

Take Your Fabric Projects to the Next Level

Brent Meulebroeck

Fulton Analytics

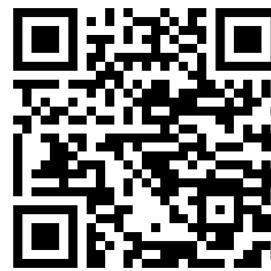
Mike Dostal

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- Your chance to help the MN Data/SQL Community!
 - <https://forms.microsoft.com/r/qcjUg5Cwk4>



Brent will
be there!



Connect, share, & learn with peers and thought leaders while celebrating all things data for a week of learning and networking opportunities.

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November 17th Through November 21st in Seattle, WA

<https://passdatacommunitysummit.com/>



Rules of the day

- We want this to be interactive! Speak up, share your experiences in Fabric
- There will be a mix of slides, demos, and hands-on activities
 - Built to use in your own tenant; notebooks provided
 - If you need to load a demo workspace - let us know (we have a plan)
- Very informal - if you need to step out, feel free
- Venue Logistics

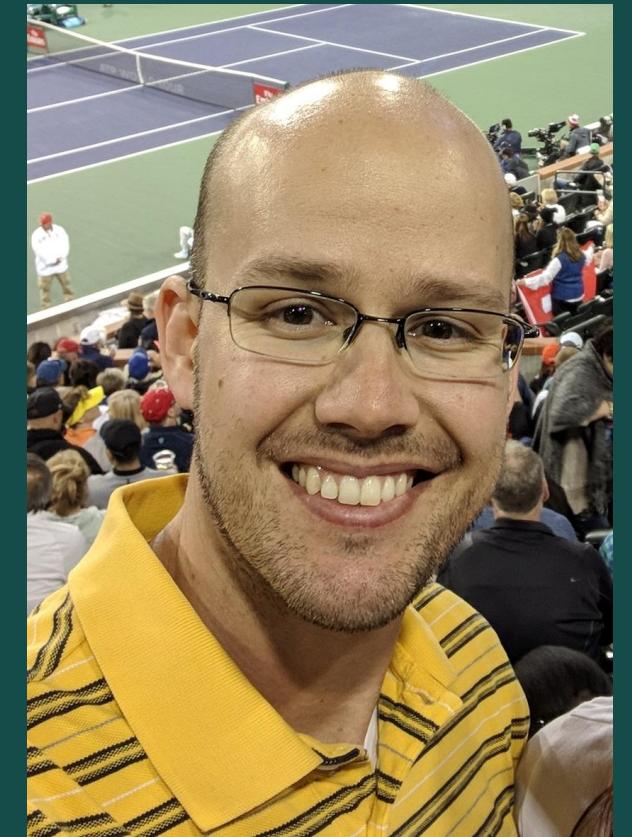
Agenda for the Day

- 9:00-9:30 Intros and Agenda
- 9:30-10:00 Fabric at 2+ Years: Where we've been, where we're going
- 10:00-10:30 Capacity Planning and Licensing
- 10:30-10:45 Break
- 10:45-12:00 Semantic Link and Semantic Link Labs Hands-on
- 12:00-1:00 Lunch
- 1:00-2:00 OneDrive, Prep Your Data for Copilot and AI
- 2:00-3:00 Built in Monitoring and Governance
- 3:00-3:15 Break
- 3:15-3:45 Fabric Unified Admin Monitoring
- 3:45-4:30 Fabric Cost Analysis, Fabric Toolbox
- 4:30-5:00 Wrap Up, Q&A

Brent Meulebroeck

Director Data Solutions

- Hometown: Pipestone, MN
- Graduated from MN State – Mankato
- Spent 20 years in the retail world in a variety of store and field leadership roles with Target, Northern Brewer, and Goodwill-Easter Seals MN
- Joined Fulton Analytics in 2021
- Primarily back-end data engineering in the Microsoft Azure ecosystem and Power Platform (Power BI, PowerApps, and Power Automate), Microsoft Fabric practice lead



You can also find me:



fulton

Mike Dostal

- Hometown: Owatonna, MN
- College: St. Cloud State University - B.S. in Finance
- Work Current: D.A. Davidson - Vice President, Data Analyst
- Work Previous: Verus Consulting, Business & Estate Advisers, Inc, Wells Fargo Investments, Washington Square Securities
- All kinds of jobs in the brokerage industry but focusing on data the last 13 years



Resources for today – available via GitHub

- GitHub link:

<https://github.com/bmeulebroeck/mnsqlsat2025fabric>

- Demo workspace - Healthcare Data

- Courtesy of Greg Beaumont and Inderjit Rana
 - Link in the Notes and Resources doc in GitHub

Now we want to know – who are all you?

- Name
- Company & Role
- How long have you been using Fabric?
- Favorite feature in Fabric?
- What do you wish Fabric could do?
- What is your bucket-list vacation?

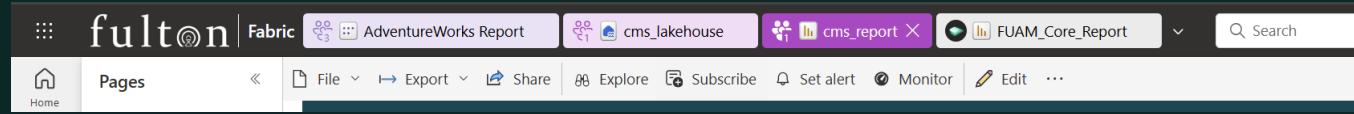
Fabric At 2 Years

Where have we come from,
where are we going?

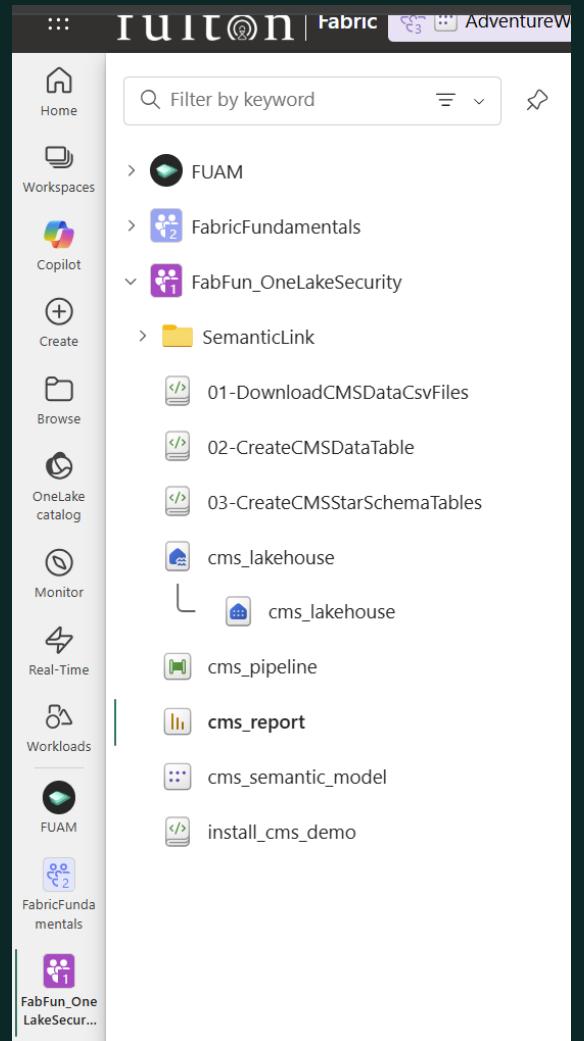


Hot Off the Presses – FabCon Europe Updates:

