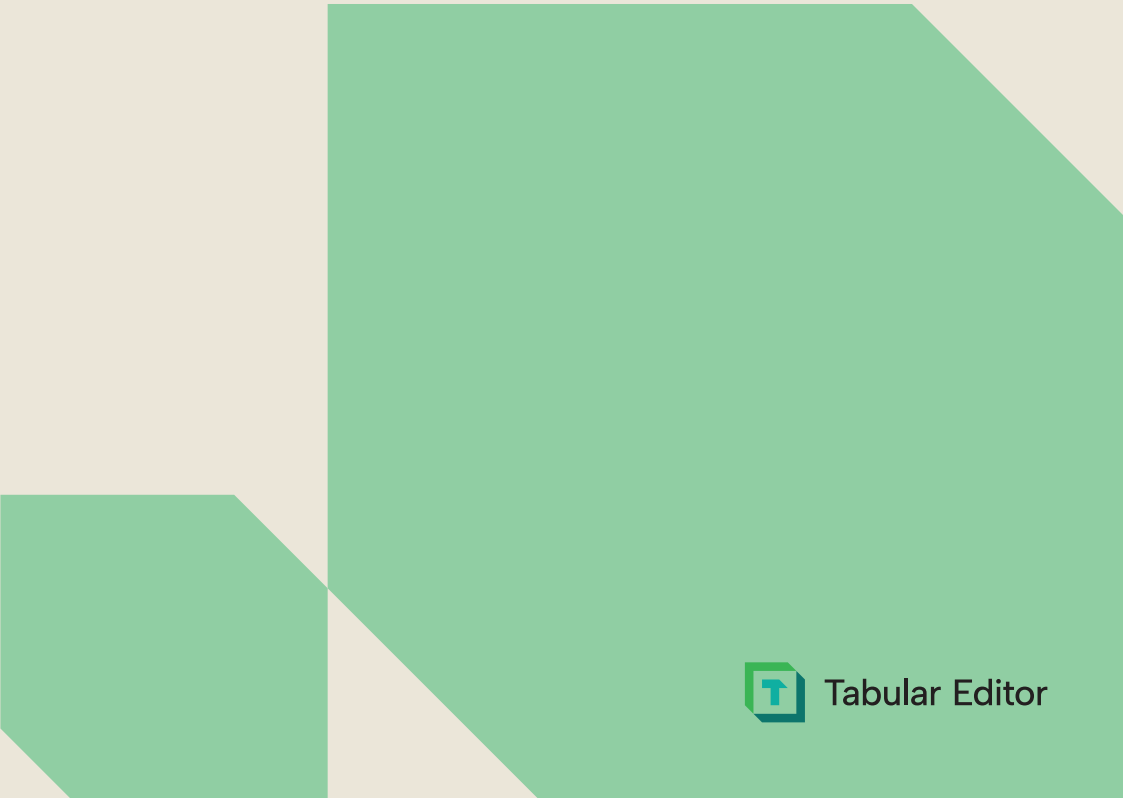
Semantic Models 101

A primer for your most important data asset in Microsoft Fabric and Power BI



Tabular Editor

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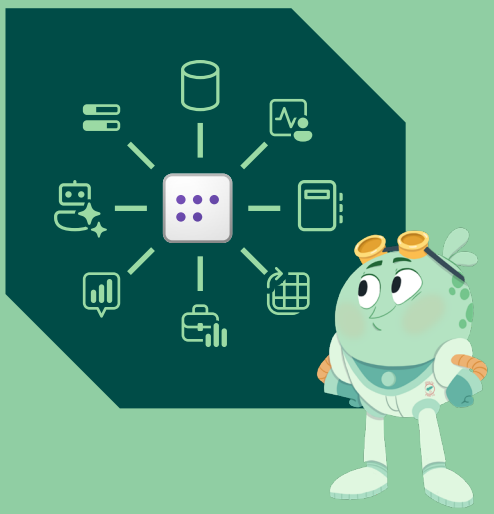
Whether you want to make useful reports and dashboards, chat with your data by using AI, or enable business users to connect to and analyse data themselves – you need a semantic model. But what is a semantic model, why are they so important, and how can you make one that works well for these different use-cases?

Don't worry; we've got you covered! In this handout, we give you a crash course in semantic models.



What is a semantic model?

In short, a semantic model is best defined as a technical artefact that gives meaning to your data (semantic) by modelling a real-world process (what you are reporting on or analysing). Modelling a real-world process means that you represent it with business logic, including a combination of calculations, tables, and other objects or properties.

Basically, you connect to a data source, be it a lakehouse, a data warehouse, a SQL database, or an Excel file, and you create calculations and other things to analyse the data and make it useful.

