SLIDES

TROUBLESHOOTING POWER BI REPORTS

aka ‘The It Depends Show’

Benni De Jagere

WHO AM I

Power BI CAT

dataMinds.be Member

@BenniDeJagere

/bennidejagere

sessionize

/bennidejagere

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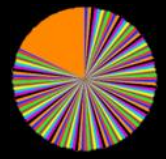
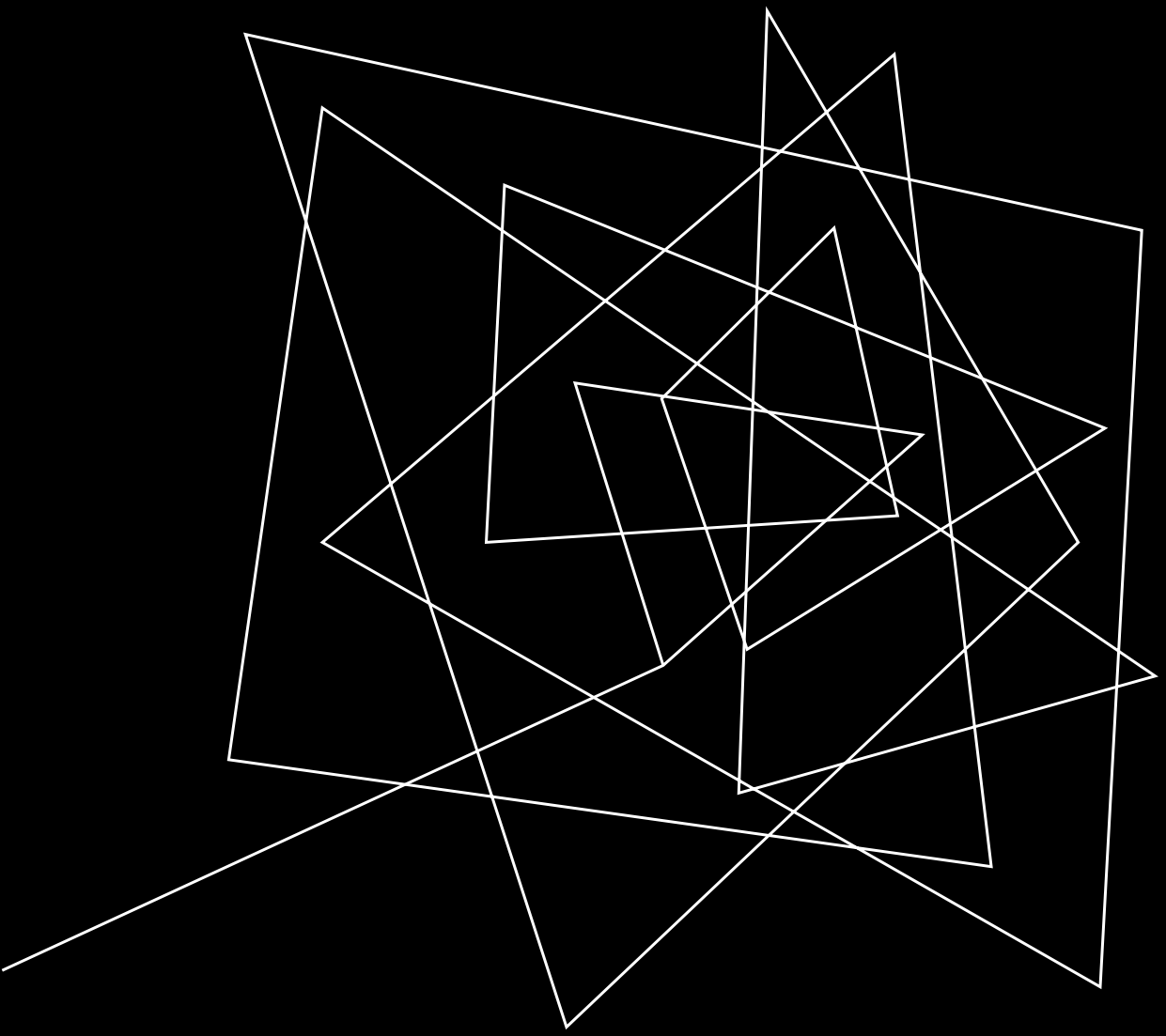


#SayNoToPieCharts



SESSION OBJECTIVES

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Leverage (external) options to pinpoint common causes

Techniques to avoid, or solve

Usable set of best practices

NOT! A DAX or PowerQuery Performance Deep Dive

It Depends ☺

WHY TROUBLESHOOT?

NO ONE LIKES TO WAIT ☺

BUT ALSO ..

“Works on my machine” is not a valid reply

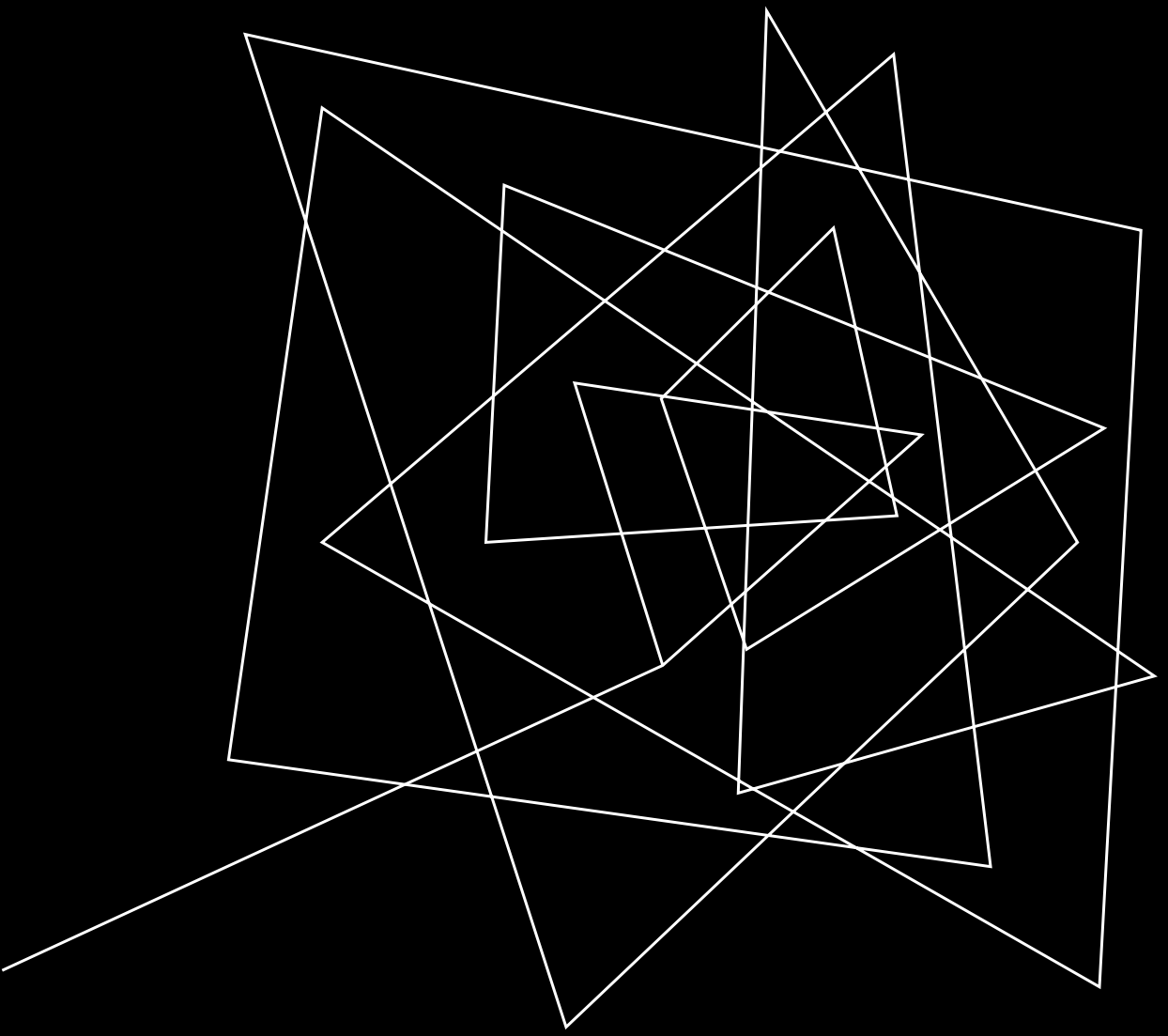
Context and Baseline are Key

Aim for quick wins on heavily used reports

Avoid long investigations on barely used reports
(unless it’s the CxO)

40% Science, 40% Art, 20% Luck

It depends!



HOLD ON ..

Noisy Neighbours

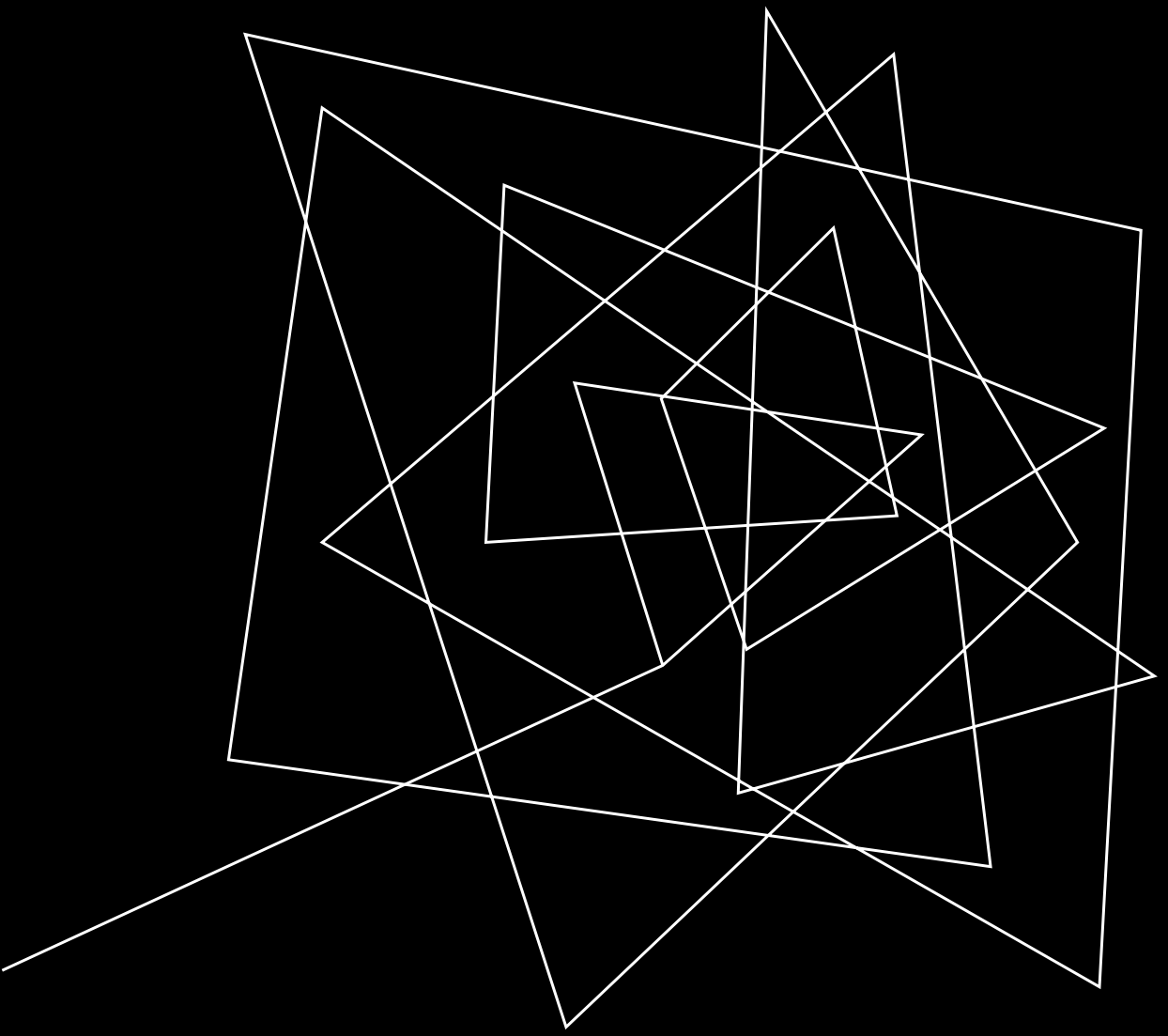
POWERBI.COM (AKA THE SERVICE)

