prologika

Gold Microsoft Partner

Microsoft

Implementing Semantic Models

Teo Lachev, Prologika

teo.lachev@prologika.com

Agenda

- Understanding semantic models
- Understanding options and toolset
- Best modeling practices
- Composite models

About Teo

- Owner of Prologika – BI consulting and training company based in Atlanta (prologika.com)
- Helping clients make sense of data
- Microsoft FastTrack Recognized Solution Architect for Power BI
- Microsoft Data Platform MVP for 15 years
- Founder and leader of Atlanta BI group

Microsoft Reporting Services IN ACTION
Teo Lachev
A GUIDE TO THE LEADING OLAP PLATFORM
APPLIED MICROSOFT ANALYSIS SERVICES 2005 and Microsoft Business Intelligence Platform
Teo Lachev
A GUIDE TO THE LEADING REPORTING PLATFORM
APPLIED MICROSOFT REPORTING
MCTS
SQL SERVER Business Intelligence Implementation and Maintenance
Training
MCTS EXAM 70-448
Microsoft SQL Server 2008 Business Intelligence Development and Maintenance
SELF-PACED Training Kit
THE BUSINESS INTELLIGENCE SEMANTIC MODEL
APPLIED MICROSOFT SQL SERVER 2011 ANALYSIS SERVICES
MICROSOFT DATA ANALYTICS
APPLIED DAX WITH POWER BI
FROM ZERO TO HERO WITH 15-MINUTE LESSONS
DAX
Teo Lachev
MICROSOFT DATA ANALYTICS
APPLIED MICROSOFT POWER BI
Bring Your Data to Life!
Teo Lachev
6th EDITION

Understanding Semantic Models

What is Semantic Model?

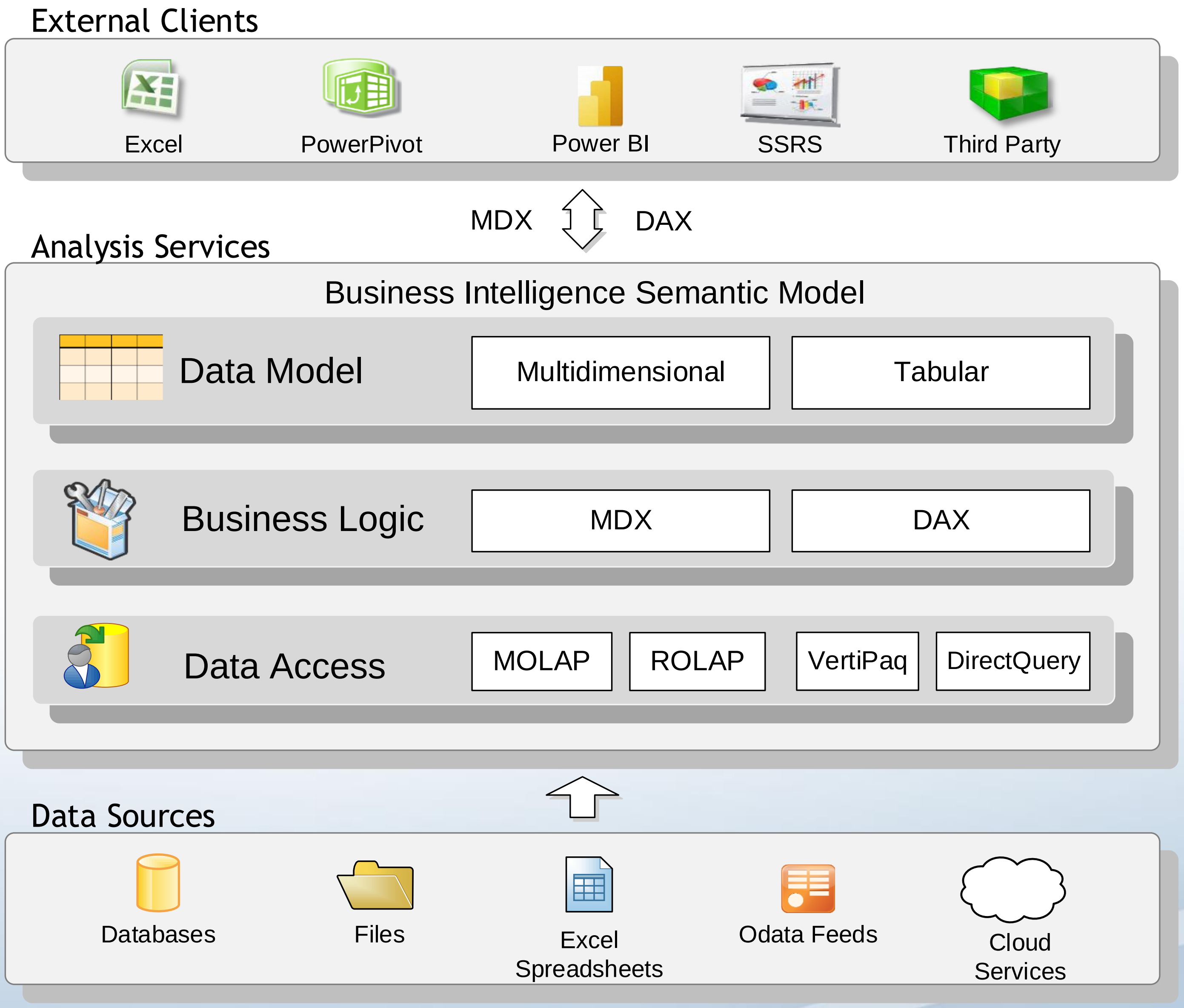
- **Semantics** (from "significant" in Greek) helps discovering meaning of message behind words
- End user's perspective - represents end-user's perspective of data
- Modeler's perspective - translates machine-friendly database structures into a user-friendly layer