Semantic model

- *Gives meaning to your data*
- *Models a real-world process*
- *Includes objects like...*

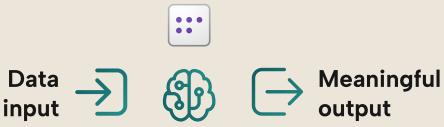
DAX measures

Tables and columns

Relationships

To illustrate, let's look at one example. Let's say that you want to create a dashboard, report, or AI data agent for your sales data. You wouldn't just use your raw invoice transactions. You need information like your customer and product hierarchies from other tables that you link to your sales data with relationships, calculations that aggregate the data and apply specific business logic and exceptions, and so on.

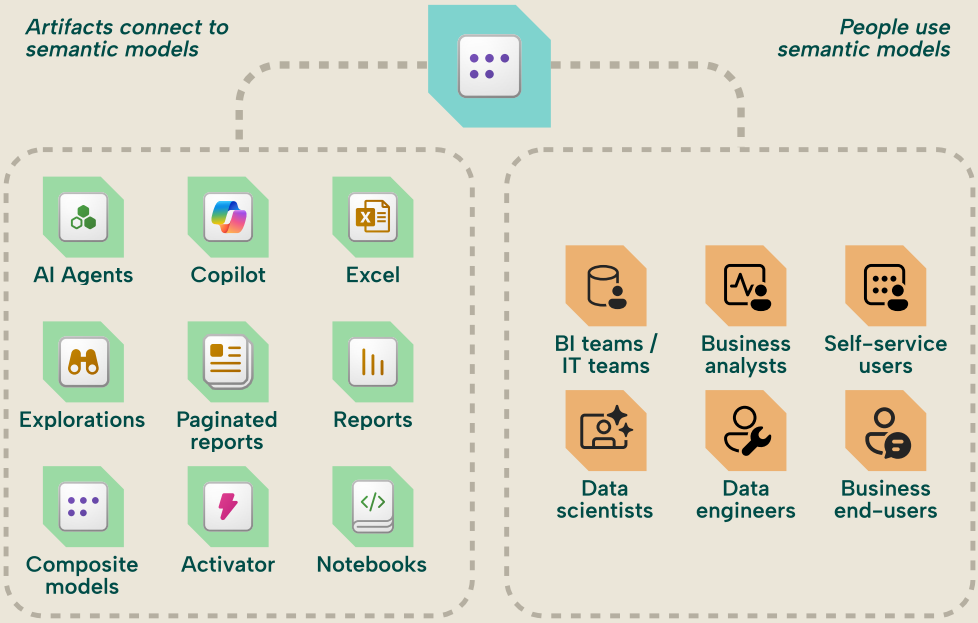
You see, a semantic model isn't just a one-off technical artefact that you make for each report or analysis. Rather, you re-use a semantic model. It's more than just a toolbox; it's the brain for data and analytics in your team, department, and organisation. Much like your brain, the model takes raw data and uses it to help you produce meaningful outputs, including decisions and actions. Like a brain, too, a semantic model is important!



Why is a semantic model important?

You re-use semantic models in different ways. You could use it to make a dashboard with visuals, pivot tables in Excel, or even AI agents to chat with your data in natural language. Different people use your model for different things; the semantic model is a central point of coalescence in your data and analytics pipeline. Because it's so useful, it's therefore also very important.

If your semantic model isn't well-built, then you risk everything downstream of it. Reports could be inaccurate and slow, analyses could be incomplete or underpowered, and anything you do with AI could be underwhelming at best, and misleading or unreliable at worst. To avoid these issues, you should invest in building high-quality, reliable semantic models that work well for your users and scenarios.



How to make a (good) semantic model?

Making a semantic model typically involves a common series of sequential steps. Some of these steps are iterative in nature, but all of them exist in a lifecycle. If you're just getting started with Power BI or exploring some data ad hoc, you might not need to worry about this stuff. But as you scale and want to get more meaningful value from your data with Power BI or Fabric – you'll need this.

Specifically, you'll need a good semantic model. Importantly, this means not just that your model follows technical best practices, but that you have also sufficiently invested in requirements gathering, testing, change management, and adoption for your business. Furthermore, what constitutes a good model differs depending on how it'll be used; especially when AI is involved.

Steps to make a good model

Design your model
Gather requirements & define design

Connect to and transform data
Gather requirements & define design

Create relationships
Link related tables by key fields

Apply business logic, write DAX
Create calculations, exceptions, etc.

Test and optimize your model
Ensure it performs as expected

Organize and document
Make it easy to understand and use

Support and manage your model
Ensure it remains relevant and useful

Qualities of a good model

Addresses the right questions
Aligns with user expectations and needs

Data-complete
Has all the relevant info (not too much)

Secure and reliable
Only shows what someone should see

Results are as users expect
Numbers are accurate and trustworthy

Performant
Queries are fast; users don't wait long

Easy to use and maintain
Create new content and make changes

Used to derive business value
People are using it, regularly

How do you optimize a model?

A key aspect of a successful semantic model is optimisation; improving its performance. Performance in this case typically refers to how fast it is to evaluate queries and return data, but performance could also refer to:
How easy it is to use and maintain.
How effective it is at supporting the underlying business process / users.
How well it works with Copilot / LLMs.

