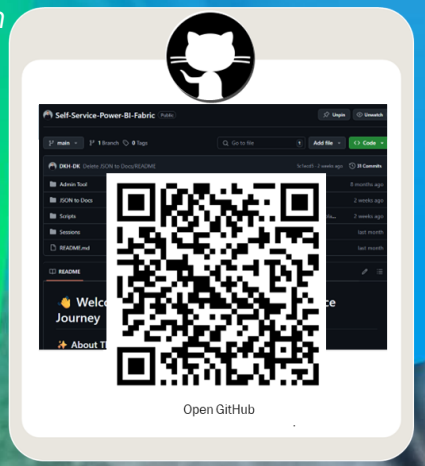
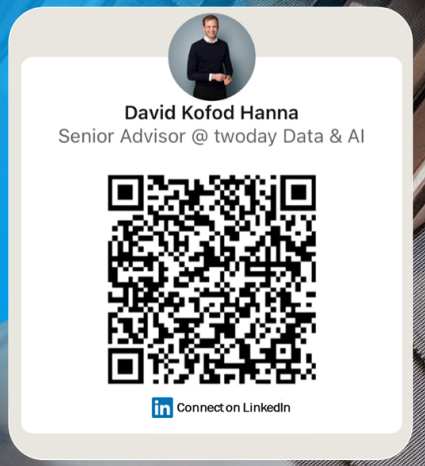
Mastering Composite Models –

Power BI for the Self-Service Developer

Data Saturday Copenhagen
31st Jan-2026

Presented by
David Kofod Hanna





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David Kofod Hanna

Senior Advisor, Data Storytelling @ twoday

+200 courses as Academy Trainer and 10 years as consultant
Microsoft Data Platform MVP, Certified Trainer in Microsoft and Tabular Editor

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 Silkeborg with wife and 3 kids
Love football and running half-marathons

Microsoft® Most Valuable Professional

Microsoft MCT Certified Trainer

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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

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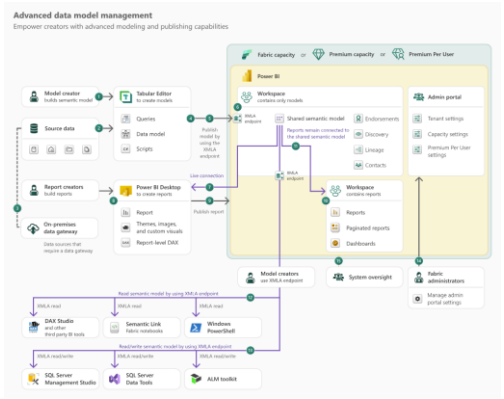
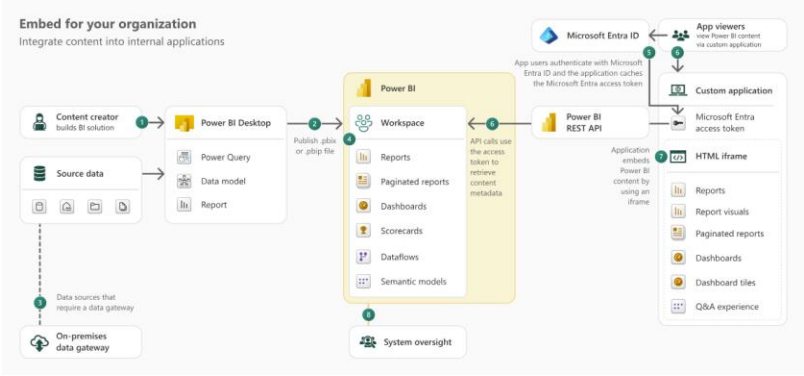
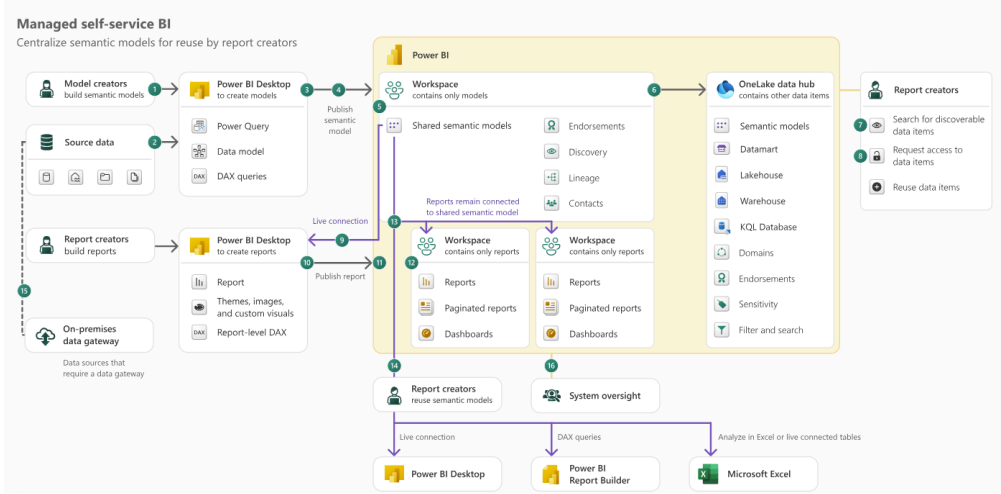
How many have explored **Composite Models** with Direct Query to Power BI Semantic Model?