- Tabs and UI improvements



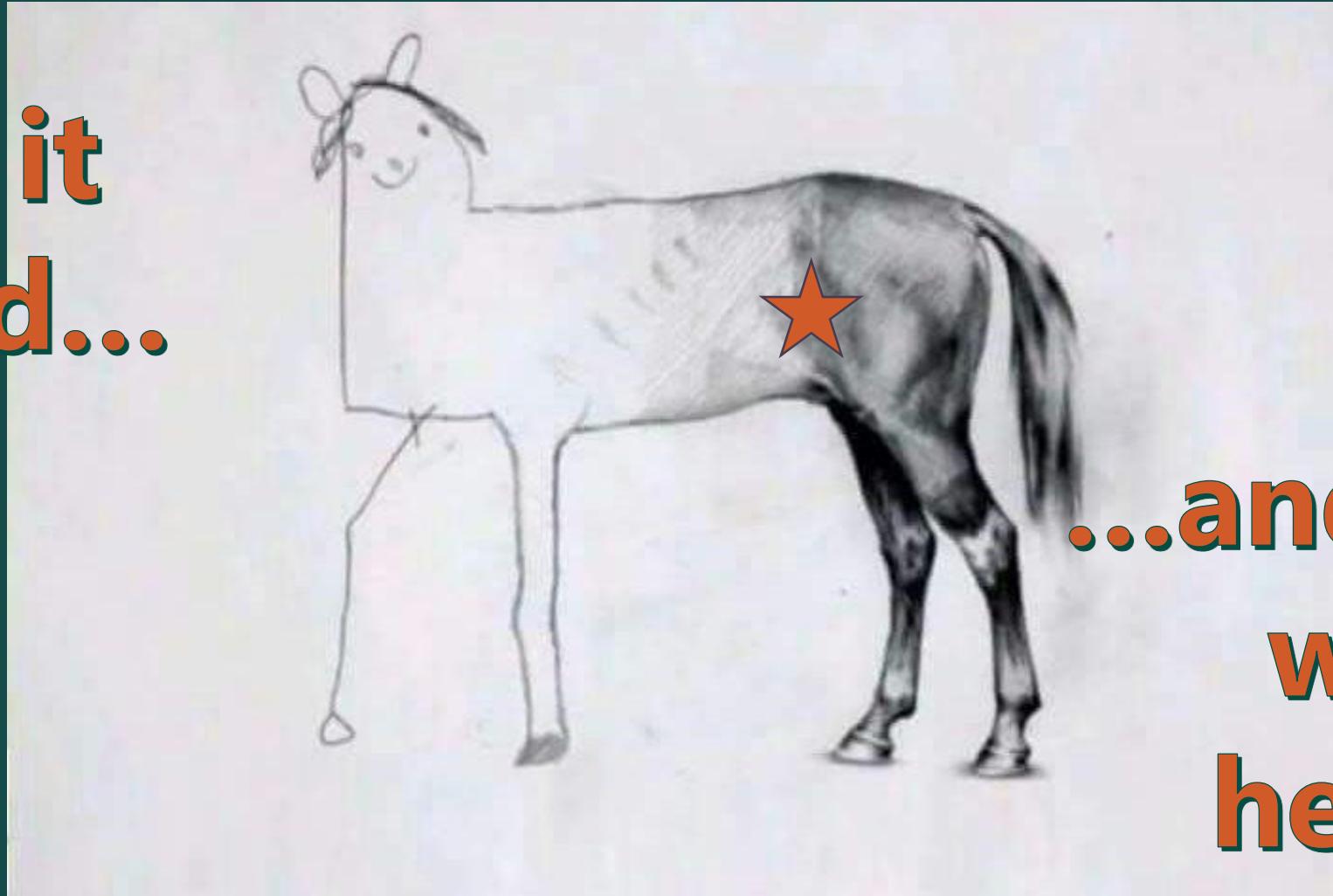
- OneLake Catalog 'Secure' tab
- Data Warehouse 'MERGE'
- Lots of things went GA
- Lots of AI news
- Power BI:
 - UDFs and new Time Intelligence functions



Fabric is evolving and refining over time



**How it
started...**



**...and where
we're
headed**

Getting into Fabric from where you are today

- The beauty of Fabric is that you can ease in as your needs dictate
- Seeing very few full migrations into Fabric
- In most cases:
 - Mirroring or Shortcuts to get existing data to OneLake
 - Net-new sources or 3P sources moved to Data Factory or DFG2
 - Semantic models still largely Import Mode

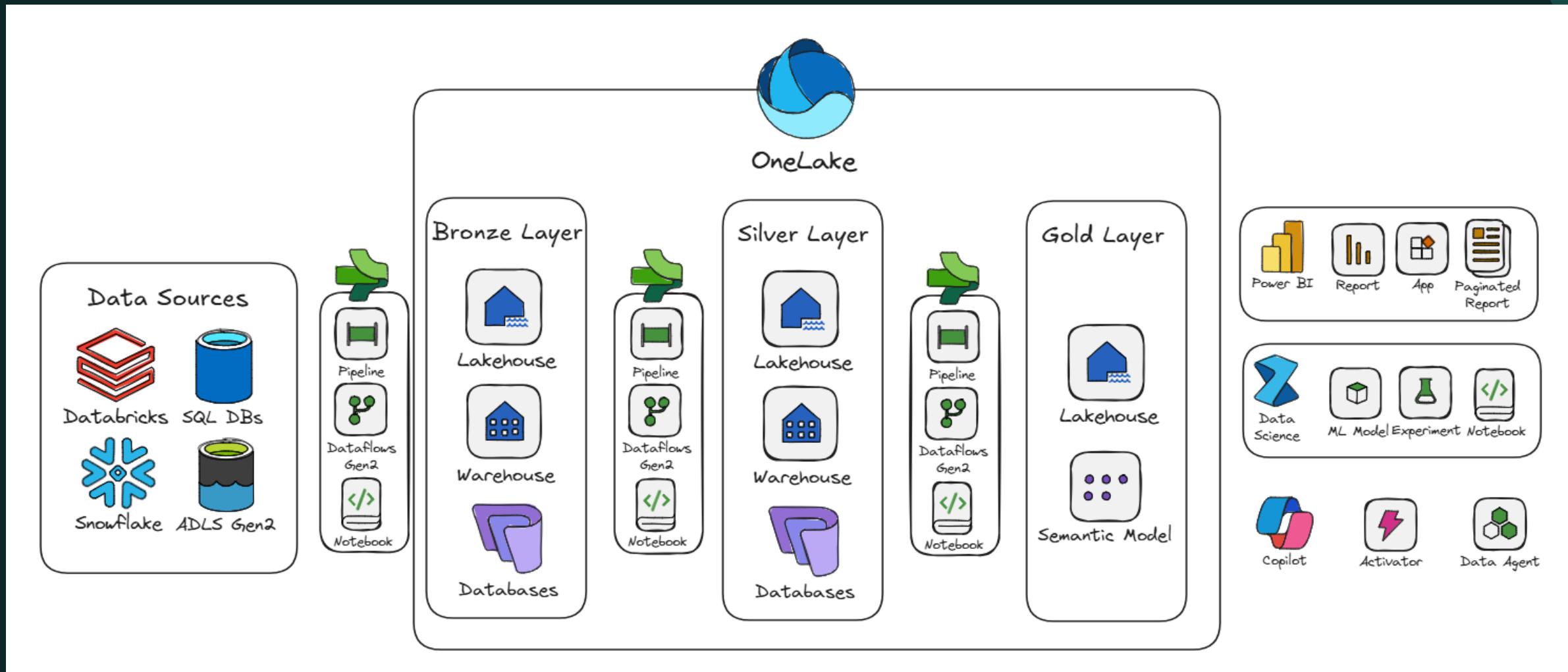
What have been the sticking points?