Optimising your semantic model involves taking a critical look at both its design and implementation, both from a technical and a practical point-of-view. Thankfully, there are some common tasks that anyone can take to start optimising a model, either reactively or proactively. The following diagram shows some examples of these tasks; if you want more information, check Tabular Editor Learn.

Optimize models by reducing size

Remove what you don't need
Only keep tables / columns you'll use

Avoid redundancy
Get rid of similar or identical columns

Filter and aggregate rows
Only keep the detail you will use

Disable auto date/time
Use your date table and hierarchies

Reduce decimal precision
More decimals = cardinality = bigger

Separate date/time fields
Datetime column = cardinality = big

Don't use strings for numbers
Strings will have a dictionary = bigger

Optimize models with improvements

Format and comment code
Make it easier to understand / read

Use display folders
Organize columns and measures

Avoid filtering tables in DAX
This is a common cause of slow DAX

Use a star schema design
Power BI performs best with this design

Optimize for the use-case / tool
Different tools = different optimizations

Add field descriptions
You can use AI suggestions to start with

Keep it simple
A good model design > complexity

How can tools like Tabular Editor help?

In Power BI, you typically develop and manage a semantic model in Power BI Desktop and the Power BI service (web). However, other, specialised tools can greatly help you to solve specific problems or be more efficient. Power BI has a rich ecosystem of third-party tools that let you safely and securely enhance your workflow, either to do things that you couldn't or to enhance effectiveness.

Tabular Editor is one such example of a third-party tool that helps you with semantic models. It's an all-in-one, integrated development environment for semantic models. Tabular Editor gives you everything you need to design, build, optimise, and manage your models to the best of your ability and available time. That way, you can make sure that your model is ready for anything.

Some tools for semantic models

Tabular Editor 3
All-in-one semantic model IDE

DAX Optimizer
Find bottlenecks, improve performance

DAX Studio
Investigate and measure DAX queries

ALM Toolkit
Compare and deploy models

Bravo
Add date tables and view model size

Notebooks
Make it easy to understand and use

Views in Power BI Desktop
DAX query view, TMDL view

Some features in Tabular Editor 3

Automatically format DAX code
Using shortcuts or scripts

Advanced DAX code assistance
Makes writing DAX easier and better

Fast performance
No more "Working on it..." pop-ups

Code actions
Helpful suggestions to improve DAX

BPA, VertiPaq Analyzer, DAX Optimizer
Integrations to help you optimize models

Batch tasks to improve productivity
Make multiple changes at once

Advanced scripts with C#
Streamline and automate tasks

Where can I get more information?

Tabular Editor can save you up to 60% of your semantic model development time. It has been designed from the ground up by semantic model developers for semantic model developers; we know the aches, pains, and frustrations during model development, and our ambition is to help people and organisations make semantic models more effectively by having all the tools that they need.

If you're looking for more information about either semantic models or about Tabular Editor, then check out our website at tabulareditor.com. We also have a learning platform with free courses to help people build better semantic models, faster. **The best part is that our courses and articles are completely free; you don't need to pay or have a Tabular Editor license to benefit from them.**

Licenses for Tabular Editor 3

Desktop license
For use with Power BI Desktop only

Business license
For use with Power BI PPU

Enterprise license
For all environments with extra support

Making good semantic models doesn't have to be difficult

If you have the right tools...

Here are some helpful resources

Tabular Editor Learn
Free courses to upskill in Power BI

Microsoft Learn
Documentation and training modules

Tabular Editor GitHub community
Post questions and get help

Fabric Adoption Roadmap
How to drive effective use of Power BI

Tabular Editor blog
Free articles about tech topics

Power BI Implementation Planning
Power BI guidance from Microsoft

Tabular Editor Blog

Tabular Editor Learn

At Tabular Editor, we're on a mission to make data modeling faster and easier for everyone working with Microsoft BI and Power BI. As the creators of Tabular Editor 2 and Tabular Editor 3, we're dedicated to helping you build better data models in less time, unlocking advanced features, automating tasks, and enhancing productivity.

Our tools are designed for Business Analysts, Enterprise Developers, Solution Architects – anyone building Tabular Models who wants to work faster and more efficient. Whether you're using it alongside Power BI Desktop or as a standalone tool, Tabular Editor makes working with tabular models more efficient.

The Ultimate Productivity Tool
Tabular Editor 3 takes productivity to the next level, offering everything from best-in-class DAX editing to batch model updates and advanced C# scripting for task automation. And with the world's only DAX debugger, troubleshooting complex measures has never been easier.

A Proven Track Record
With over 50,000 users worldwide, Tabular Editor 2 has already made its mark. For those ready to elevate their experience, Tabular Editor 3 is available under a commercial license, trusted by users across more than 110 countries to streamline and supercharge their data modeling.

Tabular Editor

Better Data Models Faster