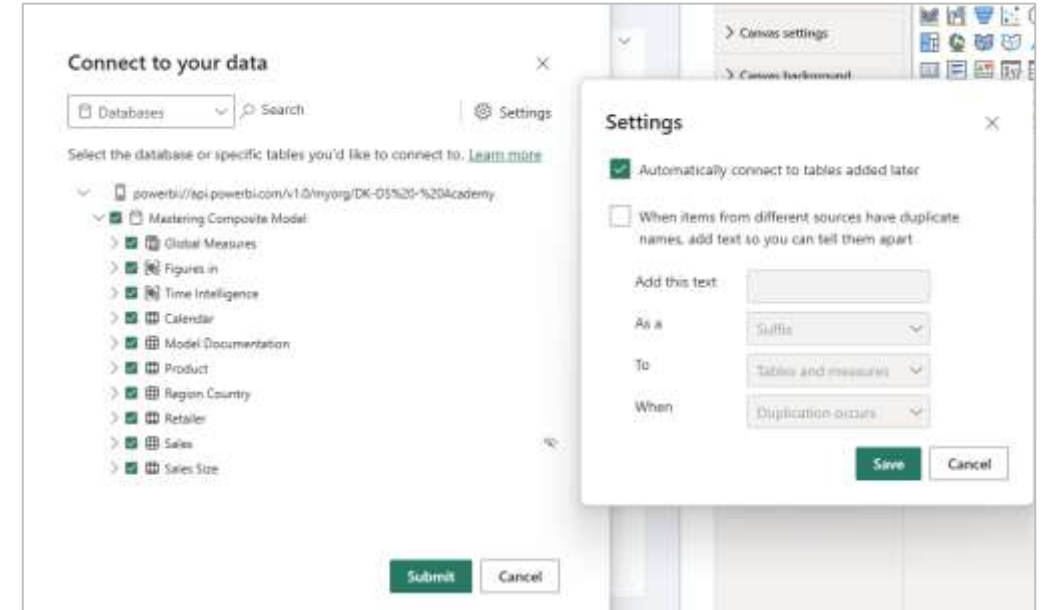
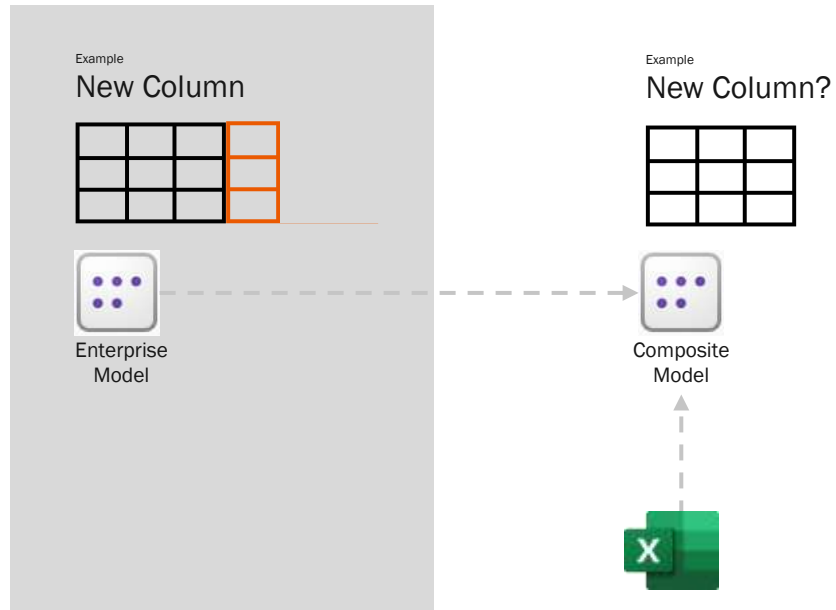
IT / Enterprise:

Do it the right way with best performance and validated numbers

Handling Schema Changes in Enterprise Model




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



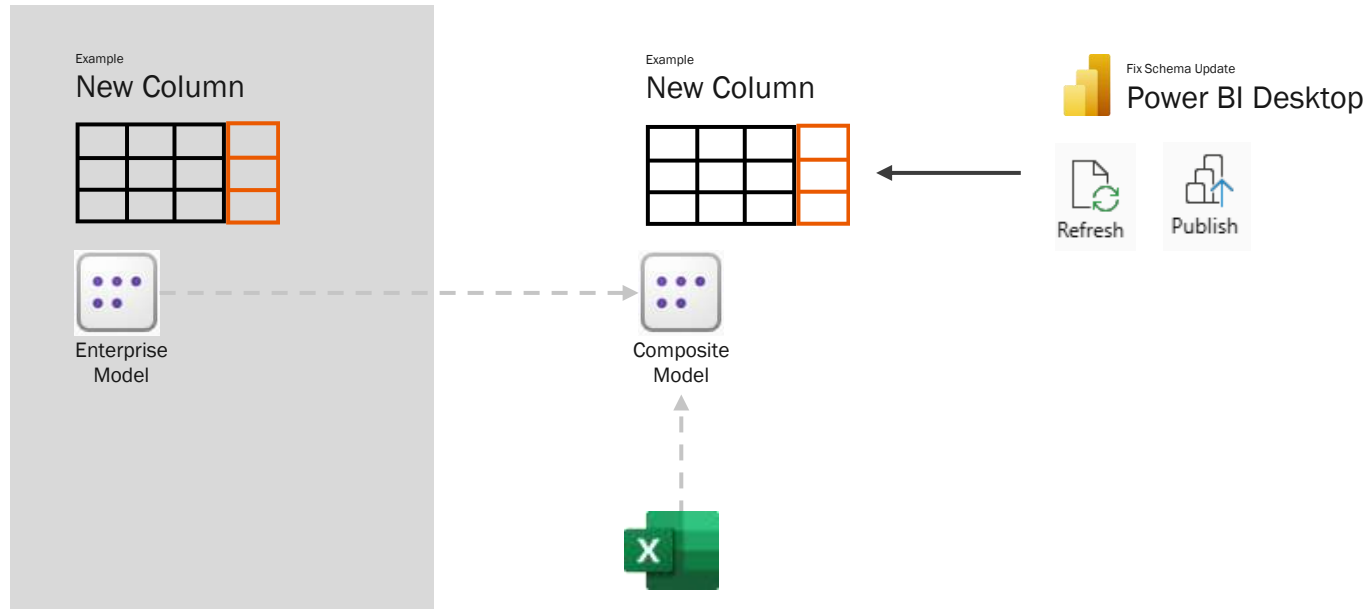
Handling Schema Changes in Enterprise Model

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!



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