- Capacity Planning - All-in-one capacity rollouts
- Workspace Organization - Need to have a plan
 - Use the tools: Domains, Folders, etc.
- Security
- Fabric is GA - but also still in Preview at the same time
- What have you all run into with your Fabric projects?

Architecture Patterns – What is the best approach?

- It depends. There are some best practices emerging
- For your Data:
 - Warehouse-Lakehouse to Lakehouse, with notebooks or DFG2 orchestrated by pipelines
 - Group your items in the way it makes sense for your workflow (use folders, or separate workspaces)
- For your Users:
 - Important to separate the sausage-making from the sausage serving

Basic Architecture Diagram



Let's Talk Capacity

What's the right size(s)? How
should they be allocated?



The first question of Fabric....

- What license do we need?
- **Fabric** is sold using a **capacity** model; **Power BI** is **licensed**
 - You **can** do Fabric **without** a PowerBI license
 - You **cannot** do Power BI without a Power BI license*
 - Except F64+ = free Power BI viewing
- For most of our clients there needs to be blend of Power BI licensing and Fabric capacity

A few scenarios

- | | | |
|--|---|--|
| <ul style="list-style-type: none">• Small/Med:• Fabric<ul style="list-style-type: none">• F16 (res): \$1,251• F4 (res): \$313• Power BI<ul style="list-style-type: none">• 50 users: \$700• Monthly Tot: \$2,264• Annual: \$27,168 | <ul style="list-style-type: none">• Mid-Size:• Fabric<ul style="list-style-type: none">• F32 (res): \$2,501• F4 (_{PAYG, 1/2}): \$212• Power BI<ul style="list-style-type: none">• 200 users: \$2,100• Monthly Tot: \$4,813• Annual: \$57,756 | <ul style="list-style-type: none">• Large:• Fabric<ul style="list-style-type: none">• F64 (res): \$5,003• F16 (res): \$1,251• Power BI<ul style="list-style-type: none">• 20 devs: \$280• Viewers: FREE• Monthly Tot: \$6,534• Annual: \$78,408 |
|--|---|--|

- Start small, scale-up as needed
- Fabric will depend on how much DE you're doing; PBI the mix of developers vs. viewers

Fabric Capacity SKU Options

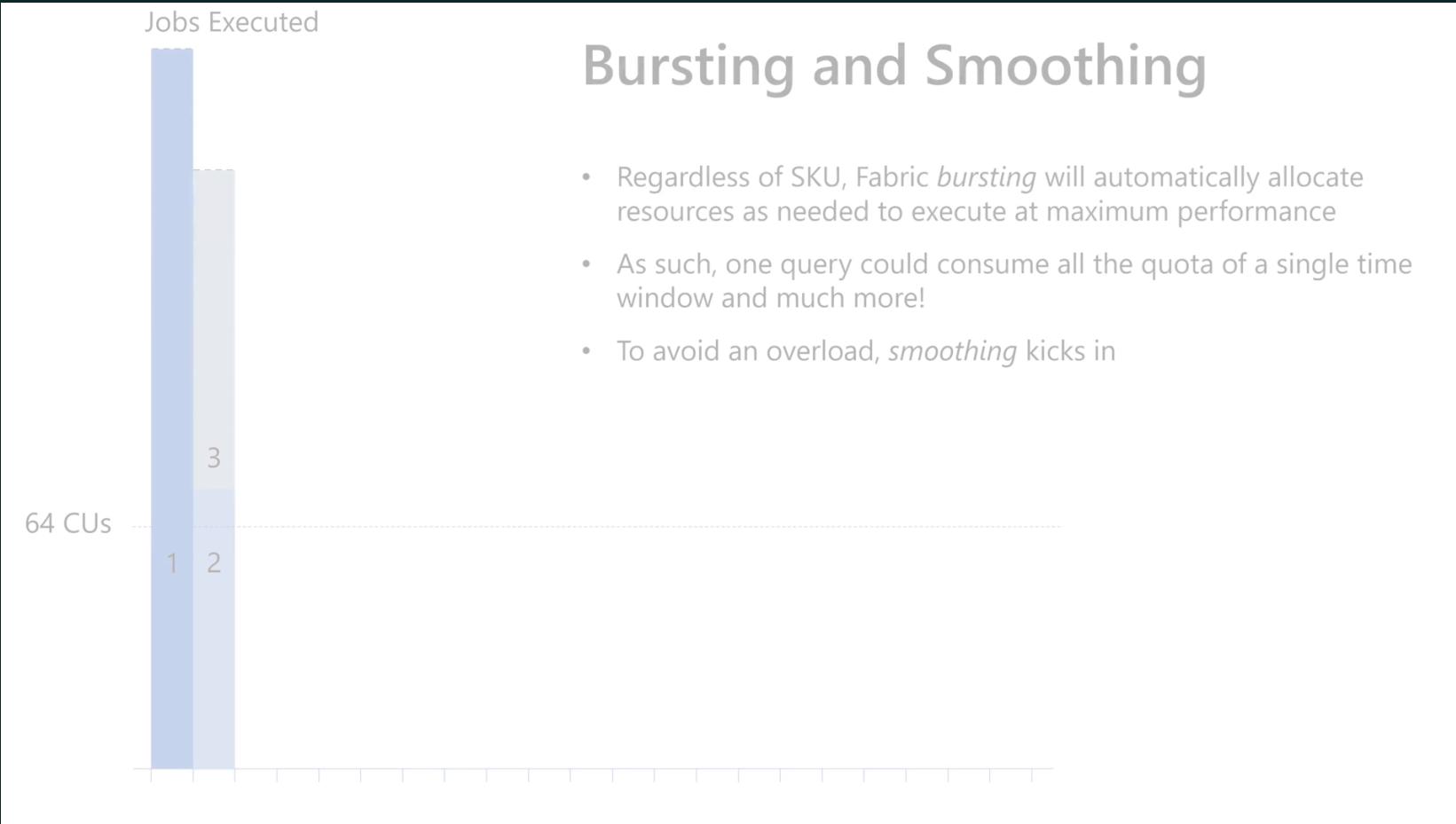
- The red line represents the divide where you can view with the PBI free license
- Prior to March of this year, this was also where AI/Copilot kicked in. But that is now included at all paid SKU levels F2 and up