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

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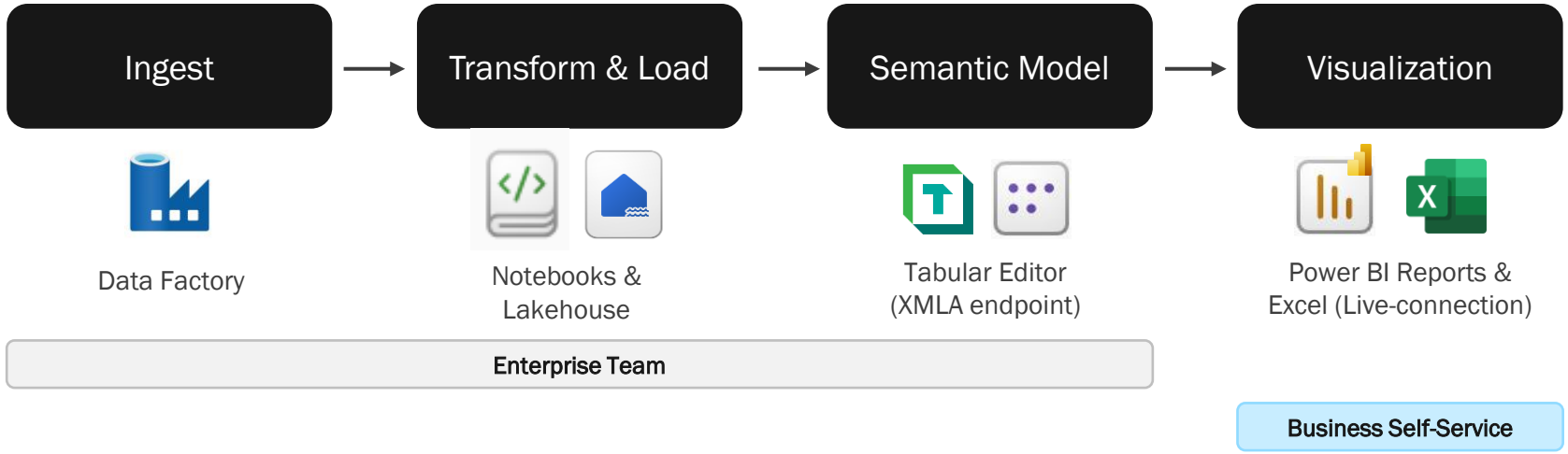
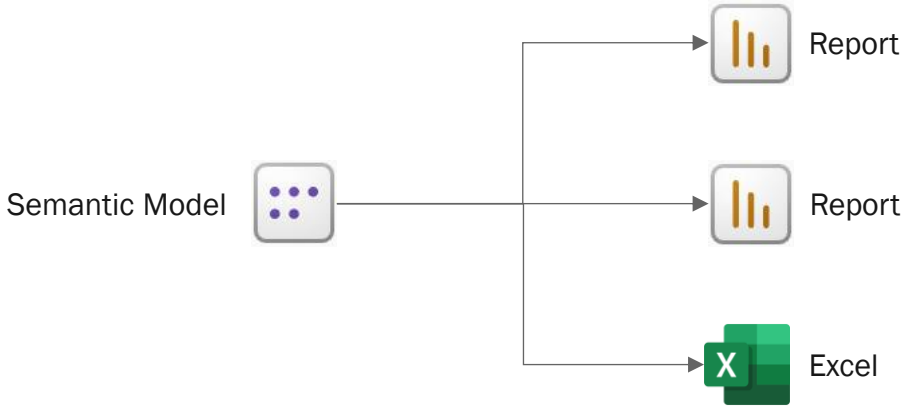
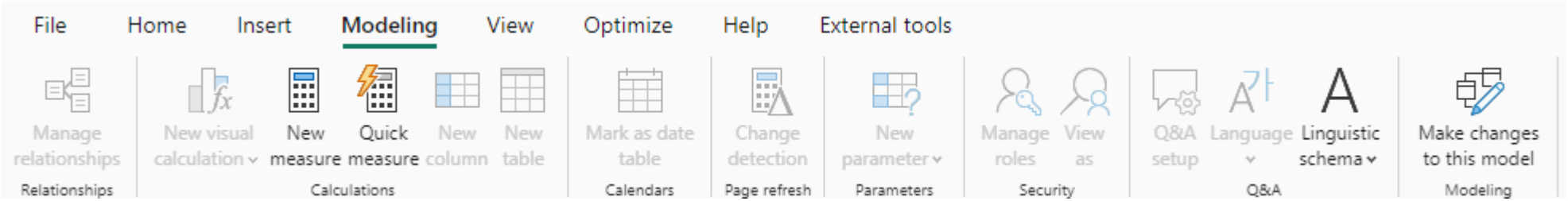
Scenario


Ingest
Transform & Load
Semantic Model
Visualization
Data Factory
Notebooks &
Lakehouse
Tabular Editor
(XMLA endpoint)
Power BI Reports &
Excel (Live-connection)
Enterprise Team
Business Self-Service

I Love Live-Connection, but …





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Demo

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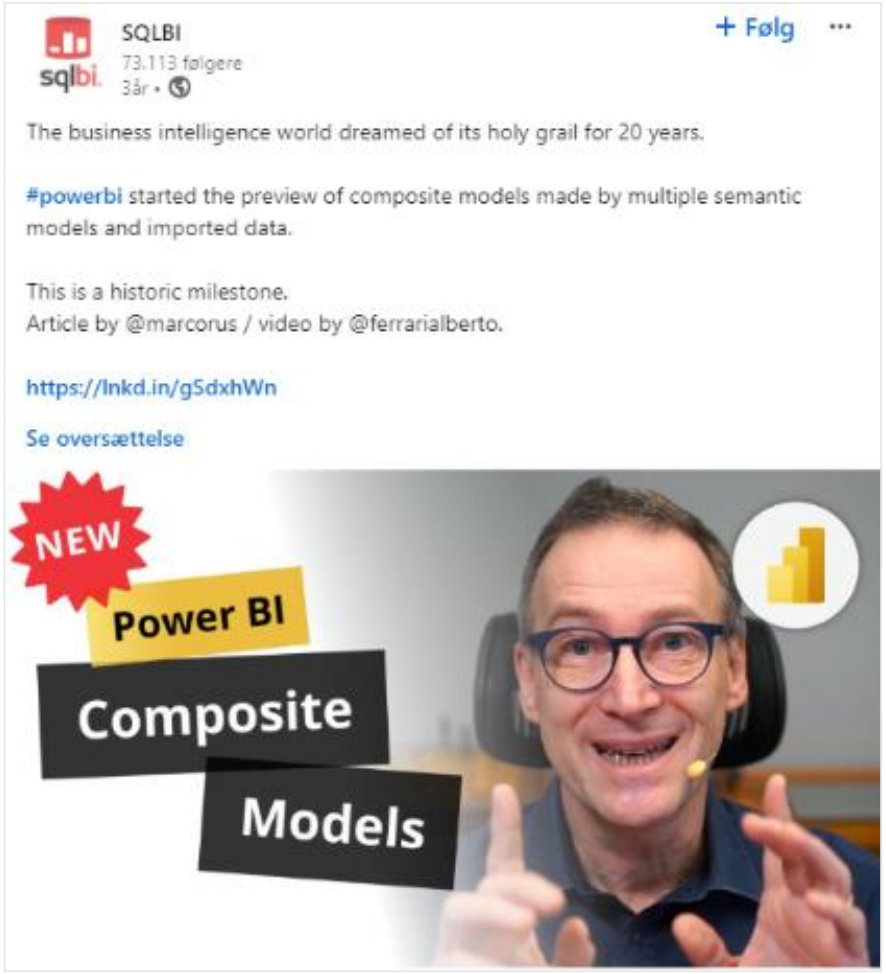
The Holy Grail for self-service BI

