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Semantic Link Labs: The Data Detective's Toolkit

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📍 Nashville, TN, USA

🛠️ Began Career as a SQL Server DBA

➡️ Transitioned to Microsoft BI Stack

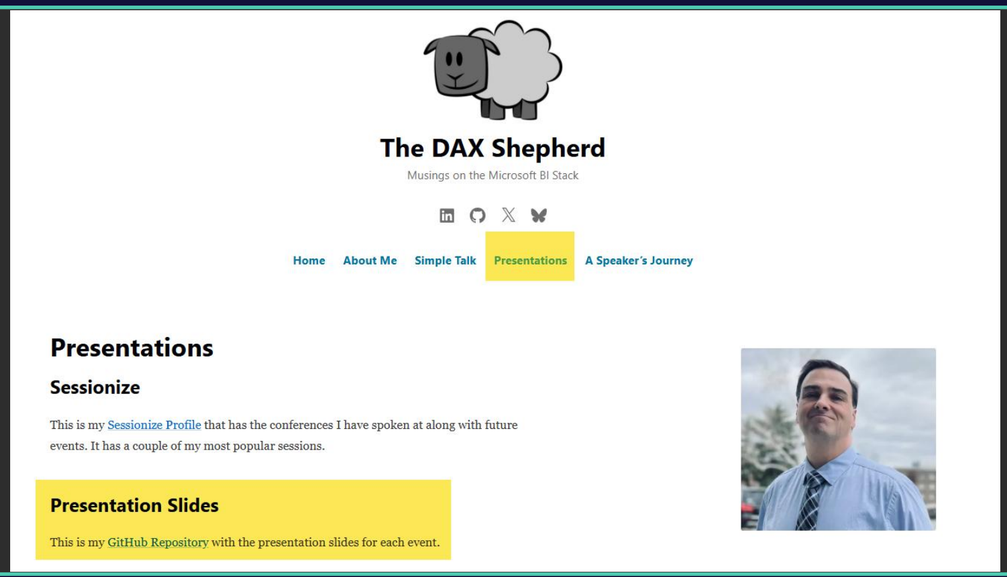
📦 Data Engineering to Data Modeling

DOWNLOAD THIS PRESENTATION

All slides, resources, and demo files available:

The DAX Shepherd

www.thedaxshepherd.com/presentations



Standing on the Shoulders of Giants

Grateful for the people who share their knowledge, encourage us, answer questions, and help the rest of us learn faster.

The Case for Semantic Link Labs

Why this matters and what Semantic Link Labs enables

OPEN THE CASE

YOU ARE HERE

CASE DEMOS

DETECTIVE AGENCY

CASE CLOSED

Sound Familiar?

"IT WAS FINE ON FRIDAY"

Why BI Teams Need Detectives

Too often, BI teams investigate only after something breaks.

- Model size creeps up
- Best practices drift over time
- Small changes leave a wide trail
- Performance issues appear before cause

Symptoms aren’t evidence — they’re just the first clue.

Monk Moment: "Something’s off"

That instinct is valuable when paired with evidence.

Use the detective habit:

- Notice the detail that doesn’t fit
- Follow the trail of dependencies
- Prove it with evidence
- Turn investigation into prevention

What You'll Learn

By the end, you'll be able to:

- **Investigate** model performance with evidence
- **Trace** dependencies and understand change impact
- **Detect** breakage and hygiene issues proactively
- **Turn** investigations into a reusable playbook

The Detective Method

Use this loop for every mystery you investigate.

Investigation loop:

- Symptom (what users feel)
- Evidence (what we can prove)
- Suspects (ranked likely causes)
- Fix (targeted action)
- Prevention (make it repeatable)

Detective’s Toolkit

SL

Semantic Link

Microsoft first-party library
Runs inside Fabric notebooks
Core: list tables, run DAX, read metadata

SLL

Semantic Link Labs

Open source
Extends Semantic Link
BPA · VertiPaq · report scanning

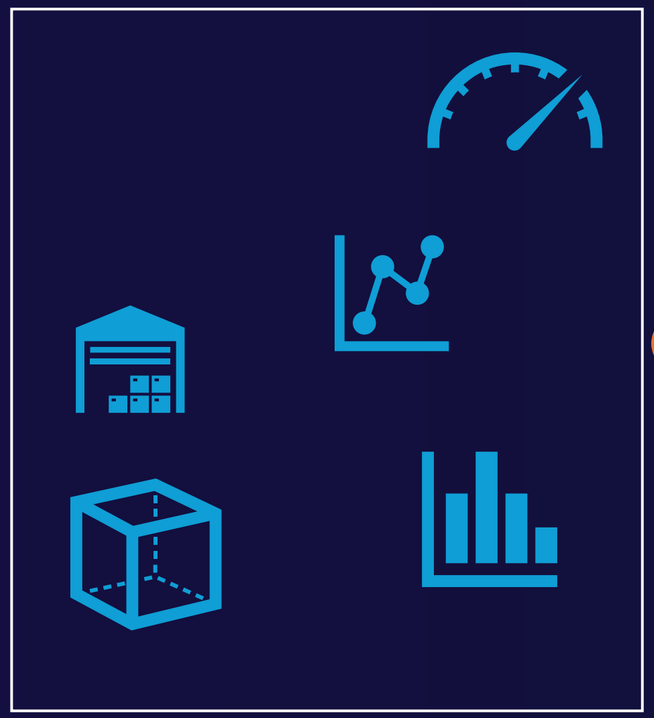
FN

Fabric Notebook

The runtime environment
Where detective work happens
Python + Spark, pre-installed libraries