SKU	Capacity unit (CU)	Pay-as-you-go (hourly)	Pay-as-you-go (monthly)	Power BI Equivalent	P cost (monthly)	RI cost (monthly)	Max memory (GB)	User required to view Power BI content
F2	2	\$0.36	\$263		\$156			Pro
F4	4	\$0.72	\$526		\$313			Pro
F8	8	\$1.44	\$1,051	EM/A1		\$625	3	Pro
F16	16	\$2.88	\$2,102	EM2/A2		\$1,251	5	Pro
F32	32	\$5.76	\$4,205	EM3/A3		\$2,501	10	Pro
F64	64	\$11.52	\$8,410	P1/A4	\$4,995	\$5,003	25	Free
F128	128	\$23.04	\$16,819	P2/A5	\$9,990	\$10,005	50	Free
F256	256	\$46.08	\$33,638	P3/A6	\$19,980	\$20,011	100	Free
F512	512	\$92.16	\$67,277	P4/A7	\$39,960	\$40,021	200	Free
F1024	1024	\$184.32	\$134,554	P5/A8	\$79,920	\$80,043	400	Free
F2048	2048	\$368.64	\$269,107			\$160,085		Free

Capacity Planning

- Capacity is measured in CU(s) - Capacity Unit Seconds
- An F64 capacity has 64 CU available per second
 - 1 second = 64 CU(s)
 - 1 minute = 3,840 CU(s)
 - 1 hour = 230,400 CU(s)
 - 1 day = 5,529,600 CU(s)
- The Capacity metrics app shows CU(s) by item for the last 14 days (unless you cross-filter)

Capacity Planning



- **For interactive jobs run by users:** capacity demand is typically smoothed over **5 minutes** to reduce short-term temporal spikes.
- **For scheduled, or background jobs:** capacity demand is spread over **24 hours**, eliminating the concern of job scheduling or contention.

Capacity Planning

- F-skus are not monolithic, you can mix and match
- Can subdivide reserved capacity
- Think about protecting key workloads:
 - Data Engineering and Model Maintenance (Background)
 - User interactivity (Interactive)
 - Copilot capacity designation
- The monitoring tools we explore later today will help you figure out where to draw your lines
- Microsoft put out a great article series on all this with some guidance:
 - Learn.Microsoft.com/en-us/fabric/enterprise/capacity-planning-plan-deployment

Capacity Planning

- Goal: MIN - MAX
 - Minimize the cost (\$s)
 - Maximize the value (utilization)
- Isolation vs. Consolidation
- Scale Up vs Scale Out