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/

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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

Data Mozart: Article on comparison on Direct Lakes

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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

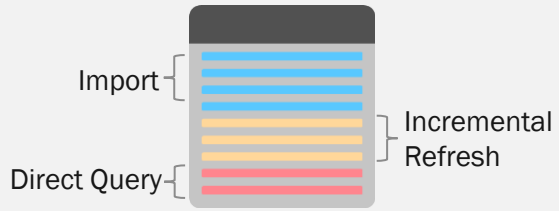
Direct Lake (OneLake) + Import

Direct Lake

Import (VertiPaq)

Zoe Douglas LinkedIn Post

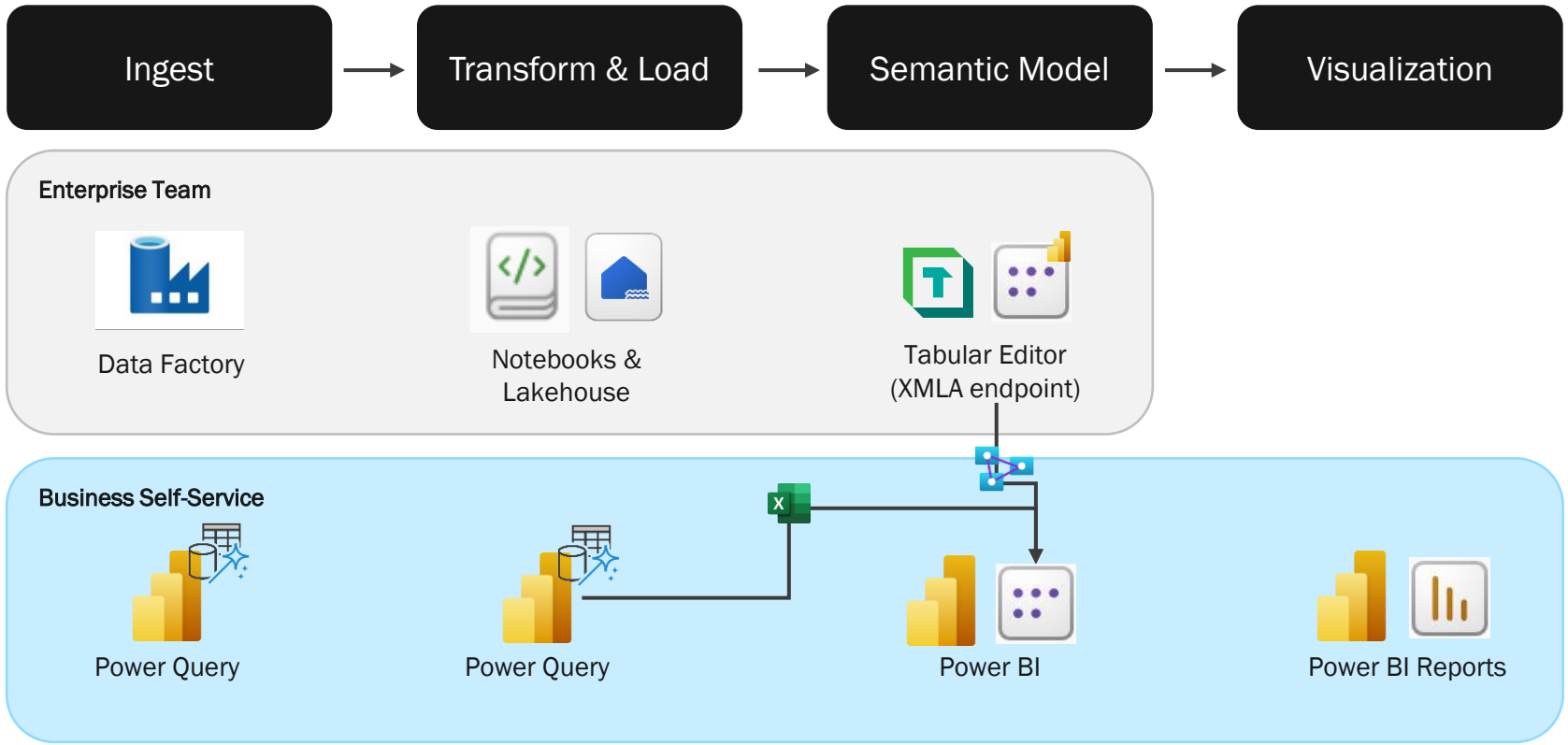
Hybrid Table



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

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Demo

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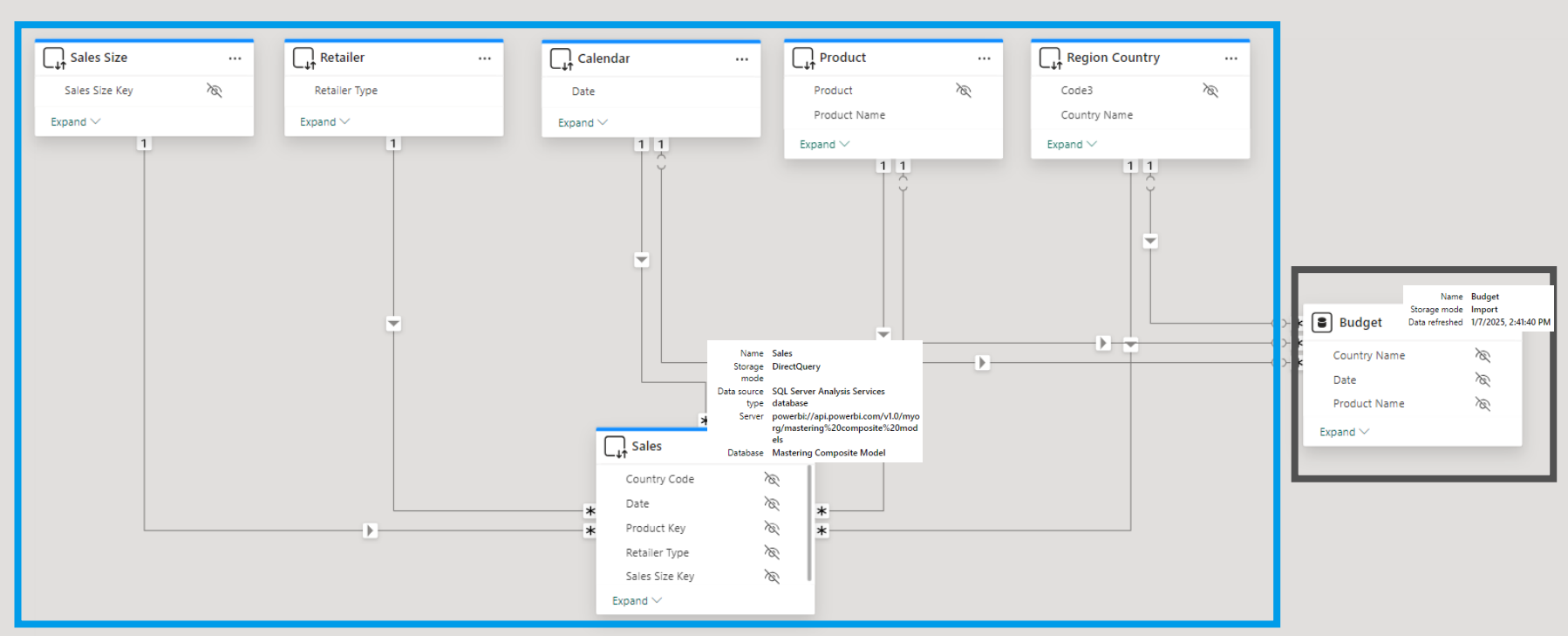
Remote & Local



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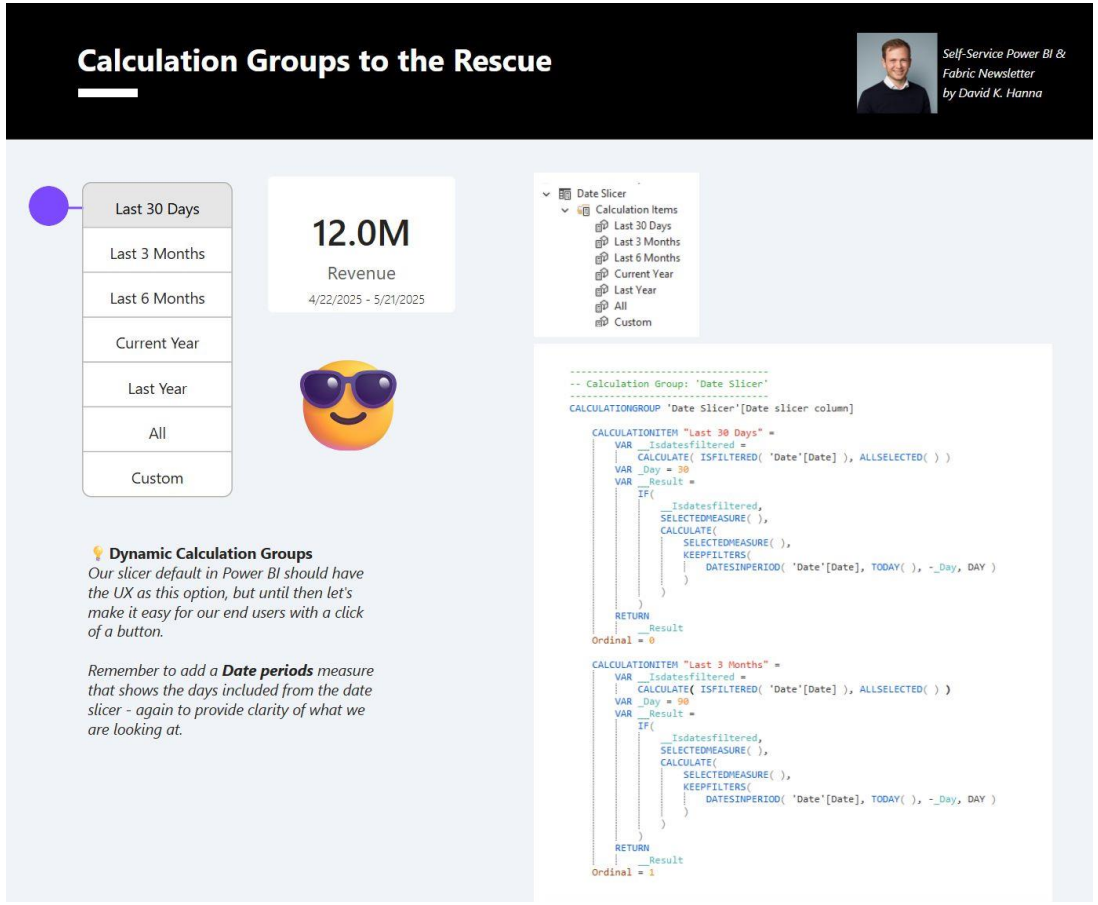
Who loves to include a **calculation group** in their semantic model?