Why Do We Need Semantic Model?

- Promote **ad-hoc reporting**
- Avoid **writing queries**
- Better **performance**
- Centralize **security**

- Semantic models come in different shapes and forms
  - Who implements it?
  - What's the vision/scope?

Microsoft Business Intelligence Semantic Model (BISM)



- Tabular
  - Your first choice for implementing semantic models
  - Used 90%+
- Multidimensional for specific scenarios Tabular can't address
  - Writeback
  - Financial (GL) reporting
  - Complex calculations (recursive calculations, scope assignments)

Where is Tabular?

- Self-service BI
  - Power BI Service and Desktop
  - Excel Power Pivot / SharePoint
- Organizational BI
  - On-prem SSAS
  - Azure Analysis Services
  - Power BI (Premium or PPU required for larger models)
  - VertiPaq is also available in SQL Server columnstore indexes (not considered BISM)

No matter what tool is used for modeling, when published your model becomes a Tabular database hosted in one of the Tabular SKUs (SSAS, Azure Analysis Services, Power BI, SharePoint).

Self-service Semantic Models

Comparing Self-service Modeling Tools

Feature	Excel	Power BI Desktop (recommended)
Data import	Excel native import, Power Pivot, Power Query	Power Query
Data transformation	Power Query	Power Query
Modeling	Power Pivot	Data and Models tabs
Reporting	Excel pivot reports, Power View, Power Map	Power BI reports (enhanced Power View reports)
Machine learning	Commercial and free add-ins, such as for integration with Azure Machine Learning	Built-in features, such as time series forecasting, clustering, Quick Insights, natural queries
Integration with R and Python	No	Yes
Update frequency	MS Office releases or more often with Office 365 click-to-run	Monthly
Server deployment	SharePoint, Power BI Service, and Power BI Report Server	Power BI Service and Power BI Report Server
Power BI deployment	Import data or connect to the Excel file	Deployed as Power BI Desktop (pbix) file
Convert models	Can't import Power BI Desktop models	Can import Excel Power Pivot models
Upgrade to Tabular	Yes	Not supported by Microsoft
Object model for automation	Yes	No
Cost	Excel license	Free

Self-service BI Modeling Best Practices

- Adopt model-first instead of report-first approach
- Avoid cramming all data into a single table
- Model once for your subject area, create many reports
- Star schema is your best friend
- Separate reports from model
- Use Tabular Editor to speed up development
- Create explicit measures