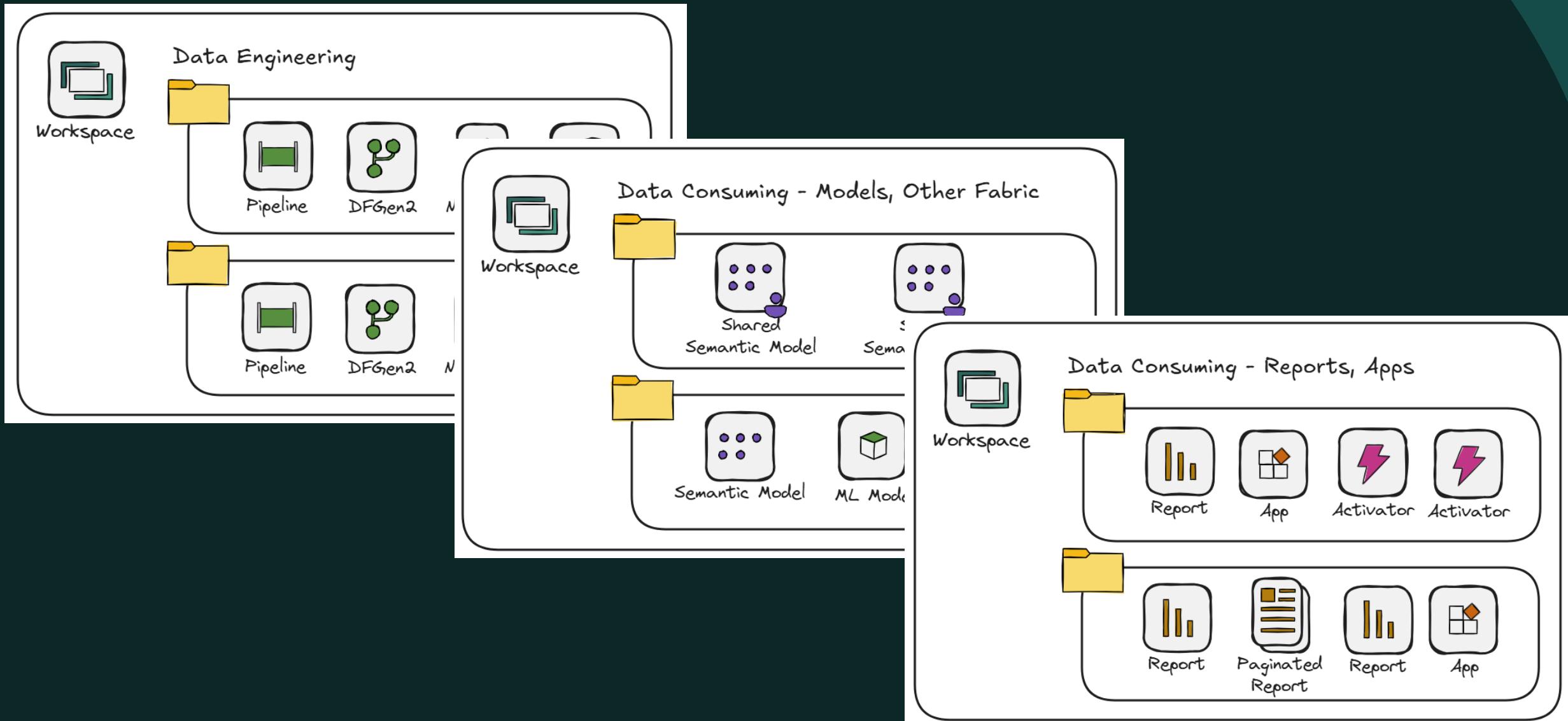
Workspace Planning



Image credit: Rob Palmer, The Data Engine Room

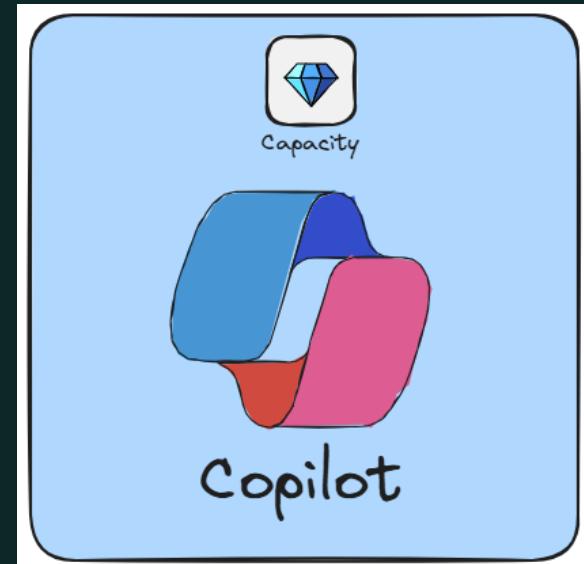
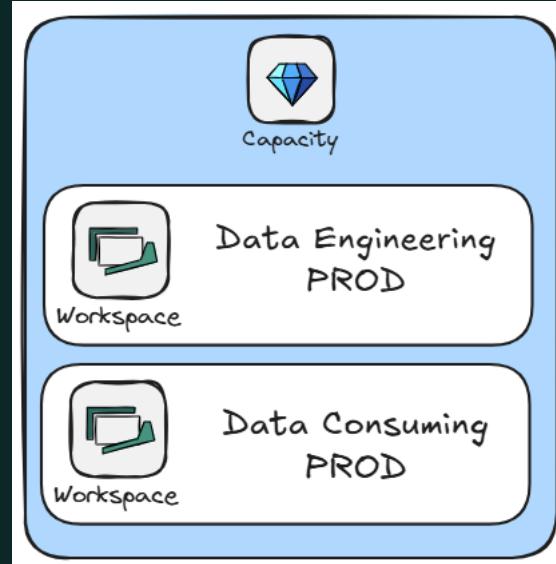
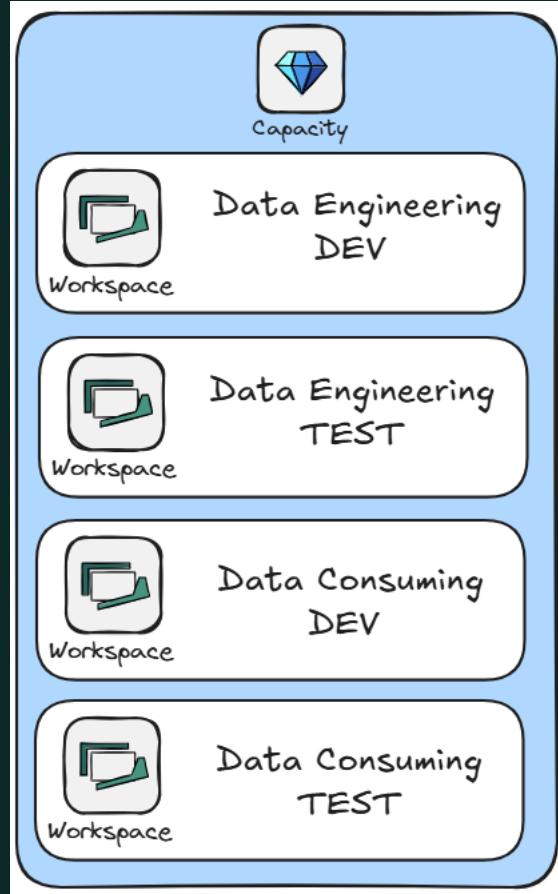
- In Power BI standalone it was more about security and distribution
- In Fabric - we still need to consider those, as well as capacity consumption and workload segmentation

Workspace Setup



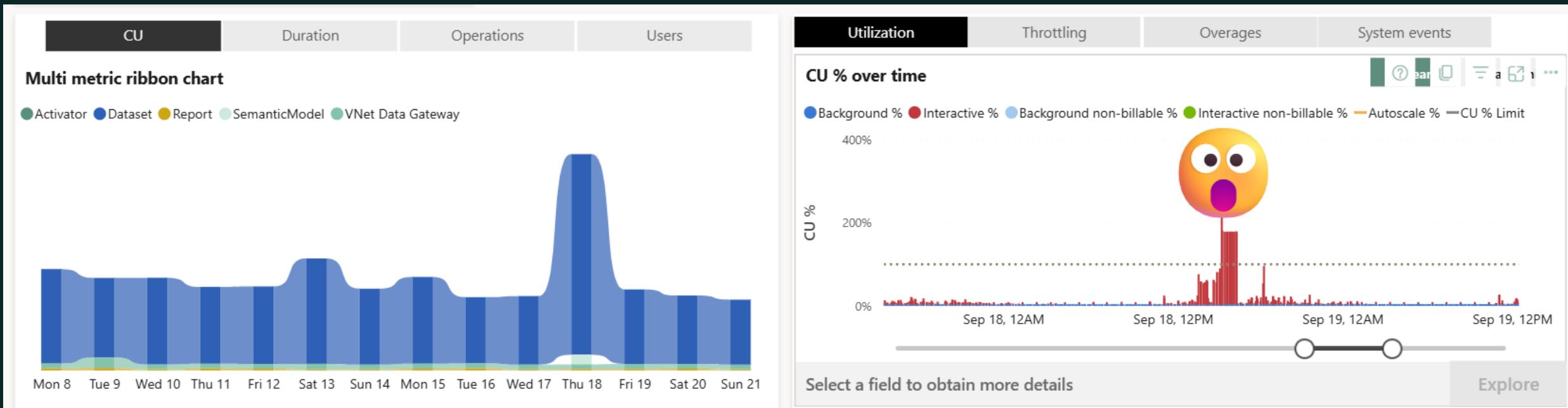
Capacity Planning

- Guidance points to multiple capacity solutions
- You can also keep PBI items (models and reports) in Pro workspaces, subject to Pro limitations