Shared Resources, blessing and curse

Power BI Premium (Gen 1) does not automagically solve performance issues

Power BI Premium (Gen 2) is a great improvement, but is not a one fix for all

Beware of Cache mechanisms (Visual, Query, Result, ..)



THE REPORT CASE

THE USE CASE

NEW YORK CITIBIKES

www.citibikenyc.com/system-data

Public Open Data

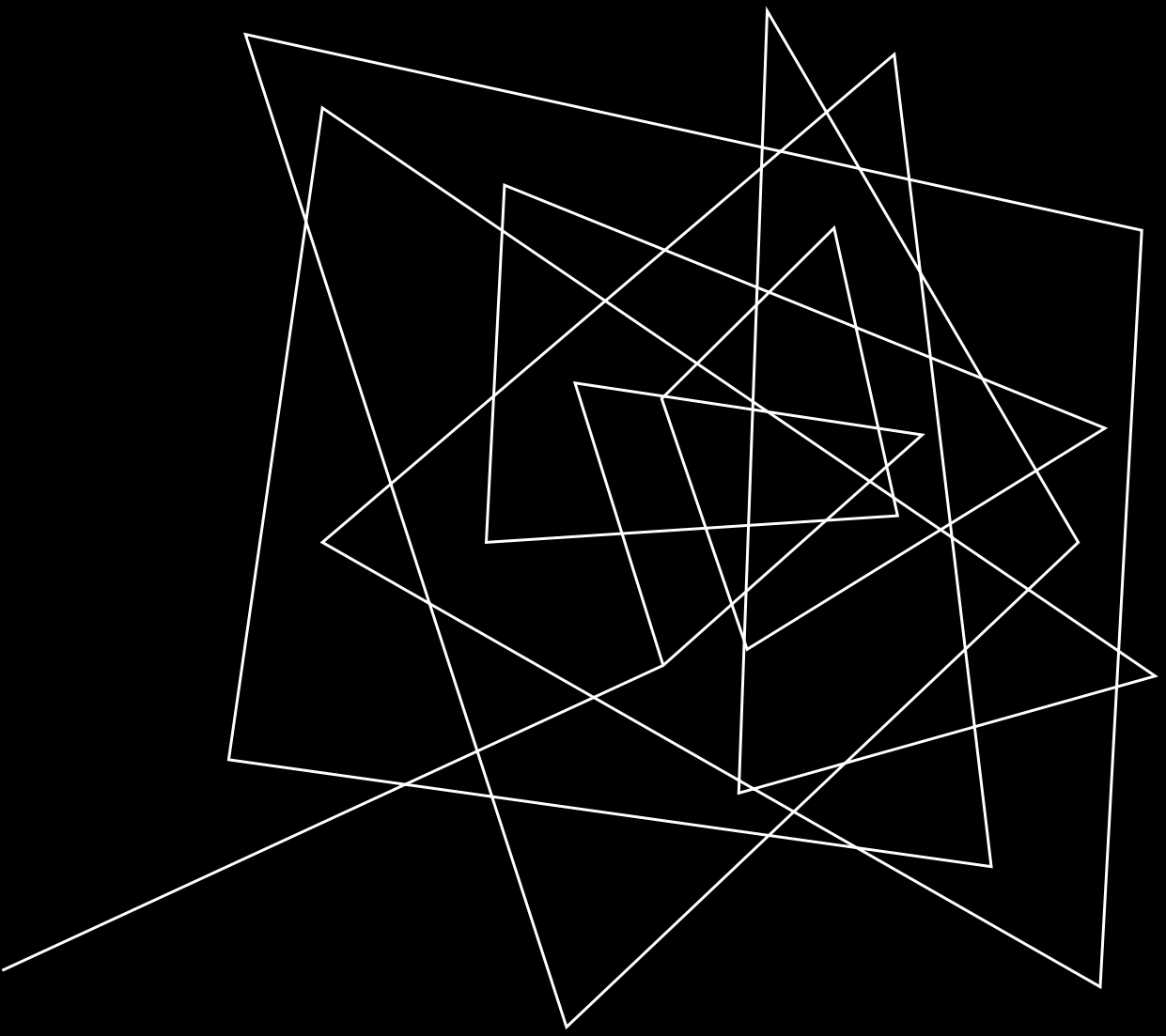
Starts June 2013

Information about every trip

- Longer than 60 seconds
- Starts at public station

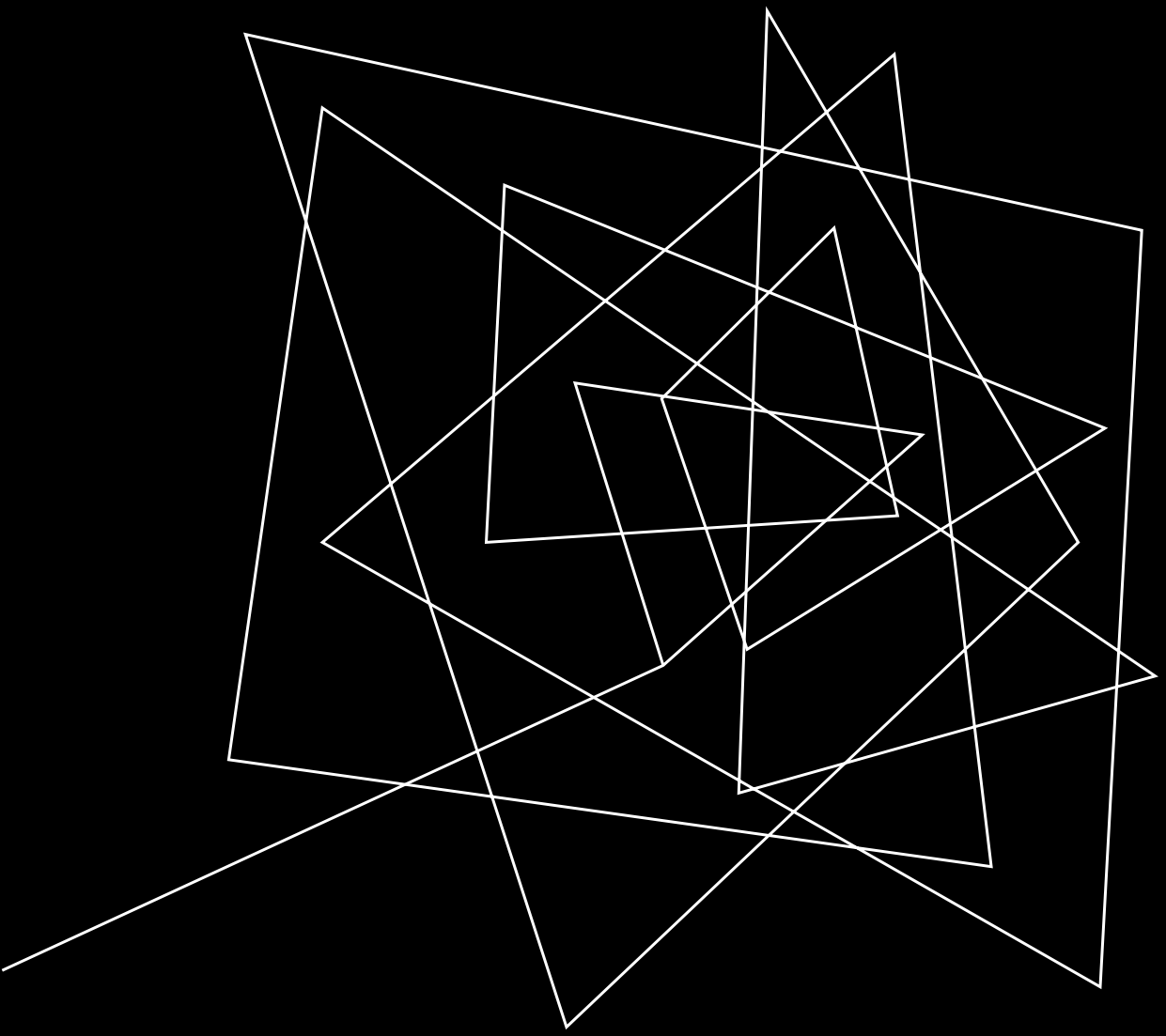
Masterdata