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 …



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

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Demo

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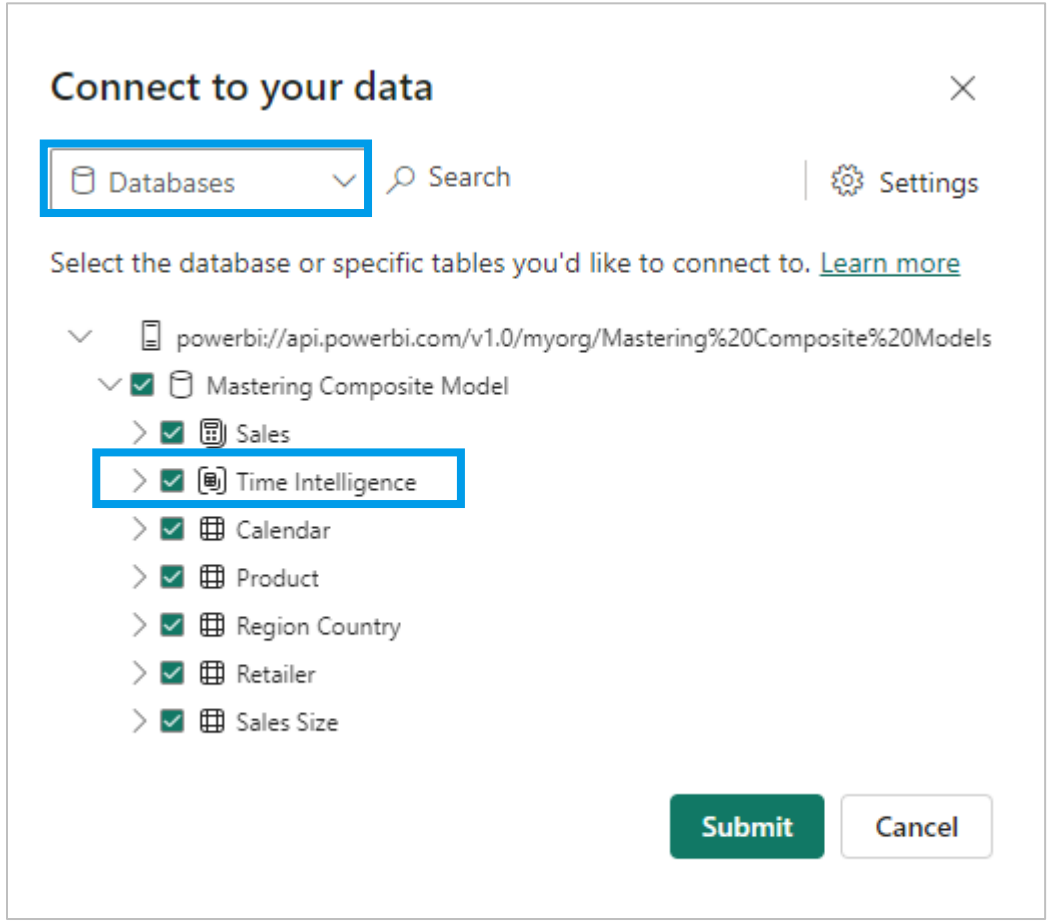
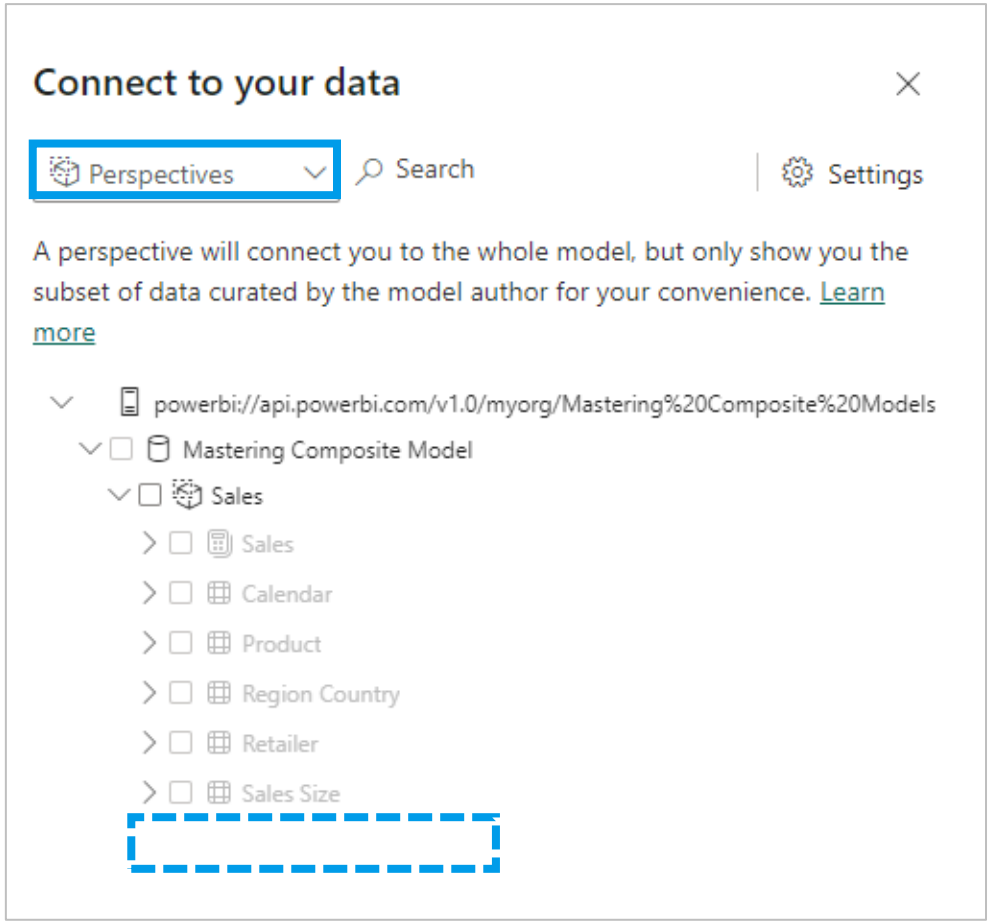
Consideration …
Create perspectives to exclude calculation group when create composite





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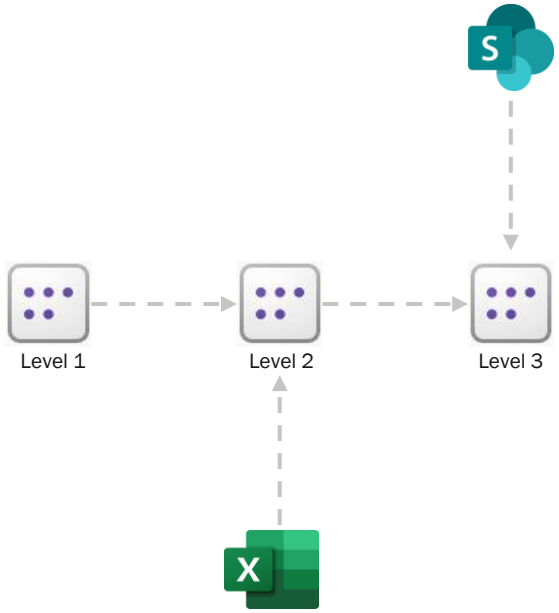
A Dream in a Dream in A Dream 🤯

The maximum length of a chain of models is three.