Semantic Link Labs

Microsoft Fabric



Semantic Link

List Tables

List Workspaces

List Models

List Reports

Semantic Link Labs

Recover Deleted Lakehouse Objects

Best Practice Analyzer

Migrate to Direct Lake

View Broken Reports

Manage Reports

Rebind Reports

Semantic Link + Semantic Link Labs

What this unlocks:

- Inspect Fabric through code, not just the UI
- Investigate assets and metadata systematically
- Trace relationships and understand downstream impact
- Catch problems earlier and reduce guesswork
- Turn one-off investigations into repeatable practice

Semantic Link

Microsoft's first-party Fabric Python library

- Runs only inside the Fabric runtime
- Foundation layer: import sempy.fabric as fabric
- Preinstalled in the default runtime
  - Update with %pip install -U semantic-link
- Extended by Semantic Link Labs

Semantic Link Labs

- Michael Kovalsky
  - aka “Kovalsky’s Laboratory”
- “Expansion Pack” — Kurt Buhler
- Built on Semantic Link
  - import sempy.fabric as fabric
- Open source on GitHub
  - Active Development

Installing in Microsoft Fabric

Update packages in a notebook cell

Semantic Link

Preinstalled in the Fabric runtime

%pip install -U semantic-link

Semantic Link Labs

Install separately when needed

%pip install –U semantic-link-labs

Follow the Evidence

Real demos that uncover what is happening in Fabric

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DETECTIVE AGENCY

CASE CLOSED

Case File: The Unidentified Model

Arrive at the scene. Catalog everything before you touch it.

VICTIM: A semantic model in a new Fabric workspace
SYMPTOMS:

- No programmatic inventory — structure is trapped in the UI
- Relationships exist in the model but not in the data — or vice versa

Case File: The Relationship Web

He sees connections others miss. So does find_relationships.

VICTIM: A semantic model with undetected relationship gaps
SYMPTOMS:

- Power BI shows only the relationships it was told about
- Data suggests more connections exist — but nobody modeled them

Case File: Running the Numbers

Your DAX knowledge is trapped in the desktop. Time to set it free.

VICTIM: DAX knowledge locked inside Power BI Desktop
SYMPTOMS:

- Can't query the model programmatically from a pipeline
- DAX results can't feed downstream Python or notebook logic
- No way to automate recurring DAX calculations

DEMO: The Detective’s Toolkit (Cases 1–3)

DEMO TIME

Let’s go investigating…

Case Board: Investigations 1–3

Cases closed. Evidence on record.

CASE 01

The Unidentified Model

CASE 02

The Relationship Web

CASE 03

Running the Numbers

Case File: Something Doesn't Add Up

Every relationship has two sides. Not every key agrees.

VICTIM: Referential integrity violations hiding in your model
SYMPTOMS:

- Fact table keys that point to dimension values that don't exist
- Blank members appearing in slicers or visuals unexpectedly
- Aggregations silently drop rows with no error

Case File: The Evidence Isn’t Ready Yet

The witness statement exists. Monk knows it. But it’s not in the file.

VICTIM: A Delta table just written to OneLake

SYMPTOMS:

- Table confirmed written in the notebook
- Not visible in the SQL Analytics Endpoint

Case File: The Witness Vanished

The witness was there. Then they weren't.

VICTIM: A Delta table deleted from the Lakehouse

SYMPTOMS:

- Table confirmed visible in SQL Analytics Endpoint
- Then gone — query returns nothing
- No backup process, no pipeline to re-run

DEMO: The Detective’s Toolkit (Cases 4–6)

DEMO TIME

Let’s work the case……

Case Board: Investigations 4-6

Cases closed. Evidence on record.

CASE 04

Something Doesn't Add Up

CASE 05

The Evidence Isn't Ready Yet

CASE 06

The Witness Vanished

Case File: The Workspace-Wide Sweep

One detective can only cover so much ground.

VICTIM: An entire Fabric workspace — all semantic models
SYMPTOMS:

- BPA run on one model — what about the rest?
- Governance gaps accumulate silently across the workspace
- No historical trend data for model quality

DEMO: The Inspection (Best Practice Analyzer)

DEMO TIME

There's only one way to know.....

Case File: The Report That Lied

The report is lying to you. I’m not sure how yet. But I will be.

VICTIM: A Power BI report connected to a semantic model
SYMPTOMS:

- Visuals reference fields that were renamed or removed
- Report-level measures live in the report instead of the semantic model

DEMO: The Report Is Lying (Report Analysis)

DEMO TIME

Let's see what doesn't add up.....