https://i0.wp.com/thenypost.files.wordpress.com/2013/12/citibike1.jpg



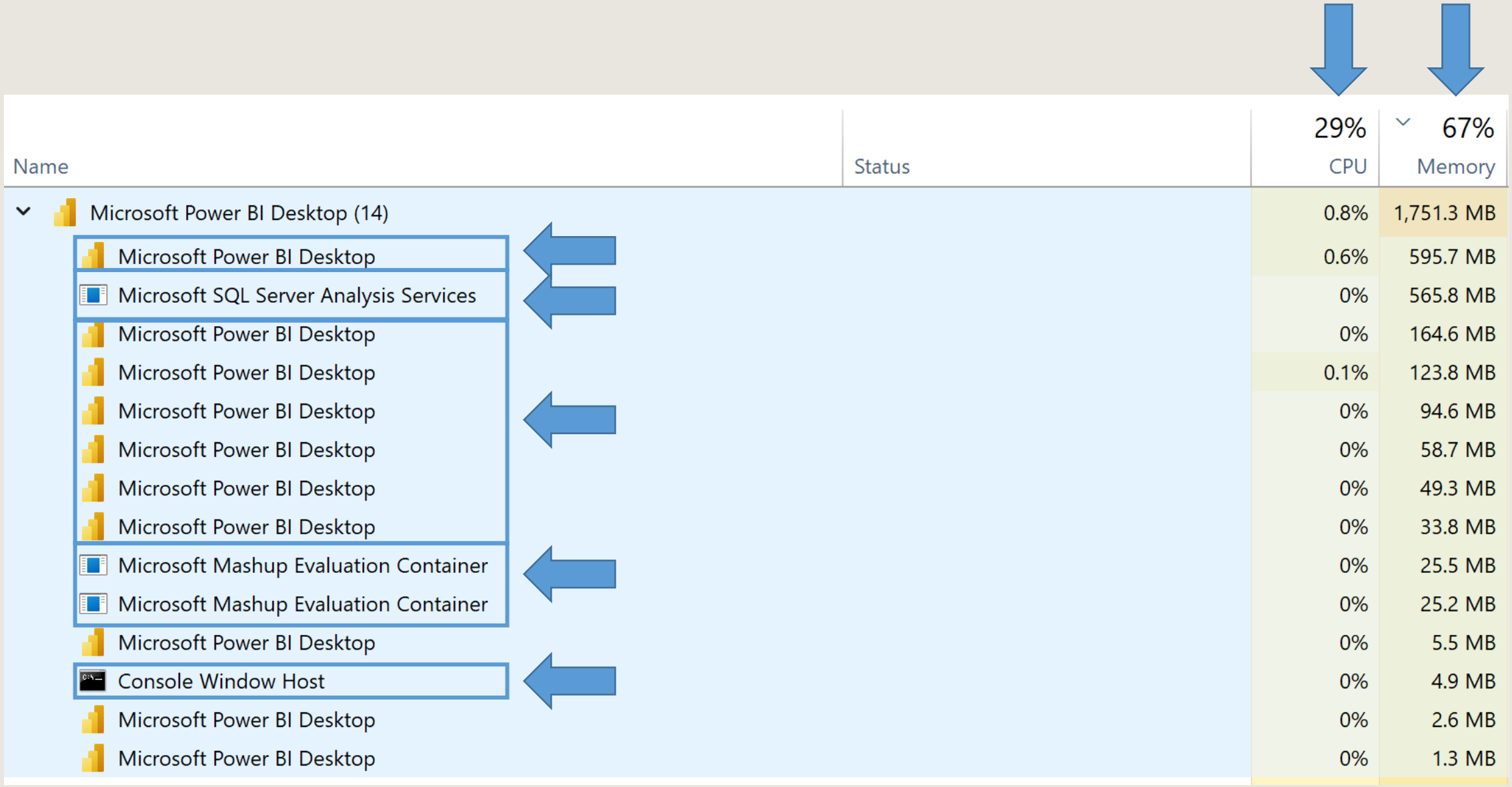
THE REPORT(S)

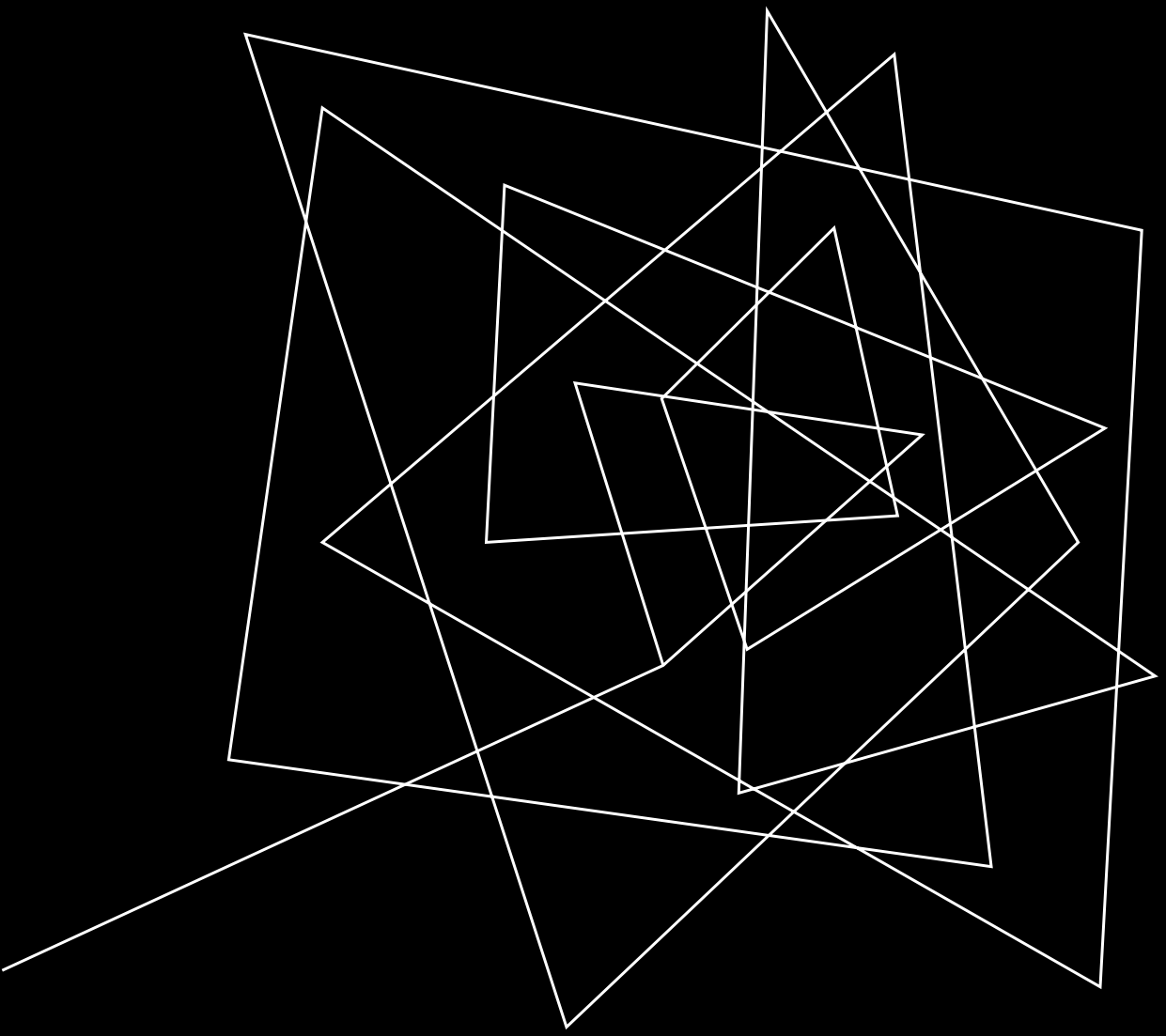
DEMO



INSIDE POWER BI DESKTOP

INSIDE POWER BI DESKTOP (WEBVIEW2)





TOOLS FOR THE TRADE

TOOLS FOR THE TRADE

Performance Analyzer Pane

DAX Studio

VertiPaq Analyzer (SQLBI.com)

Tabular Editor

Report Analyzer

Power BI Helper

Bravo

ALM Toolkit

Power BI Field Finder

Power BI Sentinel (€)

Power Query Diagnostics Tool

Power BI Sidetools

Power BI Cleaner

PBI Tools

And more ..