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



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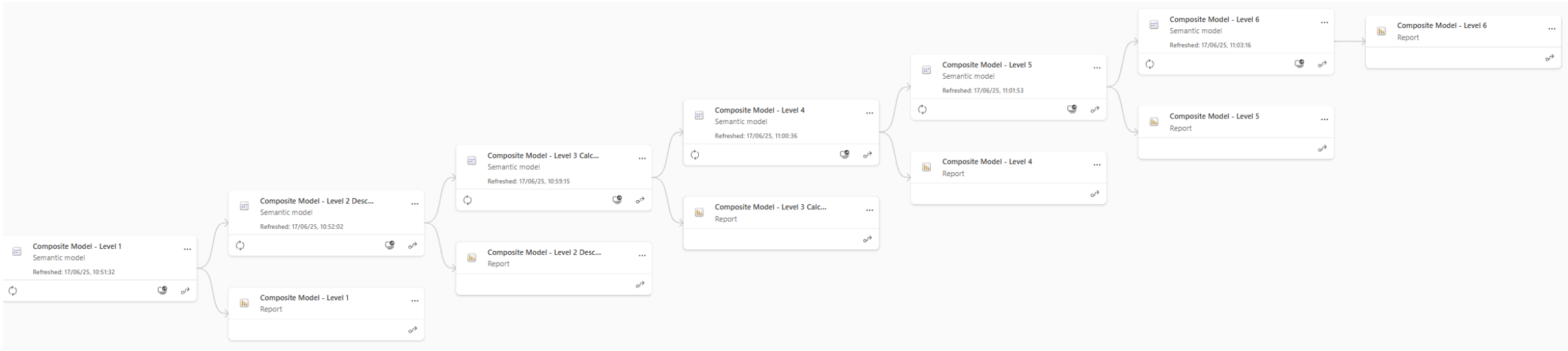
A Dream in a Dream in A Dream

~~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



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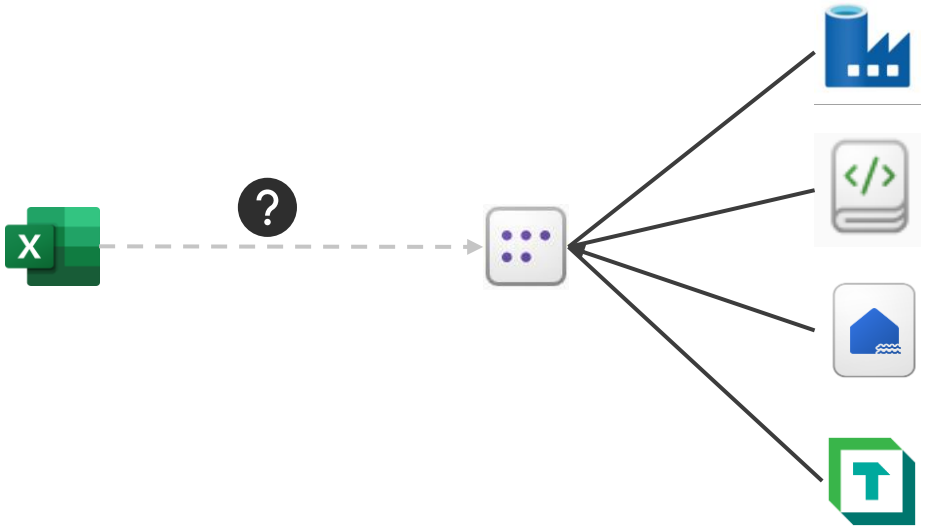
Who owns the data?

- 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?

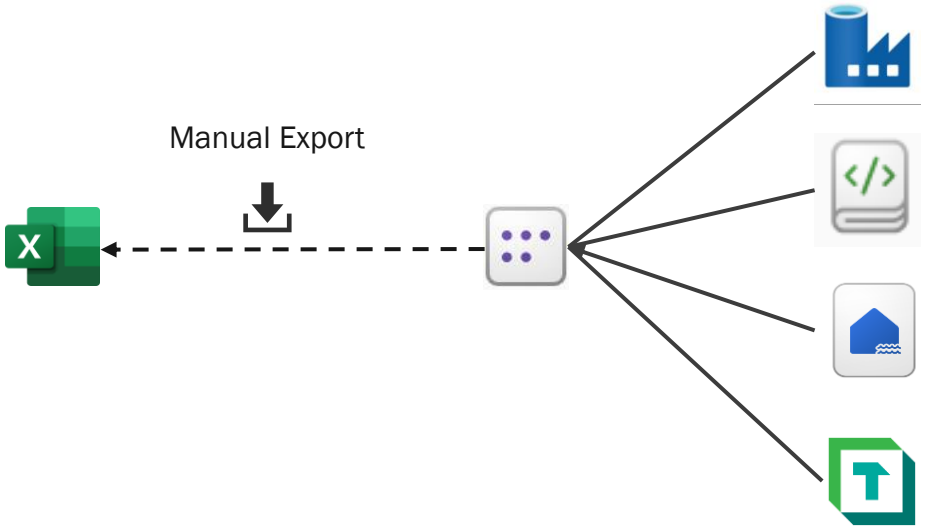
Business:
I want to solve my business problems today