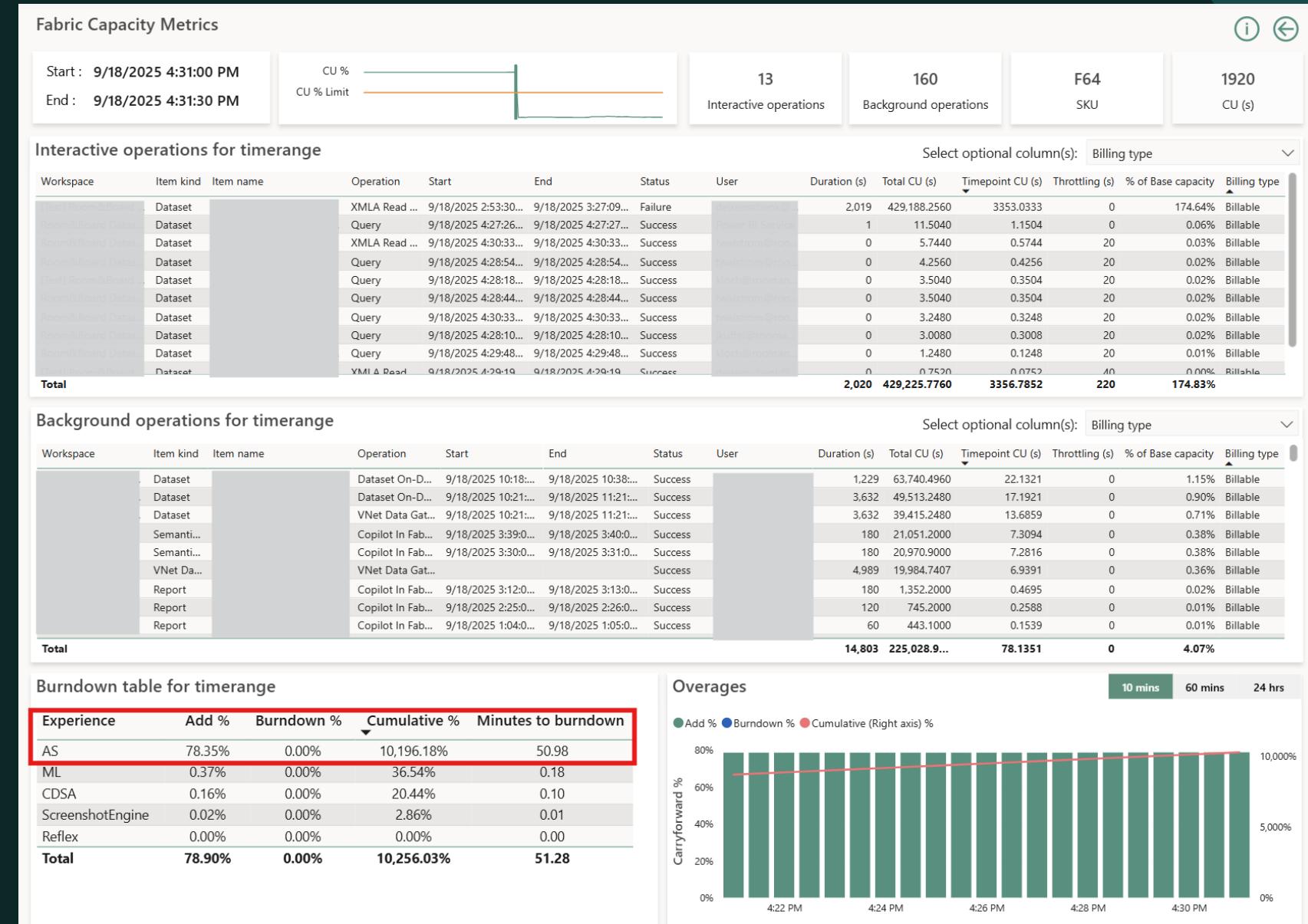
What happens if you put all in one?

- One user can inadvertently throttle your capacity
 - Surge protection exists for background ops (blue), but not for red (yet?)



How to go about fixing it...

- If you drill-through to time detail you can see who/what is causing the issue
- At the bottom you can see the 'Minutes to Burndown' – assuming the consumption stops
- There is a 'reset' button – Azure Portal -> Fabric -> Pause your capacity, then resume.
 - Back up and running fast!
 - But you'll get billed for the overage, separate from your reservation



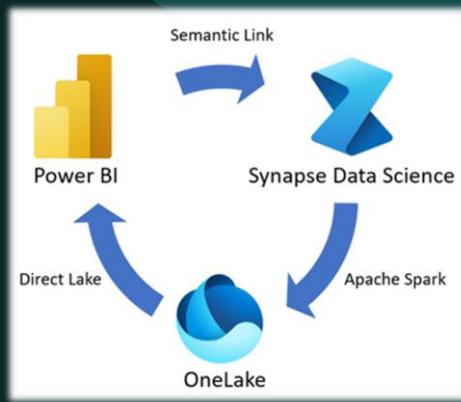
Semantic Link and Semantic Link Labs

Automate maintenance and
mundane tasks



Semantic Link basics

- Semantic link is built on the SemPy python library
- It was created with a Data Science focus, but has quickly added functionality across most Fabric items and workloads
- Using semantic link you can extract information about your models, run queries, access Power BI and Fabric REST APIs, and much more
- Output can easily be passed back to Lakehouse tables, and then on to other Fabric items
- All of this can be automated and scheduled (notebooks and pipelines)
- Authentication and security is handled for you; no tokens or auth strings to mess with



Semantic Link basics

- **Semantic Link Labs** is an extension with even more functionality:
 - 300+ Functions
 - Access to many Fabric items (semantic models, reports, lakehouses, warehouses)
 - Full access to the tabular object model (TOM)
 - A lot of this is built on the existing APIs - but you don't have to worry about all the 'API stuff' - that's handled for you behind the scenes
- Both of these are Python libraries - but you **do not** need to be a Python expert (or even a novice tbh)
- Community resources abound - notebooks and code snippets
- To learn more:

Michael Kovalsky, Sandeep Pawar

Who will use Semantic Link/Semantic Link Labs?

- **Data Engineers**
 - Extract model info, conduct data quality checks, monitor refreshes, etc.
- **Fabric Admins**
 - Extract tenant information, monitor and update permissions and access rules
- **Data Analysts**
 - Business logic and data validation, model maintenance/optimization (VPA,BPA)
- **Data Scientists**
 - Access business logic and extract data from SMs for further analysis or modeling

Semantic Link basics

- Demo Time!
- Notebooks are in the GitHub repo if you'd like to follow along. The notebooks are built to work with the CMS Drug Cost data workspace for the most part

Working In OneLake

Don't let it become
OneSwamp



OneLake (to rule them all)

- OneLake was designed from the ground up to be the unifying element of Fabric (and your data estate)
- Remember the design intentions:
 - OneLake, not many
 - Avoid silos, securely
 - One copy of your data and a single source of truth
- To learn more about the design decisions around OneLake – follow Josh Caplan

While working in OneLake – Remember to Stay D.R.Y.

- D.R.Y. =
 - **D**on't
 - **R**epeat
 - **Y**ourself
- Data should not be duplicated in the same form, anywhere
- Shortcuts enable you to make data accessible in OneLake, while leaving it where it lives

Security in OneLake and Fabric

- Up until now, security has been managed in the old tried and true ways
 - Database level roles and permissions, RLS/OLS
 - In PowerBI, workspace roles and item level permissions
- Many layers of security, and thus many places to manage security

Coming soon – OneLake Security

- One Lake Security is currently in Preview
- Enables security to be implemented at one point, where it will flow to all downstream objects in Fabric

Working with Delta Tables

- Question: How many of you are using DirectLake models in production?
- Delta brings its own benefits and challenges
- Need to optimize, vacuum to keep files tidy
- Can partition your delta files for better query performance
- Phil Seمارك from MS has a great full-day workshop - if you see it at a conference sign up!

Ensure Your Data is AI Ready

G.I.G.O

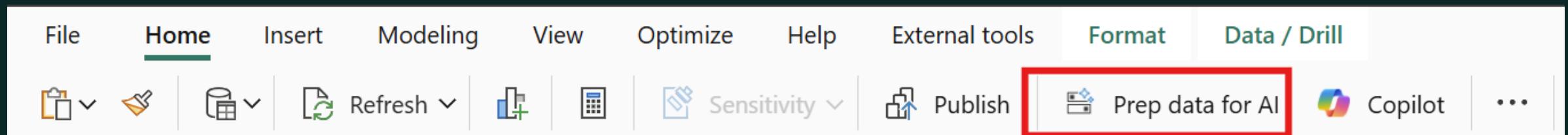


What Does 'AI Ready' even mean?