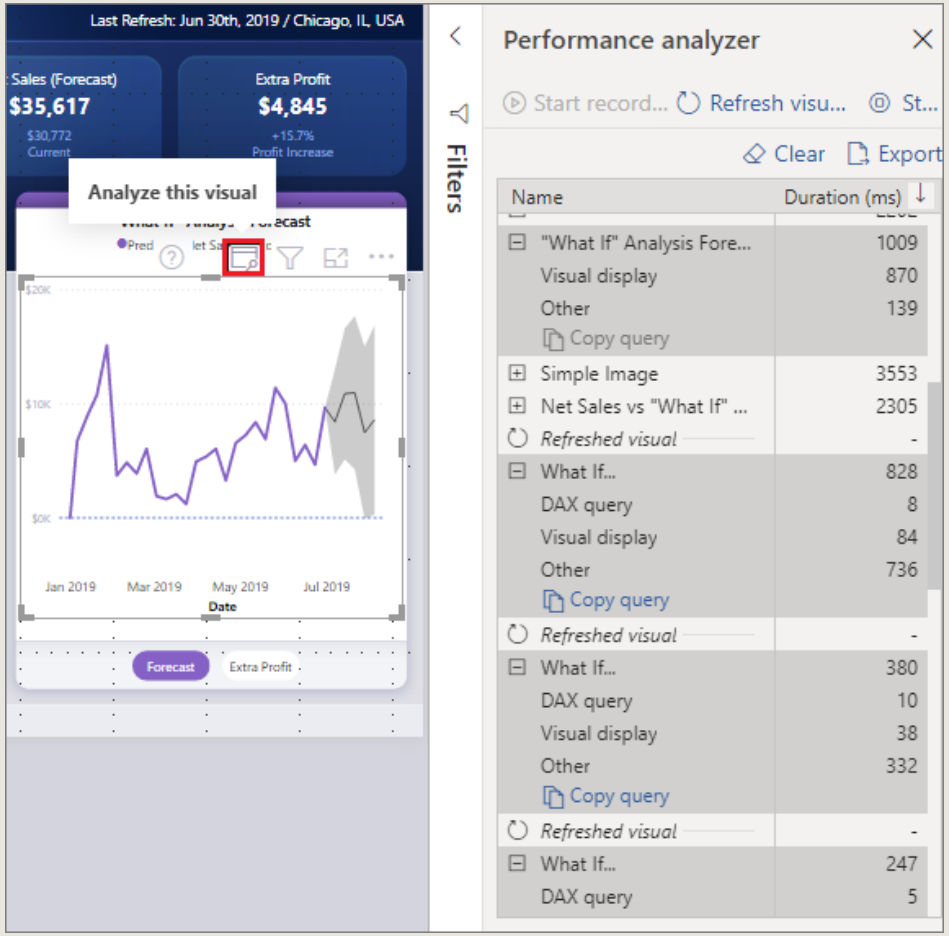
POWER BI PERFORMANCE ANALYZER PANE

Public Release in May 2019

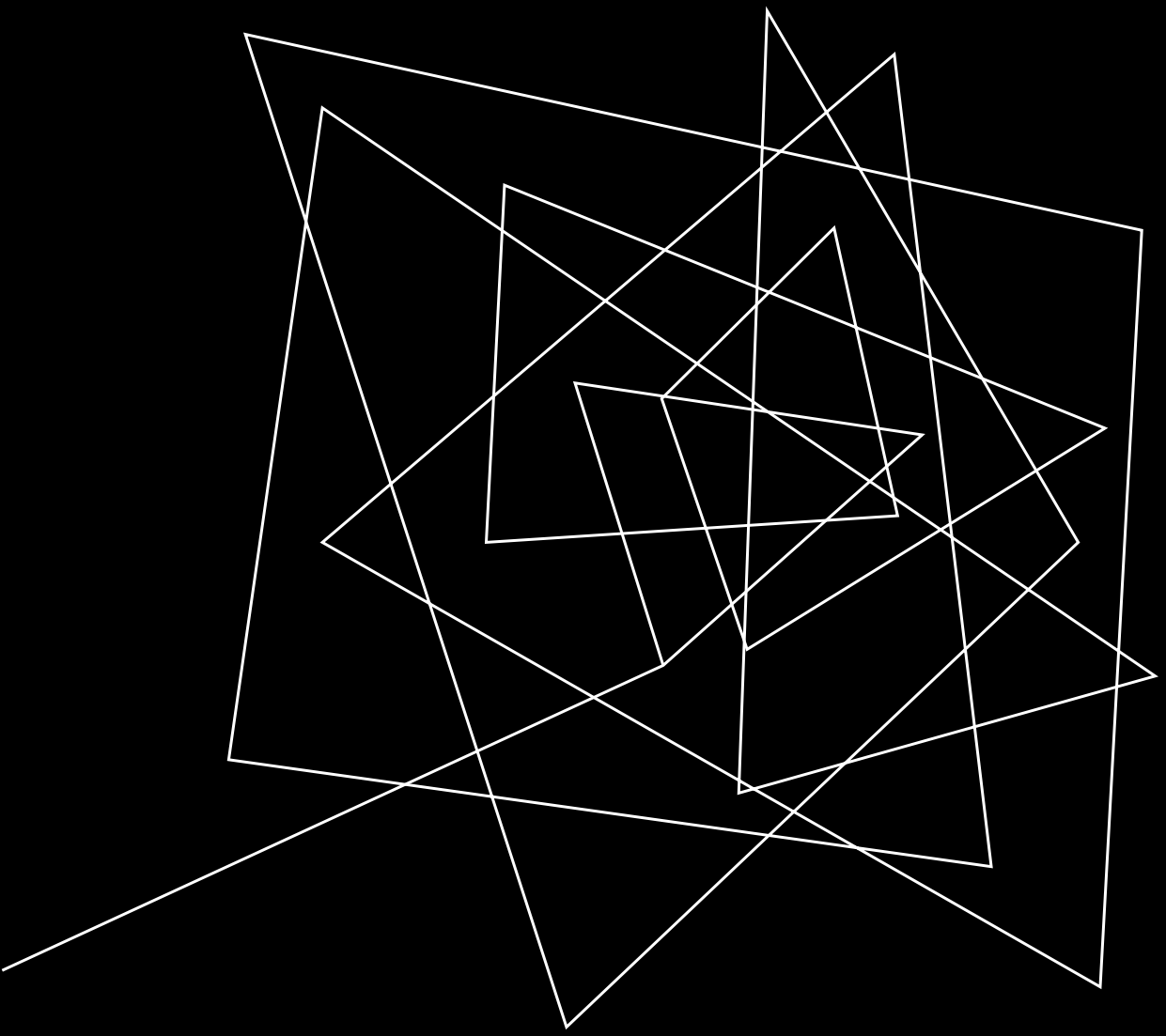
Flight Recorder for all operations

Breaks down execution times

Export results with ease

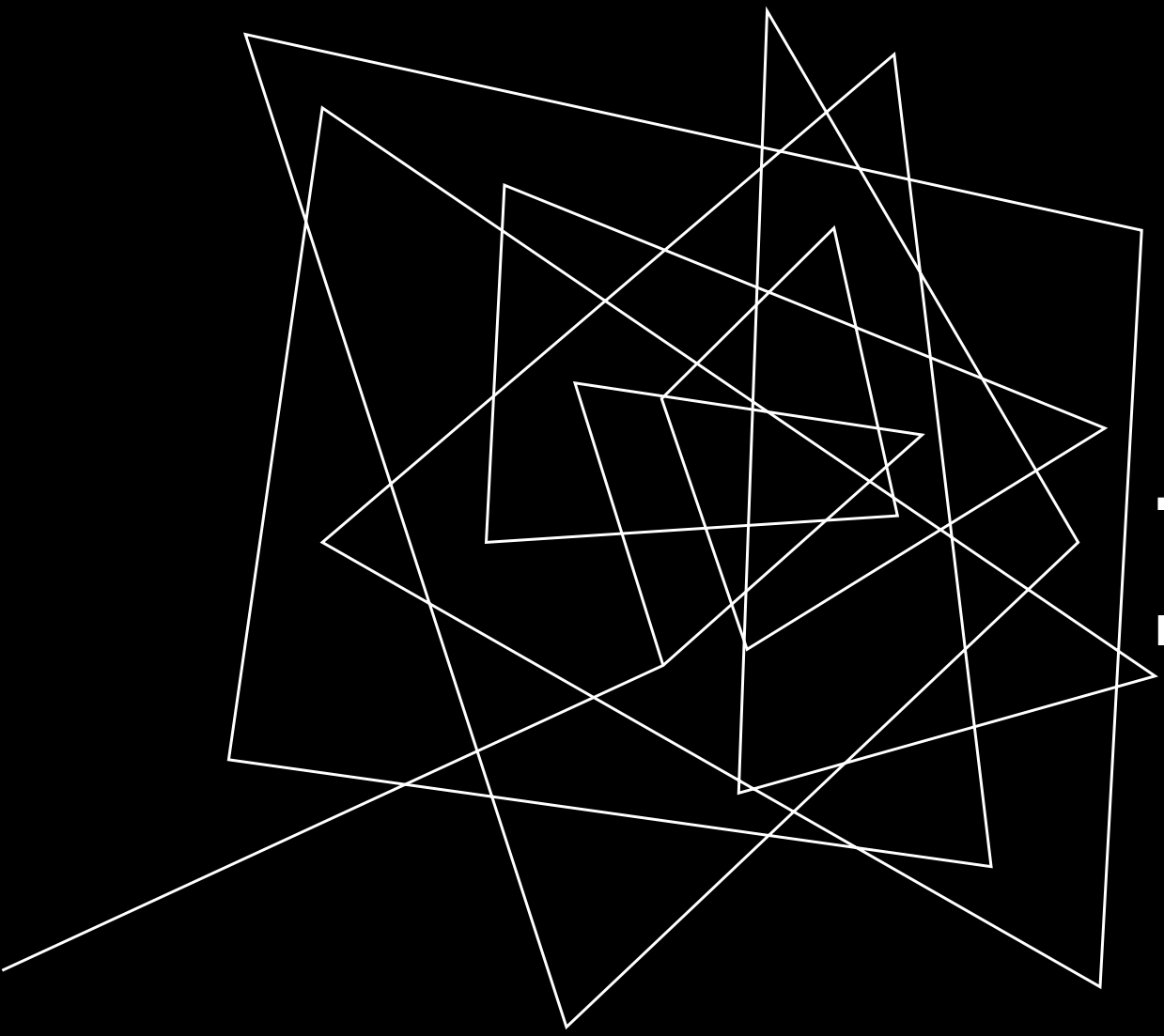


https://docs.microsoft.com/en-us/power-bi/create-reports/media/desktop-performance-analyzer/performance-analyzer-07.png