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

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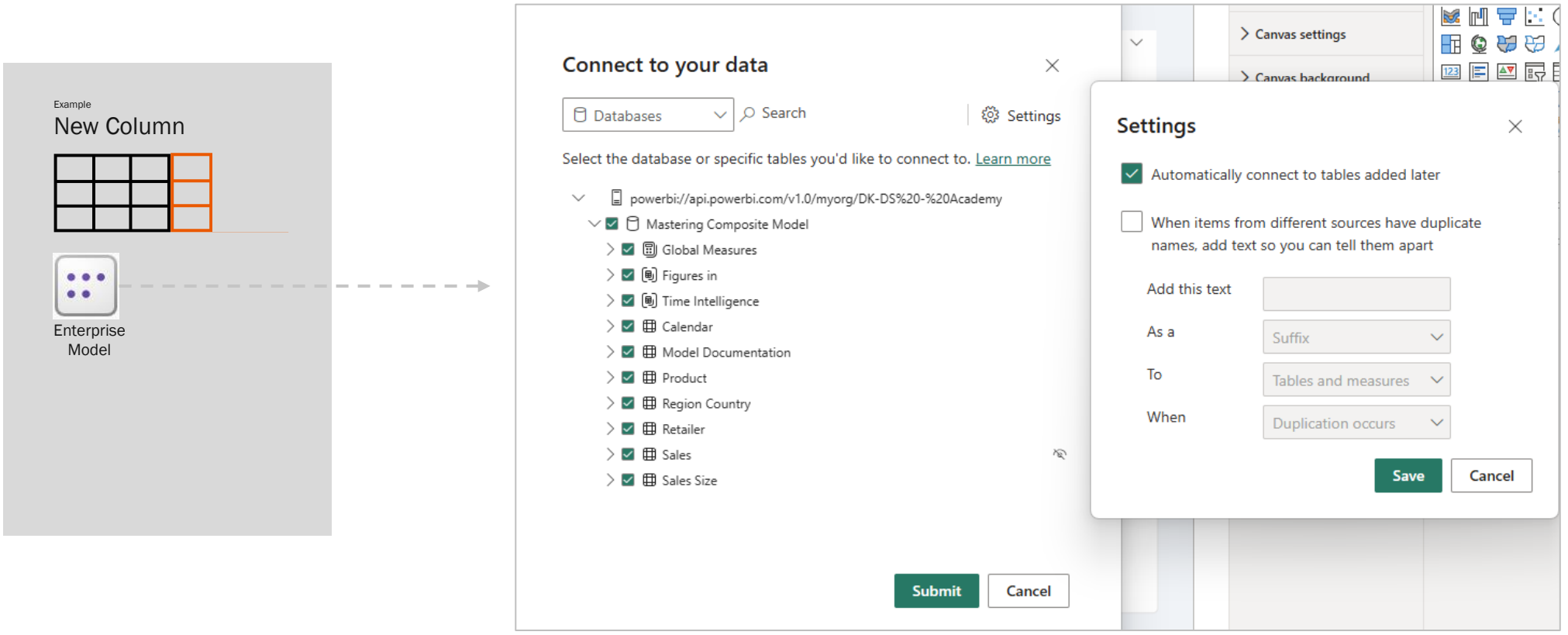
Handling Schema Changes in Enterprise Model



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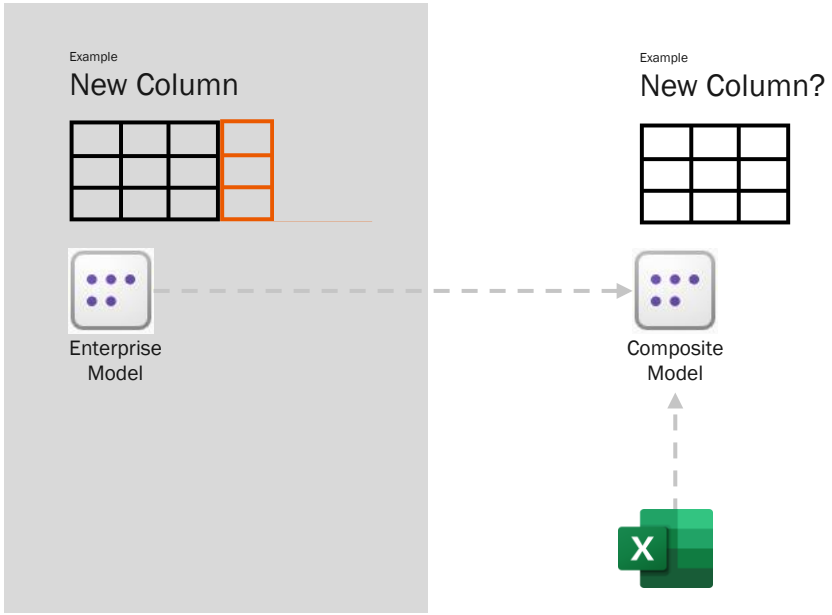
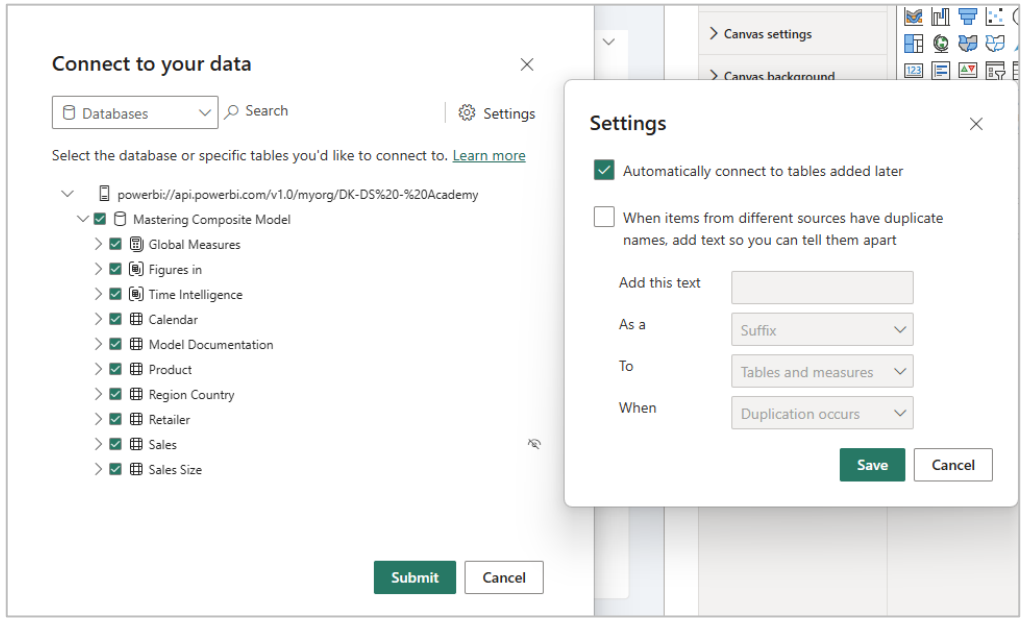
Handling Schema Changes in Enterprise Model