- ...It Depends!
- How do you intend to use AI, and how will your users interact with AI tools?
- As always - **Garbage In, Garbage Out**
- Copilot standalone experience is now on by default

Semantic Model Prep

- General rule of thumb - the more you can clean, organize, and document your models the better
- Don't forget descriptions (for Tables, Columns, Measures, etc.) and synonyms
- New tools have come online to prep your models



Semantic Model Prep

- What about using AI -
- to prep for AI?



Semantic Model Prep – Using AI tools for AI Prep

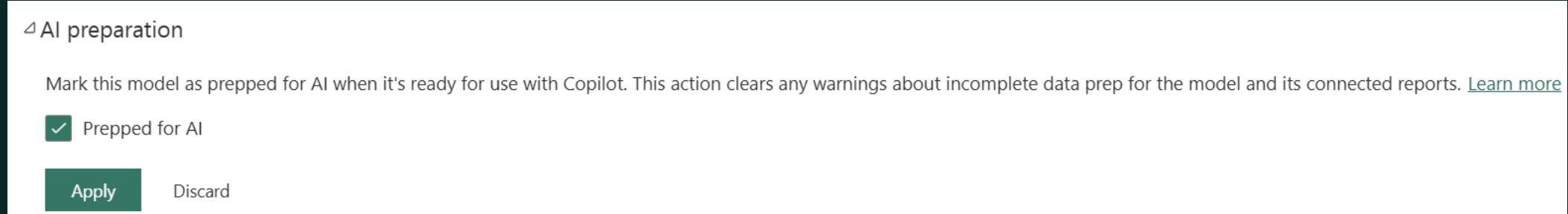
- Copilot - to generate descriptions in your model
- Semantic Link Labs - Generate descriptions in bulk
- GitHub Copilot - TMDL view
- Fabric - Built-in AI Functions
 - Similarity, Classification, Sentiment Analysis, Grammar Correction, Summarization, Translation, etc.

Semantic Model Prep – Using AI tools for AI Prep

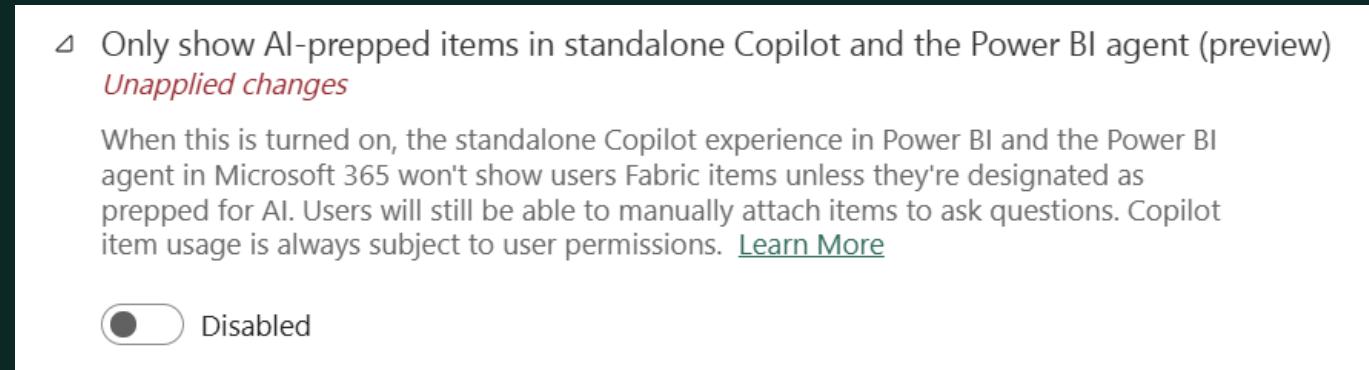
- To the demos!
- Resource notebooks in the GitHub repo

AI Prep in Fabric

- There is a setting on semantic models now to indicate that a model has been prepped for AI:



- And there is a tenant setting to limit Copilot interactions to **ONLY** models that have this box checked (and their linked reports):



Monitoring and Governance

Manage your data estate



Fabric can be a lot to keep track of

- Capacity model is new to many customers
- Monitoring tools are spread throughout Fabric
- Business users don't necessarily care about monitoring until there's an issue - and then they want answers immediately
- Knowing the tools will help you stay on top of your tenant to (hopefully) prevent issues, and also help you respond quickly when there are concerns

Built-in Tools* to Monitor your capacity

- Monitoring Hub
- Admin Monitoring Workspace
 - Content Sharing, Feature Usage and Adoption, Purview Hub
- OneLake Catalog
- Report Usage Metrics
- Fabric Capacity Metrics App*
 - Need to install and keep up-to-date

Purview Functionality in Fabric

- Domains and Sub-domains
 - Default Sensitivity Labels GA
 - Can delegate certain tenant settings to the domain admin
- Tags - Set at Tenant or Domain level
- Protection Policies - Set in Purview to automatically secure Fabric items with certain sensitivity labels

Fabric Unified Admin Monitoring

FUAM = Next Level
Monitoring of your Fabric
Tenant



FUAM – Community developed monitoring solution

- FUAM =
 - **F**abric
 - **U**nified
 - **A**dmin
 - **M**onitoring
- Developed by
- Considered an accelerator - not supported by Microsoft
- Consumes CU 

FUAM – Community developed monitoring solution

- Deployment has been streamlined significantly since launch
- Need to setup Service Principals for connections
 - Key Vault (optional)
- Microsoft Fabric Capacity Metrics (FUAM Capacity Metrics)
- <https://github.com/microsoft/fabric-toolbox/>
- Need to be tenant level Fabric Admin

FUAM – Community developed monitoring solution

- FUAM Core Report
- What Questions can it answer
 - Capacity
 - Usage (Capacity Compute & Item Operations)
 - Inventory (Item Overview & Onelake Catalog)
 - Compliance
 - Activities
 - Tenant Settings

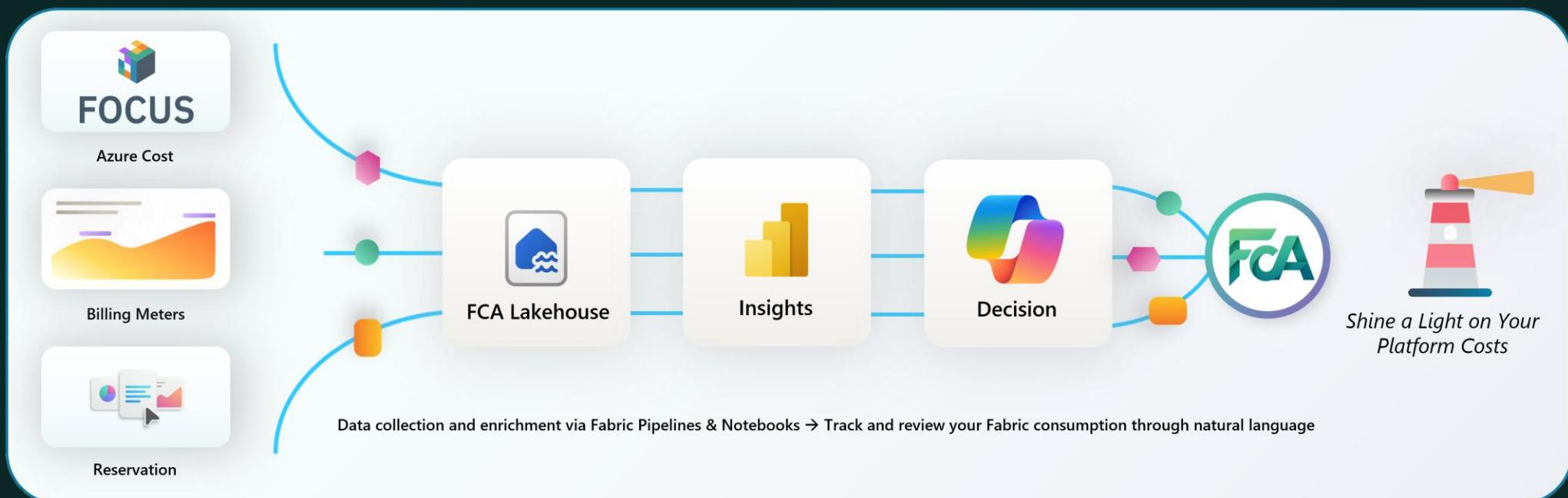
FUAM – Community developed monitoring solution