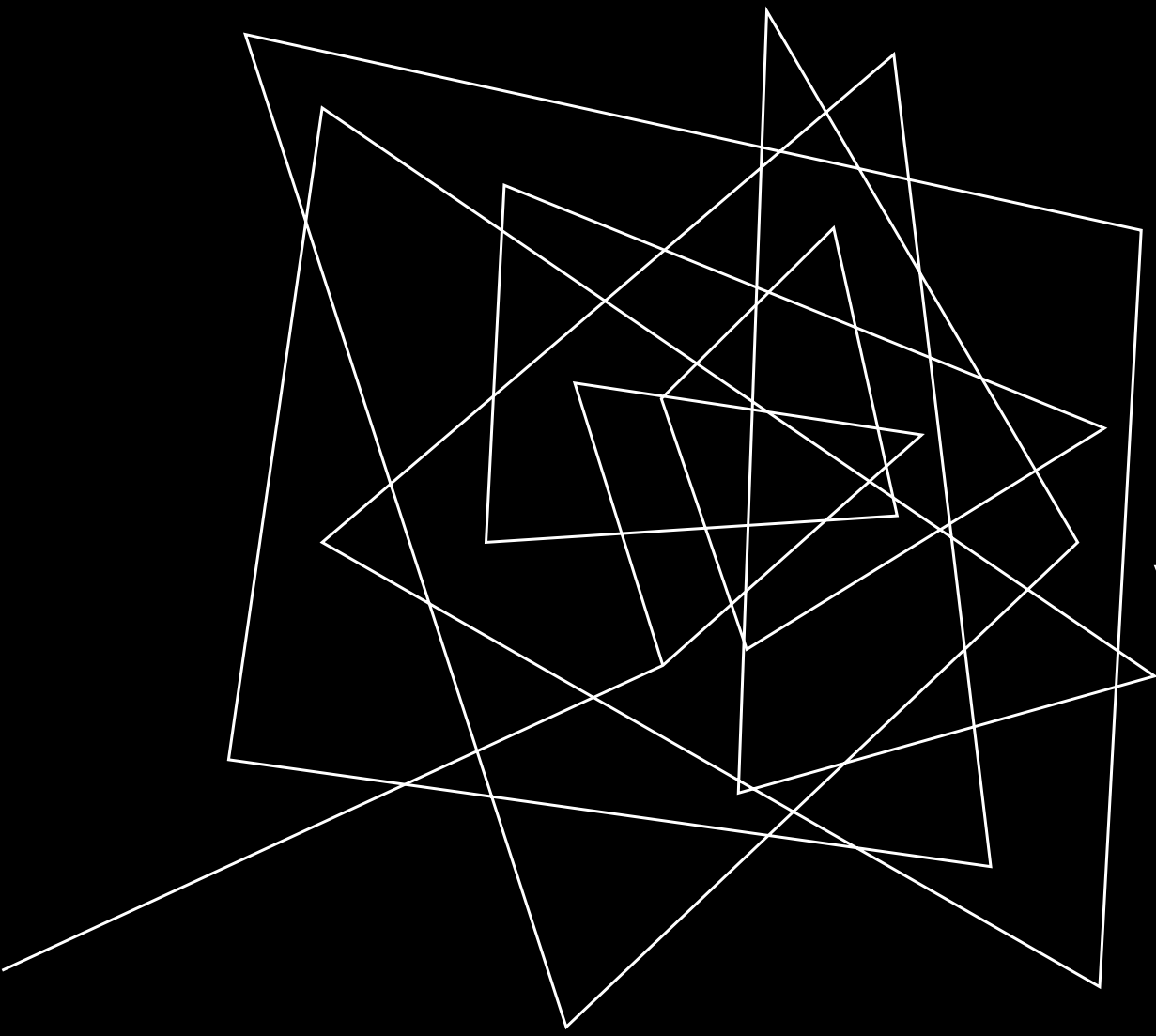
PERFORMANCE ANALYZER PANE

DEMO



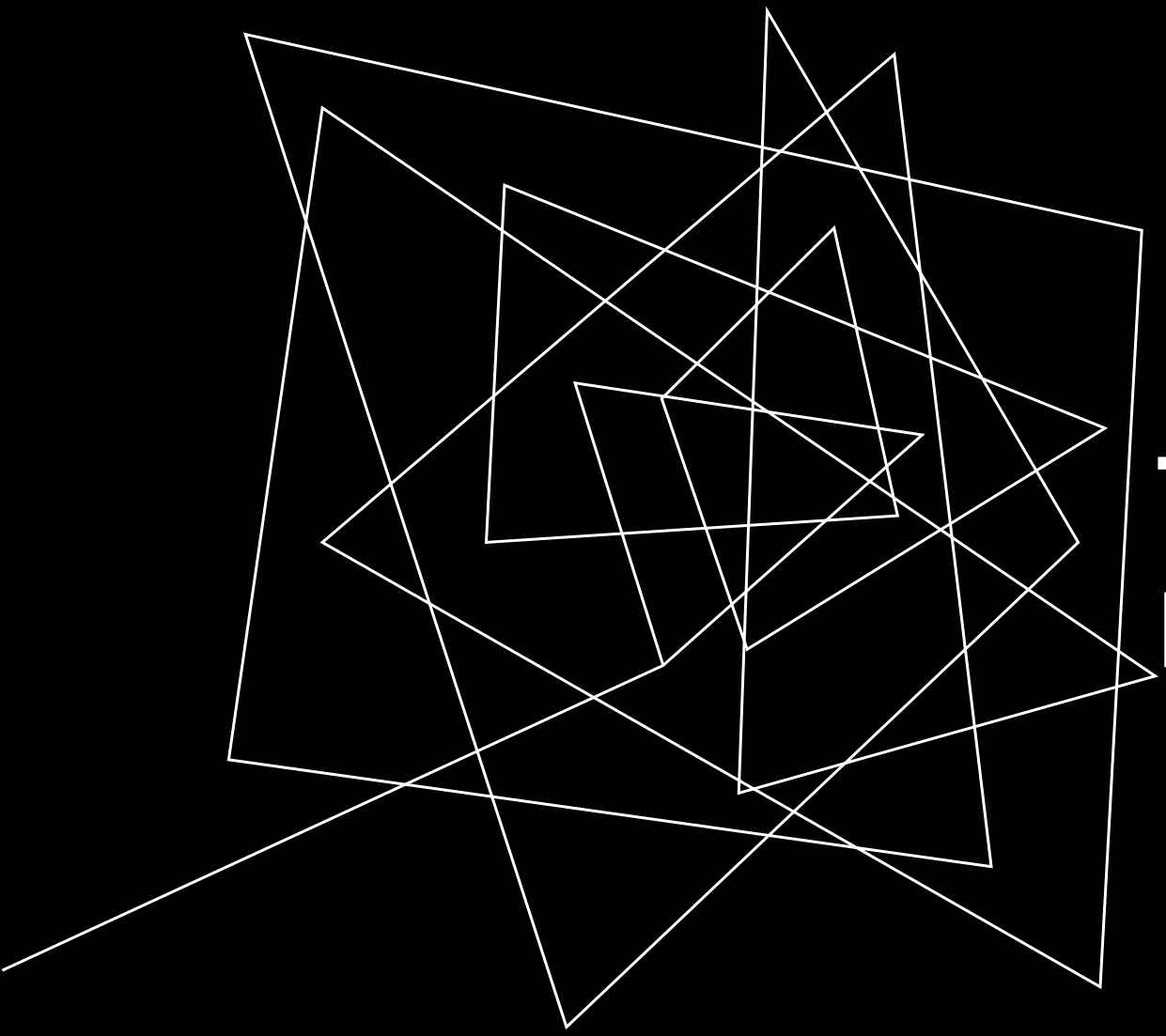
TABULAR EDITOR (2)

DEMO



DAX STUDIO VERTIPAQ ANALYZER

DEMO



THE TIPS & BEST PRACTICES

THE GOLDEN RULE(S)