Case File: The Profile

Start with the model:

Find out who’s taking up space before they become a problem.

VICTIM: The SF Case Files semantic model

SYMPTOMS:

- Memory usage is hidden behind the scenes
- Large tables and high-cardinality columns are hard to spot by eye
- Model bloat slows performance and makes optimization guesswork

DEMO: The Profile (VertiPaq Analyzer)

DEMO TIME

This deserves a closer look...

Build the Detective Agency

Monitoring, automation, and repeatable practices for the long haul

OPEN THE CASE

CASE DEMOS

DETECTIVE AGENCY

CASE CLOSED

YOU ARE HERE

From Detective to Detective Agency

1

Ad-Hoc Investigations

2

Reusable Notebooks

3

Standard Health Checks

BPA + VertiPaq + dependencies

4

Run Pre/Post Change

Catch regressions before users do

5

Share & Build Playbook

Your team runs it without you

The Precinct Goes Automated

One function call. One dashboard. A repeatable monitoring view.

WHAT THIS DOES:

- Creates a pre-built workspace monitoring dashboard
- Scopes it to the current workspace
- Gives the team a repeatable monitoring starting point

WHY IT MATTERS:

- Moves from ad-hoc investigation to operational visibility
- Makes monitoring easier to share across the team
- Helps confirm issues faster without rebuilding the view manually

PRE-REQUISITE:

- Workspace monitoring must be enabled first

DEMO: The Precinct Goes Automated (Workspace Monitoring Dashboard)

DEMO TIME

The dashboard will confirm it....

Case Closed

Key takeaways, next steps, and where to start with Semantic Link Labs

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Case Closed: Key Takeaways

1

Evidence First

Turn “something’s off” into evidence using Semantic Link Labs

2

Map the Blast Radius

Use dependencies to understand change impact before you make it

3

Build the Playbook

Make investigations repeatable so you find issues before users do

More from the Crime Lab

SLL ships ready-to-run notebooks for common Fabric governance tasks
— each one a solved case waiting to open

Best Practice Analyzer
— Run BPA rules across models, export results, and spin up a Direct Lake report

Model Optimization
— Fix column encoding, remove auto date tables, clean up model dependencies

Migrate to Direct Lake
— Convert import-mode semantic models to Direct Lake in one notebook

Workspace Monitoring
— Provision a KQL Eventhouse and real-time dashboard with a single call

Report Rebind
— Retarget reports to a new semantic model across an entire workspace

github.com/microsoft/semantic-link-labs → notebooks/

Next Steps

- Run BPA + VertiPaq + dependency scan on one of your own models this week
- Create a case notebook template your team can run without you
- Schedule run_model_bpa_bulk() — make governance automatic

Resources

Semantic Link
https://learn.microsoft.com/en-us/fabric/data-science/semantic-link-overview

Semantic Link Labs
github.com/microsoft/semantic-link-labs

Session materials (slides + notebooks)
github.com/thedaxshepherd/Presentations

Sound off.
The mic is all yours.
Influence the product roadmap.

Join the Fabric User Panel

Share your feedback directly with our Fabric product group and researchers.

https://aka.ms/JoinFabricUserPanel

Join the SQL User Panel

Influence our SQL roadmap and ensure it meets your real-life needs

https://aka.ms/JoinSQLUserPanel

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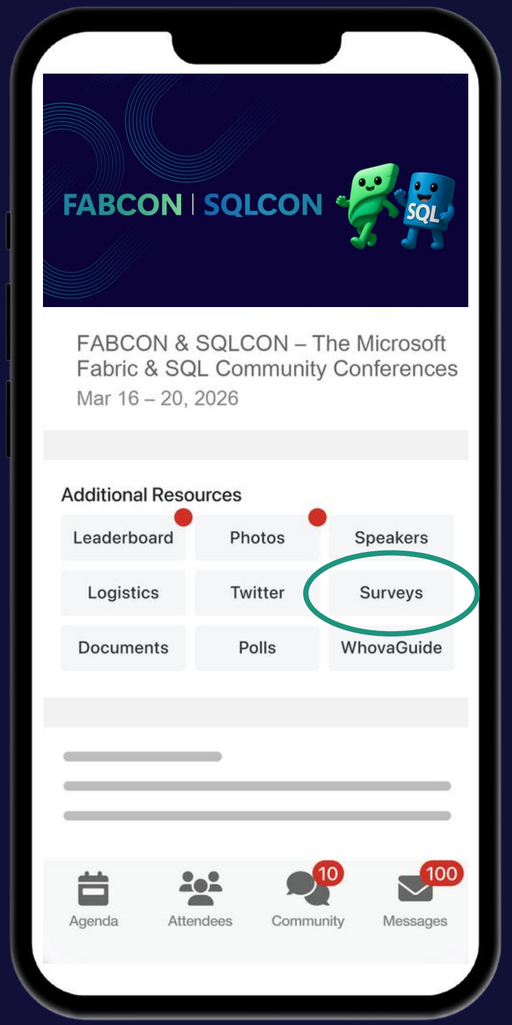

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THANK YOU

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