- What else;
 - Look at the ETL they use. Great for ideas of how to use python, pipelines, lakehouses, medalion architecture
 - Look at the tables in the Lakehouses
 - Gateway Report

FCA – Fabric Cost Analysis



- Solution accelerator; part of the Fabric Toolbox GitHub Repo
- Ties your capacity consumption to \$s



FCA – Fabric Cost Analysis



- Can be configured to run daily, weekly, monthly
- Brand new – still some hiccups to iron out, with more features coming soon

Monitoring Tools Feature Comparison

Feature / Tool	Monitoring Hub	Admin Monitoring Workspace	Capacity Metrics App	Workspace Monitoring	Fabric Unified Admin Monitoring
Scope	Operational monitoring of activities (e.g., semantic model refresh, Spark jobs)	Tenant-level overview, adoption, inventory, auditing	Tenant-wide capacity usage and trends	Workspace-level diagnostic logs, root cause analysis	Tenant-wide holistic monitoring (activities, capacities, workspaces, settings)
Target Users	Admins & Developers needing quick status checks	Global/Fabric/Capacity admins, COE leads	Capacity admins, Fabric admins	Developers, support teams, workspace admins	Advanced admins, COEs needing extendable monitoring
Data Sources	Activity logs from workloads (Power BI, Data Factory, Spark, Data Science)	Multiple telemetry sources, audit logs, activity events	Capacity telemetry from Fabric workloads	Eventhouse (KQL-based diagnostic logs)	Activity logs, API data (Scanner API, Admin APIs)
Retention Period	Dynamic, based on activity	28 days	12 days	Historical logs stored in Eventhouse	Depends on implementation (can be extended)
Customization	Limited filters & views	Build custom reports off semantic models	Build custom reports off semantic model	Raw data available for custom dashboards	Fully customizable (open-source, extensible via Fabric tools)
Proactive Alerting	None (manual monitoring)	None out of the box	None out of the box	Possible via KQL & integrations	None out of the box
Ease of Use	Simple UI, quick actions, minimal setup	Managed workspace, automated refresh	Visual dashboards, interactive metrics	Requires setup, KQL skills useful	Requires setup with Data Pipelines & Notebooks
Availability	Built-in, available to all Fabric tenants	Available to all tenants regardless of license	Built-in, Fabric capacity-level	Requires Eventhouse (uses capacity)	Community-supported, uses Fabric components

- Credit: Just Blindbæk and Ásgeir Gunnarsson

Monitoring Tools Decision Matrix

Scenario / Need	Monitoring Hub	Admin Monitoring Workspace	Capacity Metrics App	Workspace Monitoring	Fabric Unified Admin Monitoring
Daily operational monitoring (refreshes, jobs, failures)	✓ Simple & quick for recent activity	✗ Not real-time	✗ Focused on capacity, not ops	✓ Deep dive into logs & anomalies	✗ Dont include job events
Tenant-wide adoption, inventory, governance insights	✗ Too limited	✓ Best choice for overview & reports	✗ Not focused on adoption	✗ Workspace-specific only	✓ Combines adoption, inventory, settings
Capacity usage & optimization	✗ No capacity view	✗ Not designed for capacity	✓ Primary tool for capacity monitoring	⚠ Workspace-level capacity insight	✓ Custom capacity dashboards possible
Root cause analysis & diagnostics (troubleshooting)	✗ High-level only	✗ Not designed for RCA	✗ Focused on trends, not diagnostics	✓ Eventhouse-powered deep analysis	✓ Custom diagnostics possible via Notebooks
Custom dashboards, flexible reporting, extendable solution	✗ Minimal customization	✓ Custom visuals via semantic models	✓ Custom visuals via semantic model	✓ Build custom KQL queries	✓ Full flexibility to build custom reports & alerting
Proactive alerting & automation	✗ No alerting	✗ No alerting	✗ Needs custom integration	⚠ Possible with KQL + integrations	✗ No alerting
Low maintenance, out-of-the-box experience	✓ Instant availability	✓ Managed & automated refresh	✓ Built-in app, minimal setup	⚠ Needs setup on workspace level	✗ Requires deployment & maintenance (code first)
Best suited for...	Daily ops & quick insights	Tenant governance & audits	Capacity admins & performance planners	Troubleshooting & support teams	COEs & advanced admins needing tailored monitoring

- Credit: Just Blindbæk and Ásgeir Gunnarsson

Monitoring Tools Decision Matrix

- Monitoring Hub = **“What’s going on now?”** (Ops dashboard)
 - Admin Monitoring Workspace = **“What’s happening across my tenant?”** (Governance & adoption)
 - Capacity Metrics App = **“Are we running out of resources?”** (Capacity & sizing)
 - Workspace Monitoring = **“Why is this workspace having issues?”** (Root cause & diagnostics)
 - FUAM = **“I need it all, my way”** (Custom, holistic, extensible monitoring)
- Credit: Just Blindbæk and Ásgeir Gunnarsson

Wrap Up and Q&A

Lessons Learned and
Takeaways



Where to learn, stay on top of things:

- LinkedIn & Social names to follow:
 - Brent Meulebroeck
 - Michael Kovalsky
 - Kurt Buhler
 - Michael Carlo
 - Mathias Thierbach
 - John Kerski
 - Chris Wagner (Kratos BI)
 - Rui Romano
 - Nikola Ilic
 - Jeroen (Jay) ter Heerdt
 - Alex Powers

Where to learn, stay on top of things:

- YouTube Channels:
 - GuyInACube
 - KratosBI
 - Learn Fabric with Will
 - Tales From the Field
 - Vancouver BI User Group
- Reddit: r/MicrosoftFabric (18k members)
- More links in the resource doc

Thank YOU for coming!

- Thank you for supporting the MN Data Community!
- PASSMN - SQL Server User Group
- MN BI User Group - Power BI/Fabric & Power Platform
- M365 Community
- DUG - Dynamics User Group
- Power Platform User Group

Thank YOU for coming!



Brent Meulebroeck

Director of Data Solutions at Fulton
Analytics



Mike Dostal

Senior Data/Business Analyst at D.A.
Davidson Companies