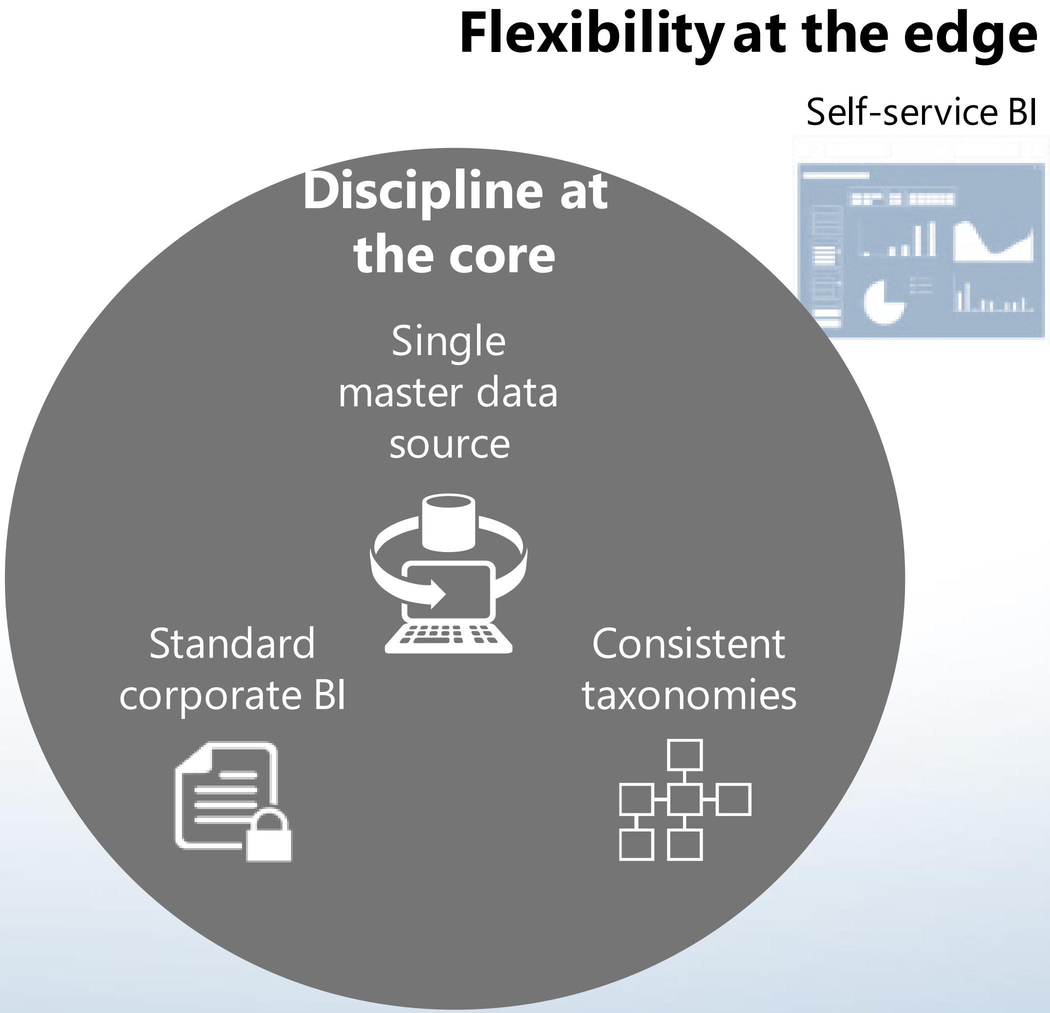
Avoid creating a dataset for each report! This duplicates data and effort. Instead, aim for a model that represents your subject area.

Demo

Self-service Modeling

Organizational Semantic Models

Discipline at the core, Flexibility at the edge



Flexibility at the edge

Self-service BI

Discipline at the core

Single master data source

Standard corporate BI

Consistent taxonomies

Discipline at the core (organizational BI)

- IT retains control by curating a single master data source to:
  - Deliver standardized corporate BI
  - Define consistent taxonomies, hierarchies, and KPIs
  - Enforce data permissions centrally
  - Review and certify data sources for consumption
  - Administer Power BI environment

Flexibility at the edge (self-service BI)

- Analysts apply agile self-service BI to:
  - Quickly create reports sourced from trusted data
  - Mash up core data with departmental data
  - Create new metrics and KPIs relevant to their business
  - Manage reporting environment using standardized workflows

> I call it the 80/20 principle where 80% goes into organizational BI and 20% goes to self-service BI.

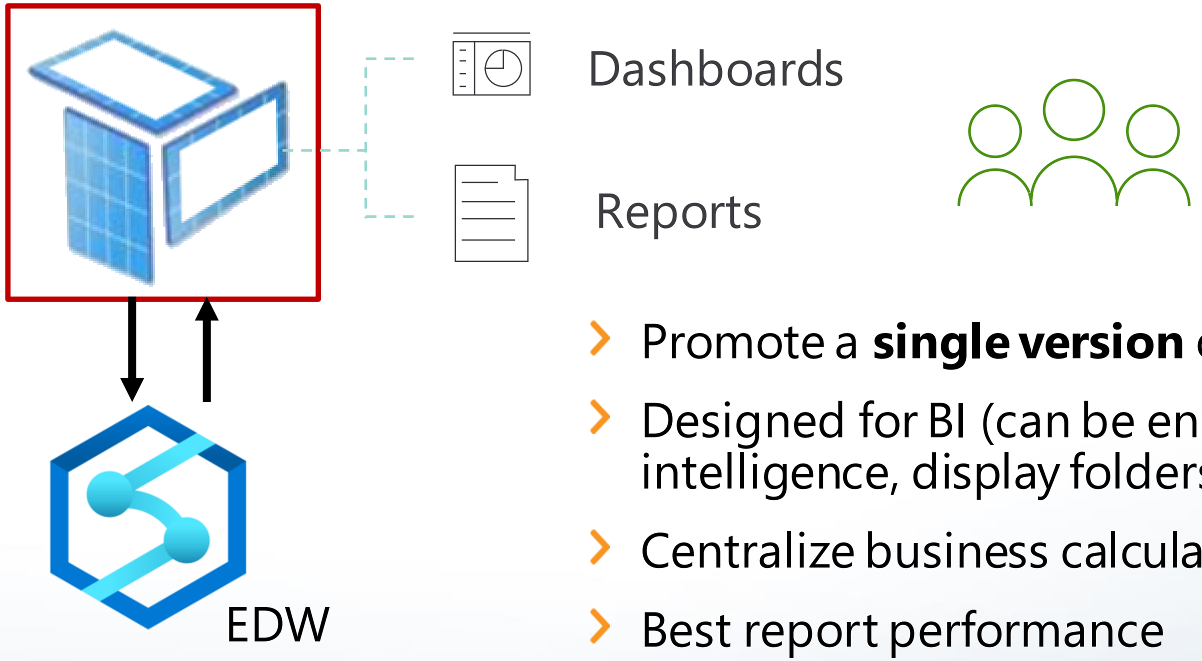
Avoid Leaning Too Much on Self-service BI