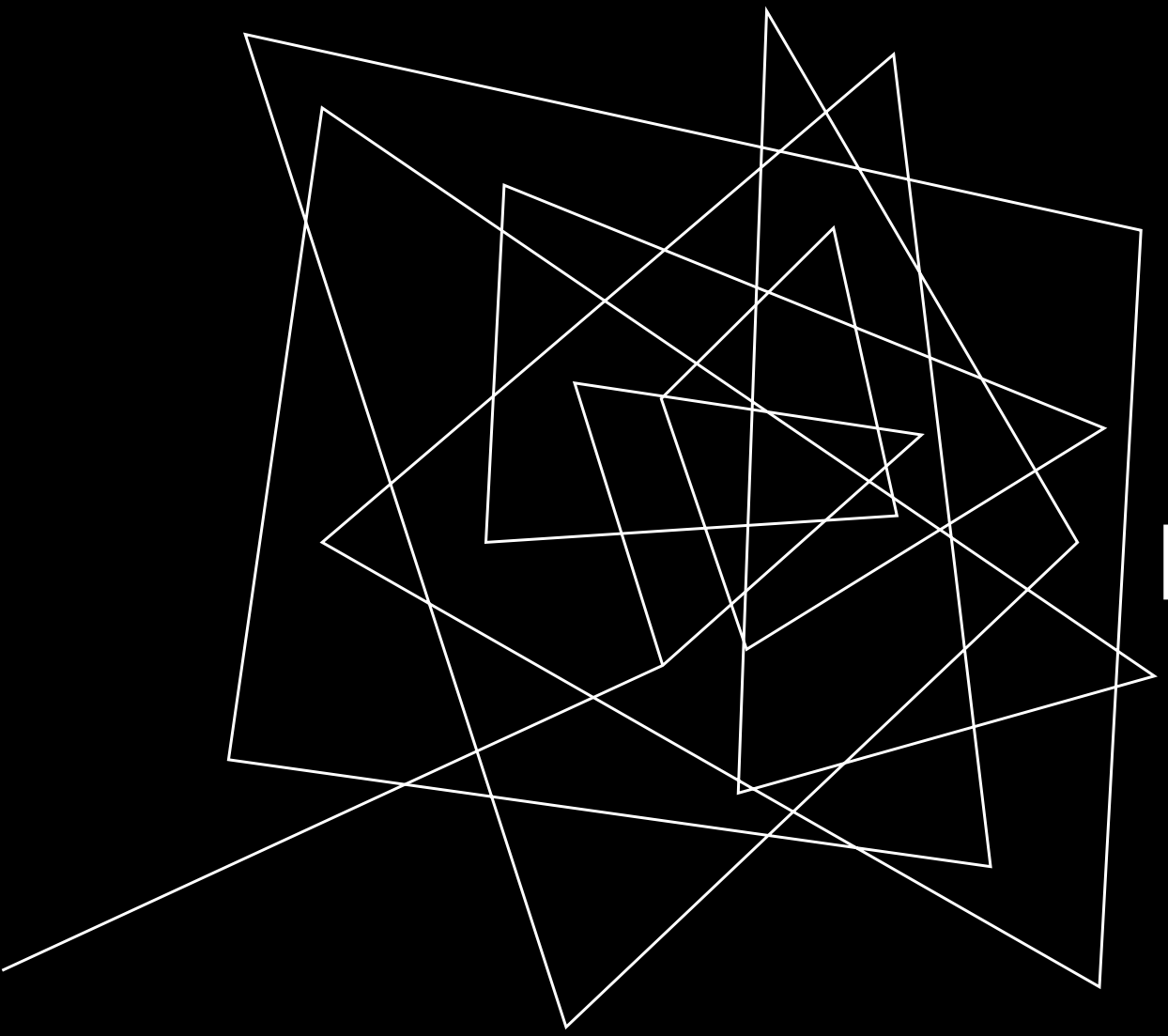
Transform early

Transform once

Transform smart

Or refer to Roche's Maxim of Data Transformation

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



DATA TYPES

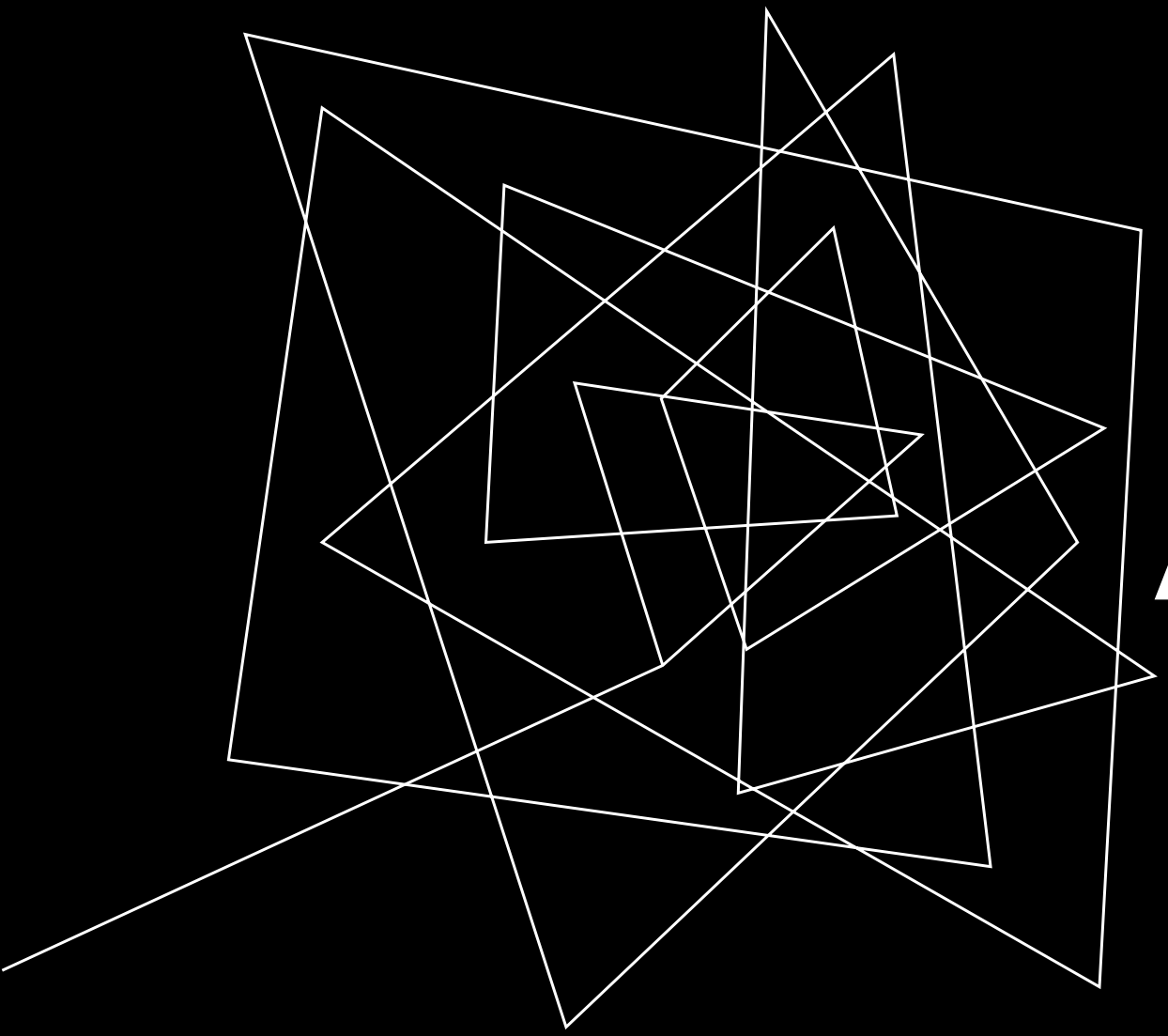
DATA TYPES

Don’t underestimate the impact

Ie. ‘Double’ vs. ‘Currency’

Think about precision and scale

Do you really need date and time combined?



AUTO DATE/TIME

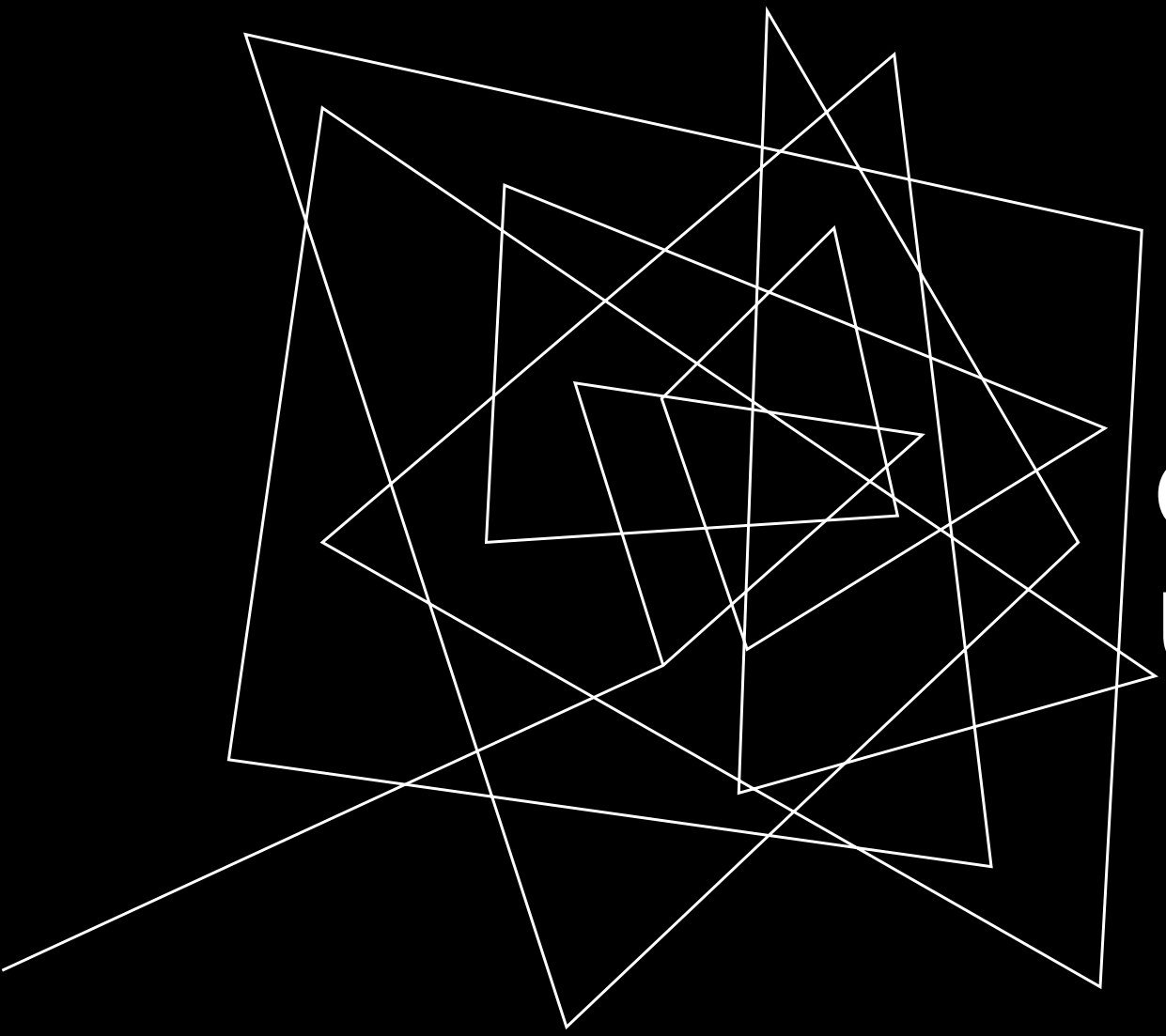
AUTO DATE/TIME

Enabled by default

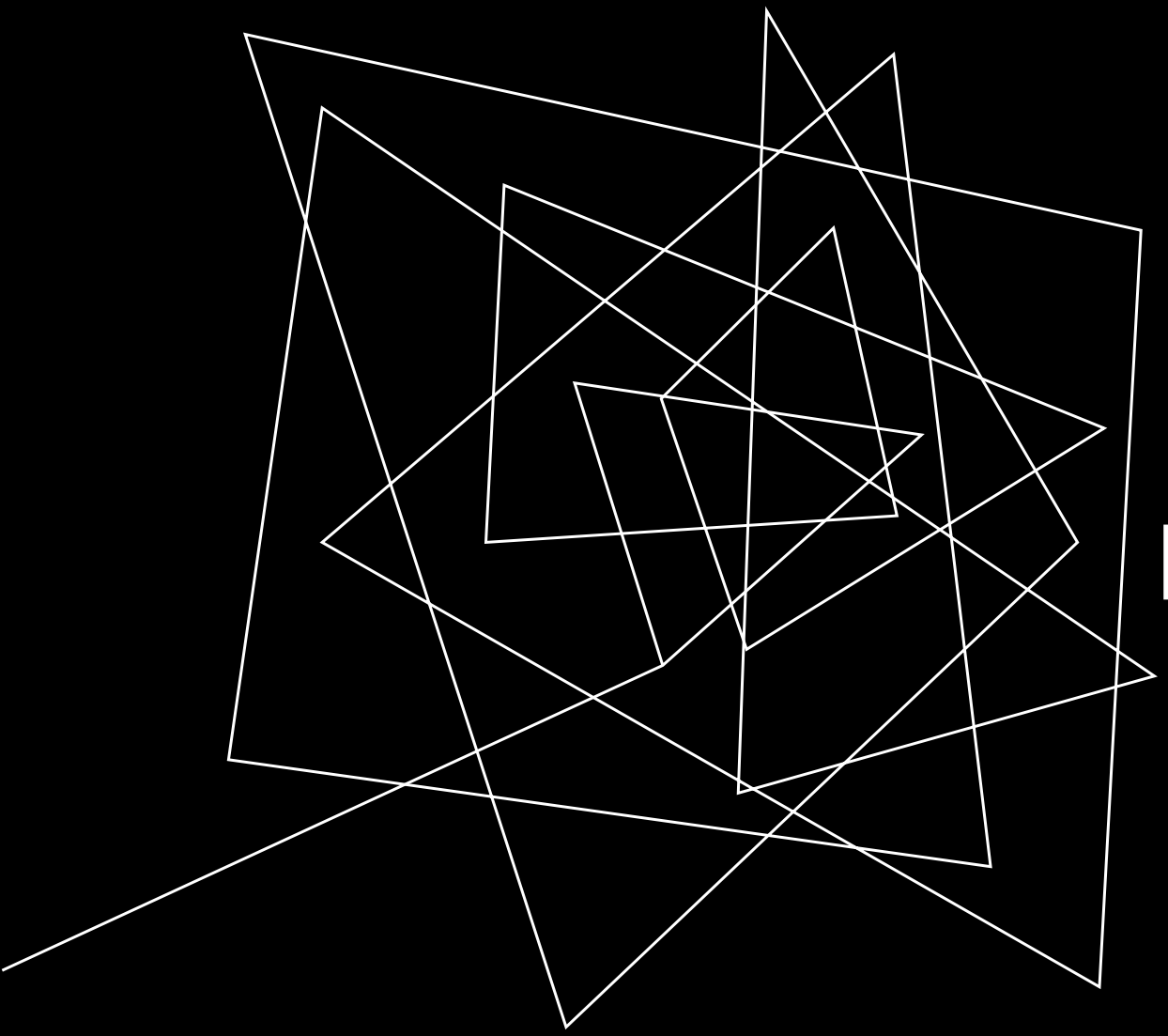
Control behaviour in PBI Desktop Settings