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





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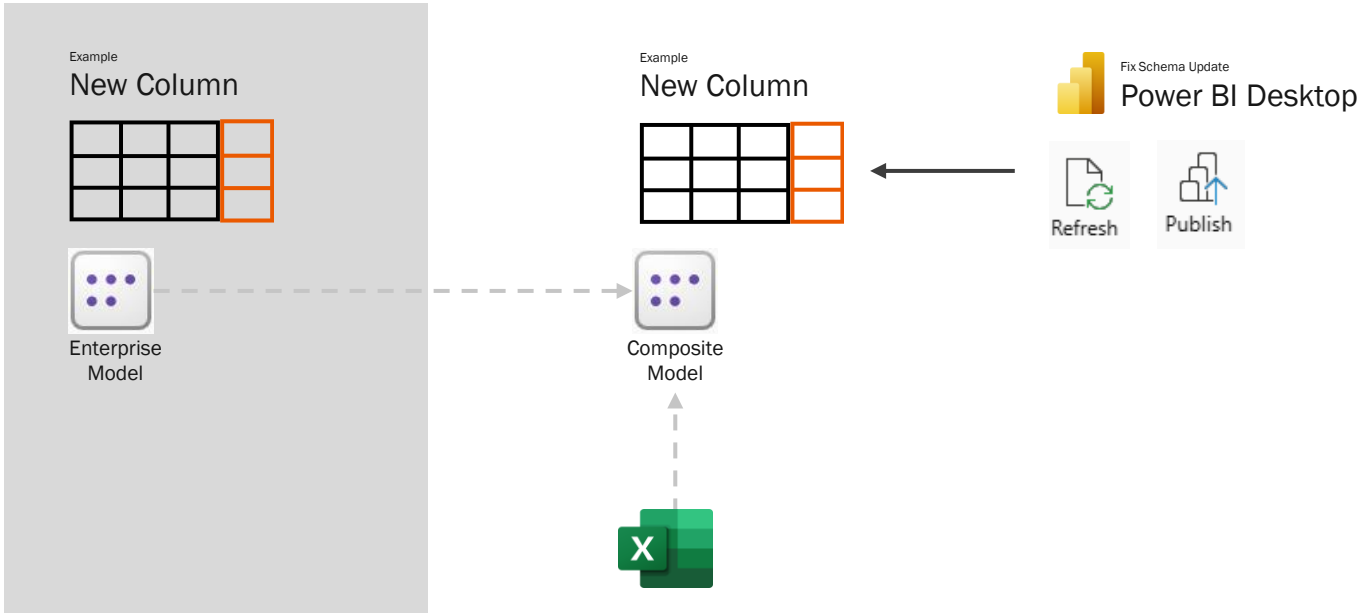
Handling Schema Changes in Enterprise Model

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



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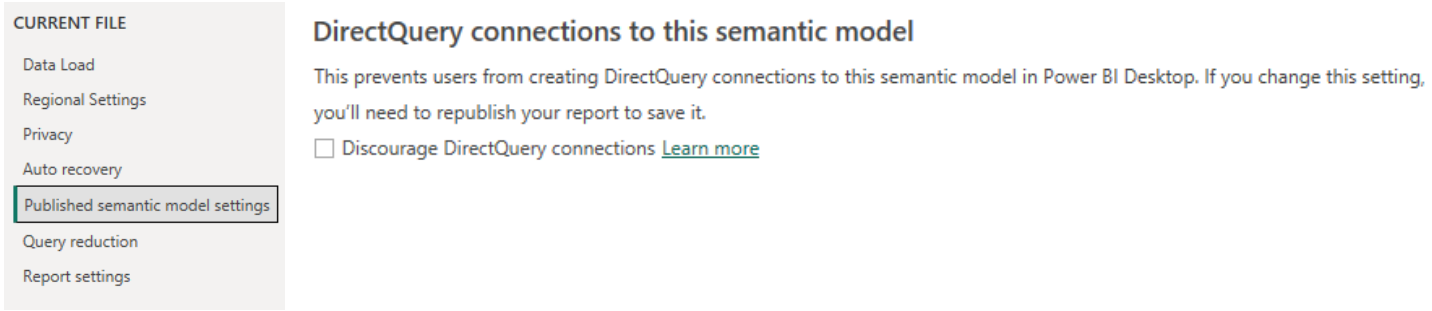
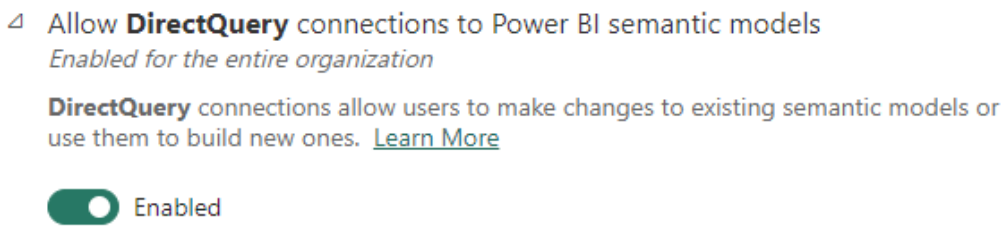
I’m from IT or Enterprise team: How can I **disable** this?

[Individual model]
Power BI Desktop settings before publishing



[Tenant]
Admin Portal in Tenant Settings



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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)*

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Roche's Maxim of Data Transformation:

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