What Microsoft discovered

- Inconsistent data definitions, hierarchies, metrics, and Key Performance Indicators (KPIs).
- Analysts spending 75% of time collecting and compiling data.
- 78% of reports being created in "offline environment"
- Over 350 centralized finance tools and systems
- Approximately $30 million annual spend on "shadow applications"

Recommendation: Learn about the Microsoft BI maturity journey and benefits of "Discipline at the core, Flexibility at the edge" at [Microsoft's BI transformation - Power BI | Microsoft Docs]()

The Role of Organizational Semantic Model



- Promote a **single version** of truth for corporate metrics
- Designed for BI (can be enriched with hierarchies, time intelligence, display folders, comments, etc.)
- Centralize business calculations
- Best report performance
- Isolation between EDW and reports

Recommendation: Consider a consolidated semantic model spanning subject areas to avoid duplicated dimensions, support reports showing metrics that transcend subject areas, and achieve single version of truth. When hosting it in Power BI, consider promoting it as a certified dataset(s).

Organizational Semantic Model Hosting Options

	SSAS	Azure Analysis Services	Power BI Service (My preferred option)
Pros	• Great for on-prem or hybrid deployments • License only for production use (DEV, TEST free)	• Gateway (Power BI->AS) is not required • Easy scale out • Highly available • More features than SSAS	• Strategic option for cloud hosting • Latest semantic model features • Gateway (Power BI->AS) is not required
Cons	• Limited features (must wait for new SQL Server release in hope to get features) • Must provision hardware and software • Requires Power BI gateway	• Not a strategic option (caught in the middle of SSAS and Power BI) • Potentially higher cost than on-prem for multiple environments • DevOps entails additional cost	• Higher cost than on-prem • Requires Power BI Premium or PPU for larger models • Inflexible premium plan hardware options

Organizational Semantic Layer Development Options

	SQL Server Data Tools (SSDT) (Pro)	Tabular Editor (Community) (Pro/Business)	Power BI Desktop (Business/Pro)
Pros	• Microsoft-provided tool for development (primarily for SSAS) • Integrates with Visual Studio IDE • Wizards to get you started • Diagraming support • Source control	• Speed of development • Doesn't require workspace database • First tool to support new features • Extensibility with scripts, such as to rename multiple measures	• Intuitive and familiar user interface • Features on par with Power BI Service • Diagramming support • Updated monthly
Cons	• Slow performance (every change requires commit to underlying AS) • Bugs • Features limited to SSAS SKU • Requires Power BI Premium/PPU hosting to connect to XMLA endpoint when deploying to Power BI	• Community tool • No diagramming support	• Slow performance (every change requires commit to underlying AS) • No source control • No extensibility • Lacking UI for some features (perspectives, calculation groups, detail measure expressions, translations)

Recommendation: Consider using Power BI Desktop and Tabular Editor for development. This works for both Power BI Pro and Premium hosting.

Composite Organizational Models
Currently in preview

- Allow end-users to extend semantic models
- Bring great flexibility
- Replaces live connection with DirectQuery

Demo

Composite Models

Summary

- Almost every company needs organizational semantic model
- Adopt "Discipline at the core, flexibility at the edge" principle
- Download
- Stay in touch
  - Email: teo.lachev@prologika.com
  - Blog: https://prologika.com/blog
  - Training: https://prologika.com/training
  - Books: https://prologika.com/books