Creates a Calculated Table for **every** date/time

Range is the min to max



COLUMN/ROW USAGE



DATA MODELLING

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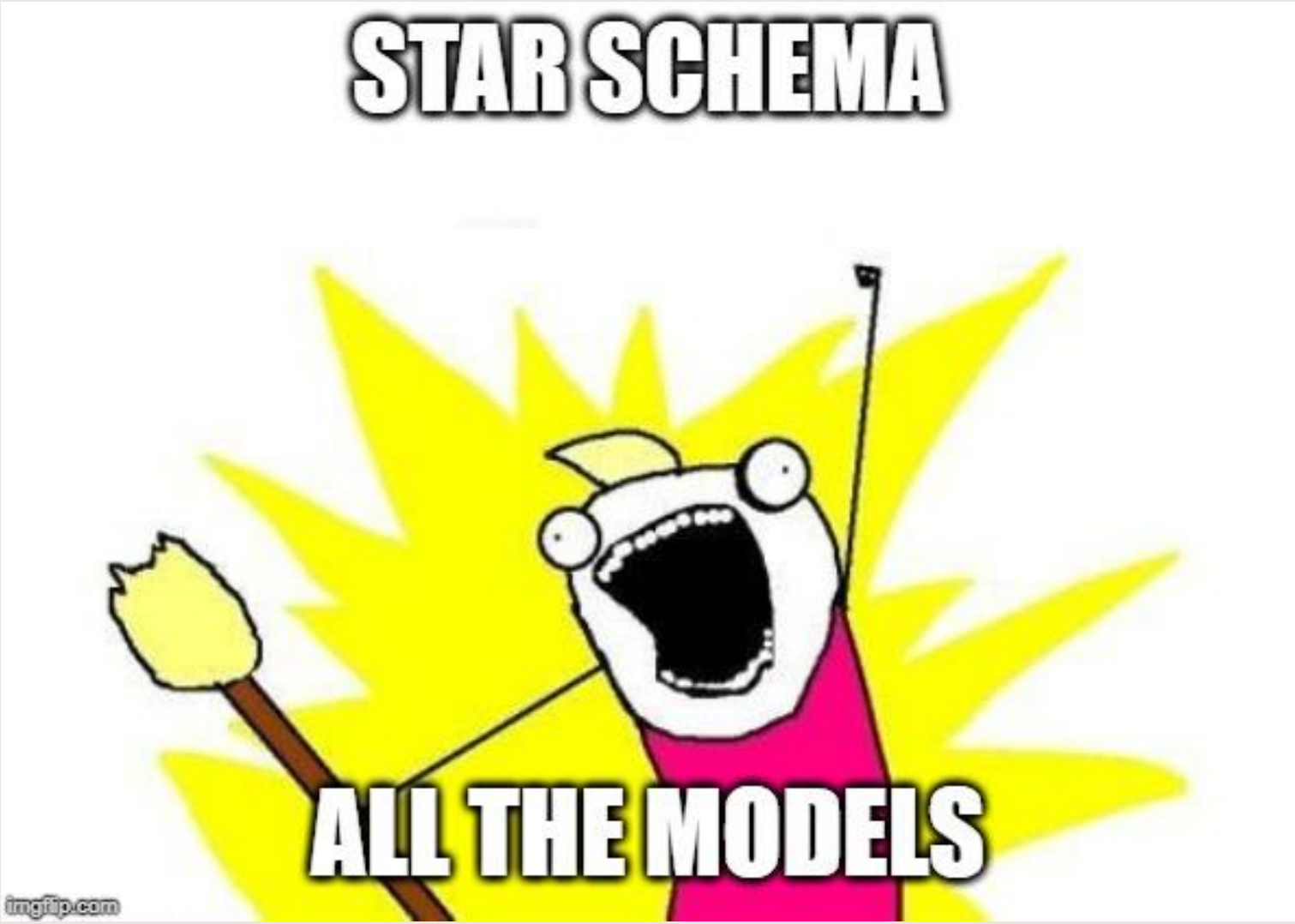


Thanks, @KoVer ☺

MODELLING TIPS

Star Schema (all the things!)

Use persisted surrogate keys for relationships

Avoid Bi-Directional filtering (rather DAX Crossfilter)

Disable auto date/time, rather ‘Mark as Date Table’

Debate Role-playing dimensions

Optimize Data Types, Precision, and Scale

MODELLING TIPS (CONTINUED)

Avoid wide tables

Remove unused columns **and** rows

Only load queries that are used

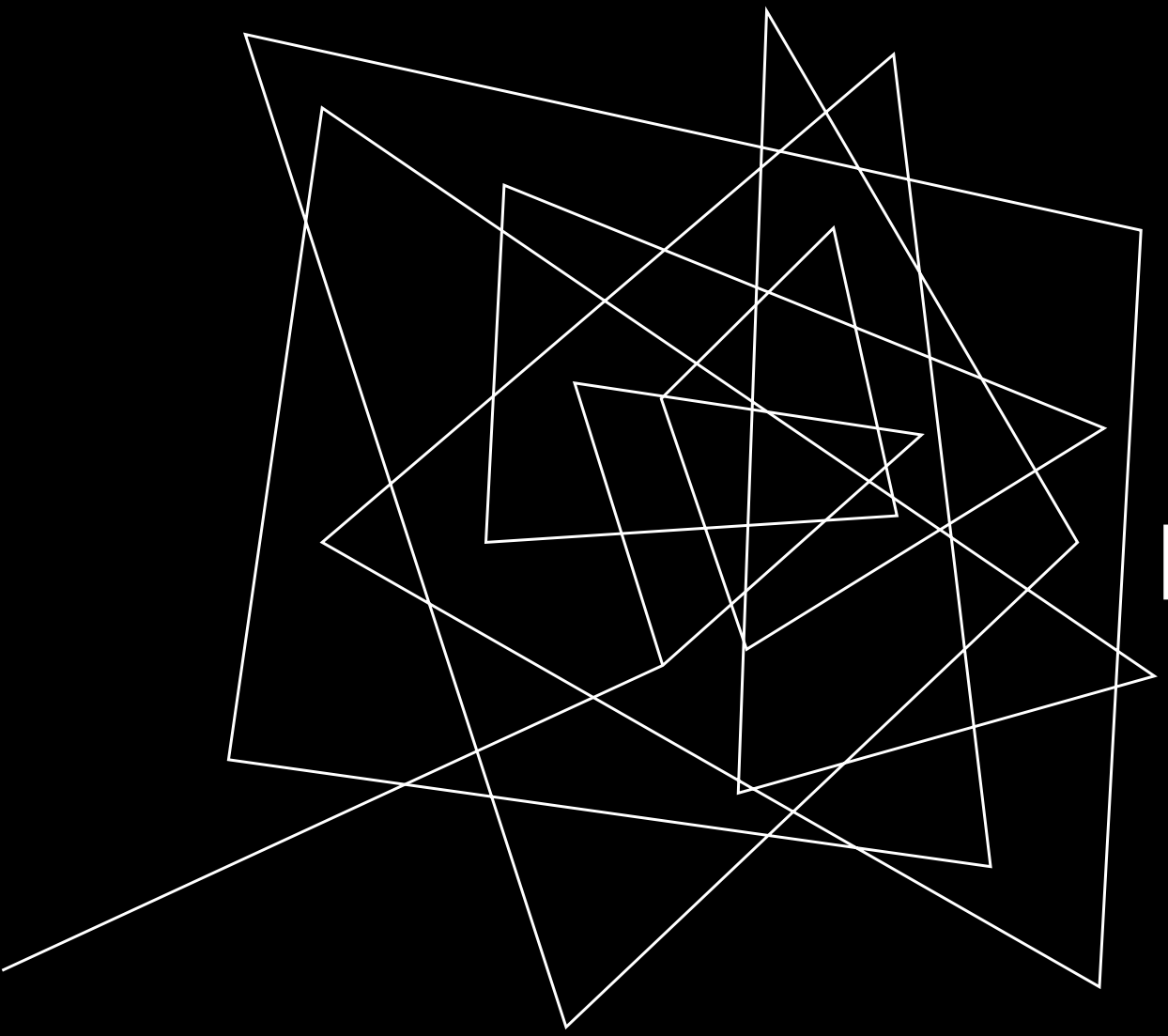
Reduce inappropriate summarization

Think about your data granularity

Hide (or remove) Key fields from the model view

Consider ‘IsAvailableInMDX’

Benchmark with(out) RLS/OLS applied



REPORTS

REPORT TIPS

Limit visuals on a single pane

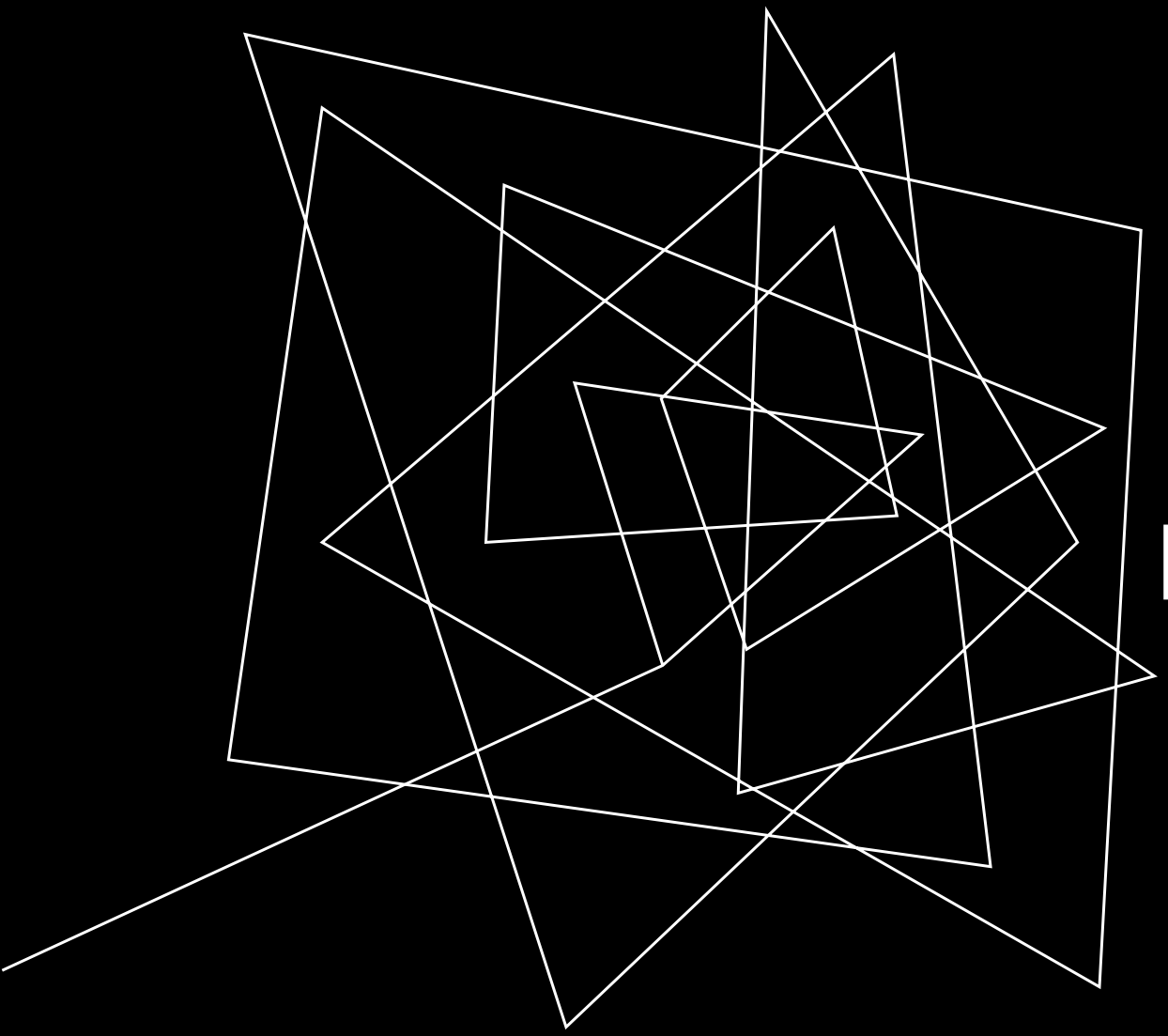
Filtering and slicing before rendering is a valid option (ie. Landing page, Report Filters, Query Reduction, ..)

Avoid having 8+ report tabs on a single report

Avoid interaction between visuals when they’re not needed

Avoid overly detailed visuals

Be aware of render intensive visuals (ie. Maps, Custom visuals, ..)



POWER QUERY

POWER QUERY TIPS

Consider your source and refresh schedule

Query Folding, when possible

Are you aware of the Gateway role?

Don’t repeat tables & fields

Only load tables that are used in the model

Specify correct Data Types

Parameterize ‘fact’ queries (by Date or Entity)

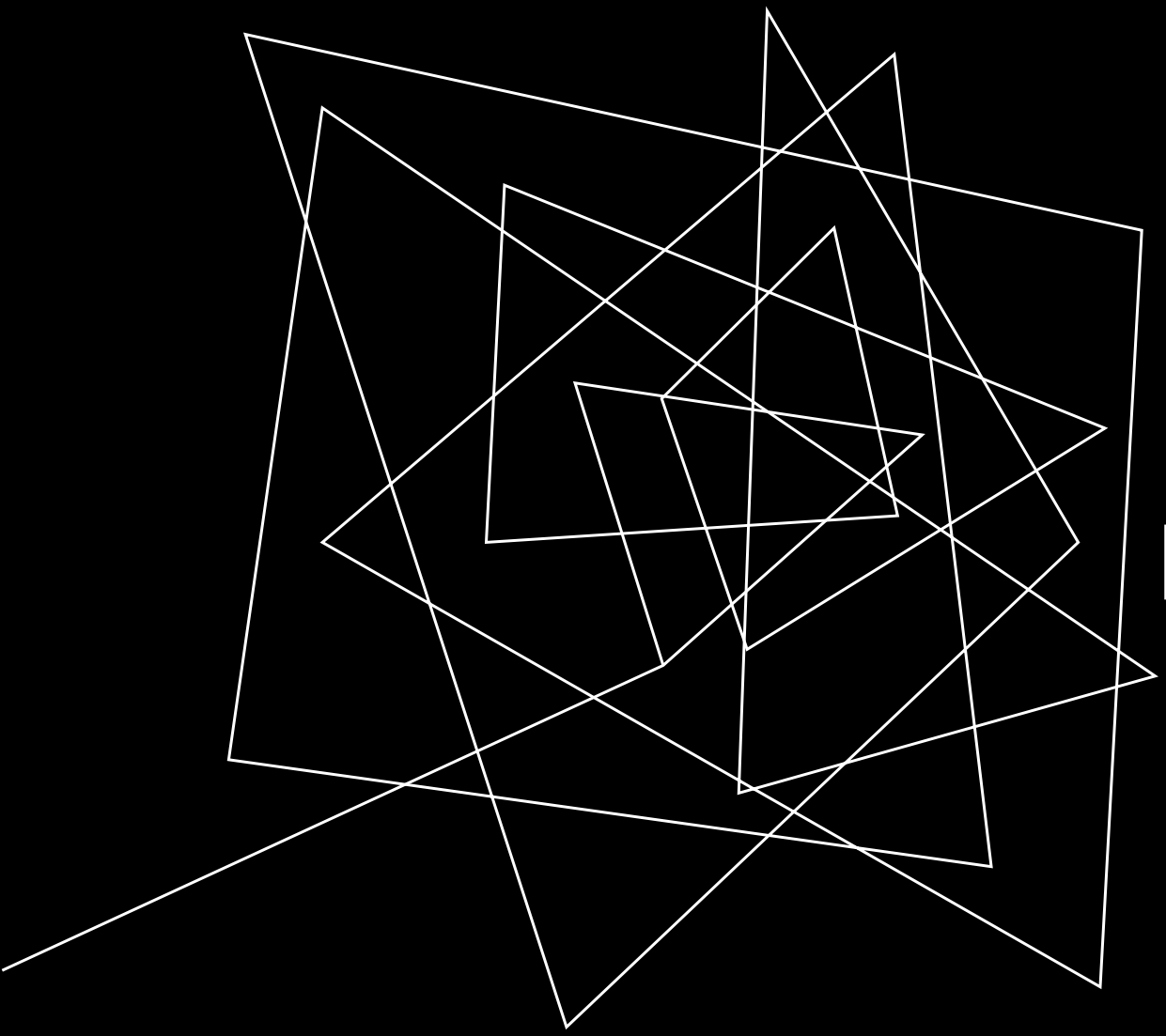
POWER QUERY TIPS (CONTINUED)

Are you looking at?:

- Incremental Refresh
- Composite Models
- Aggregations
- Partitioning
- Hybrid Tables

Phil Seamark – Visualise your Power BI Refresh

Chris Webb – Tuning a dataset refresh



DAX

DAX TIPS

Use variables

Use ‘repeater’ functions (SumX, AverageX, ..) when needed

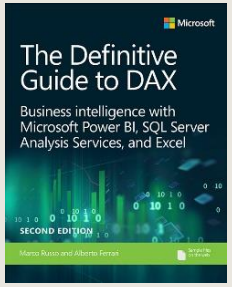
Avoid calculated columns and tables

Keep measures simple initially, add complexity later

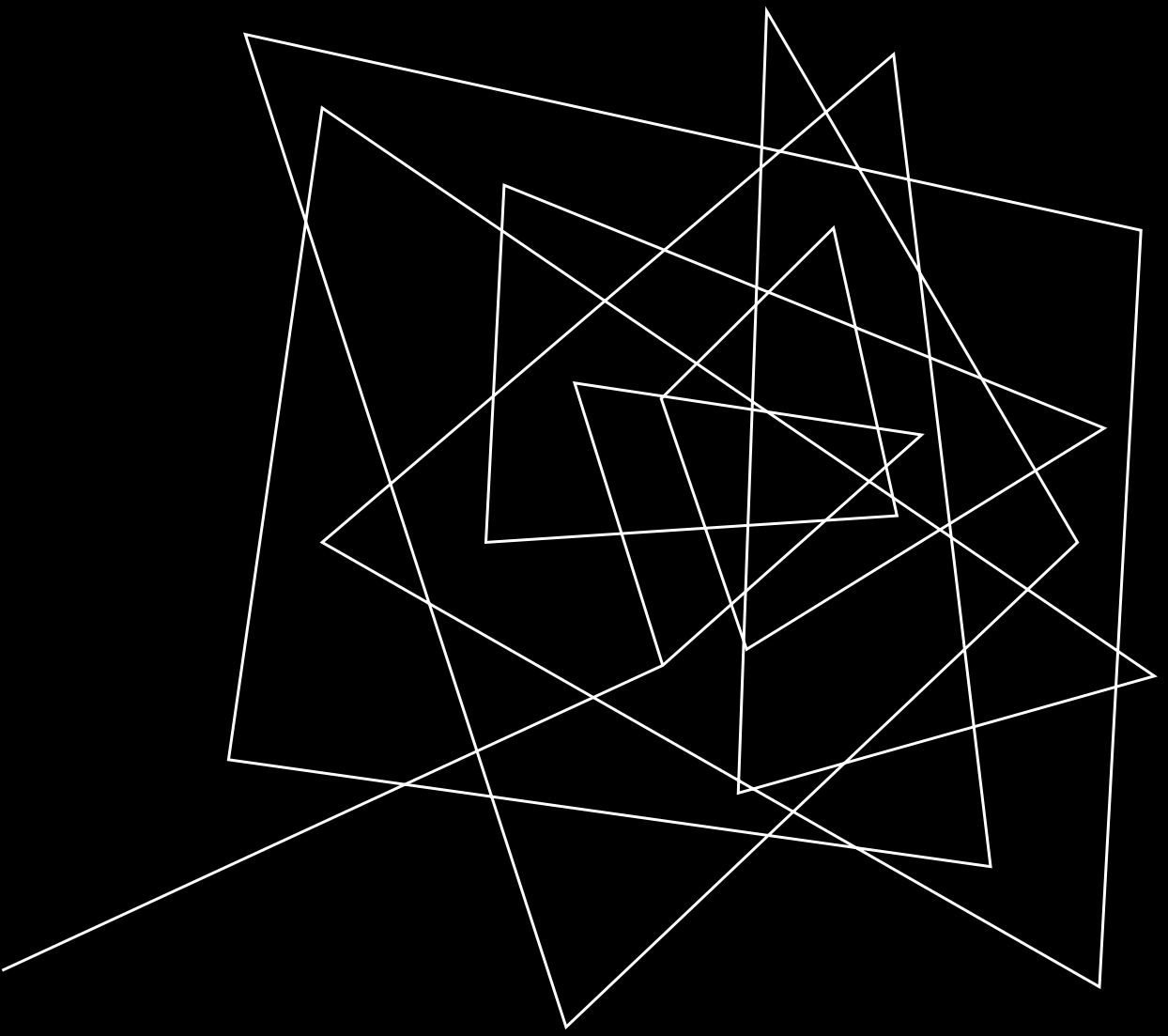
Solve the model, then solve DAX

“The best DAX is the one you don’t have to write”

Read the Bible ☺

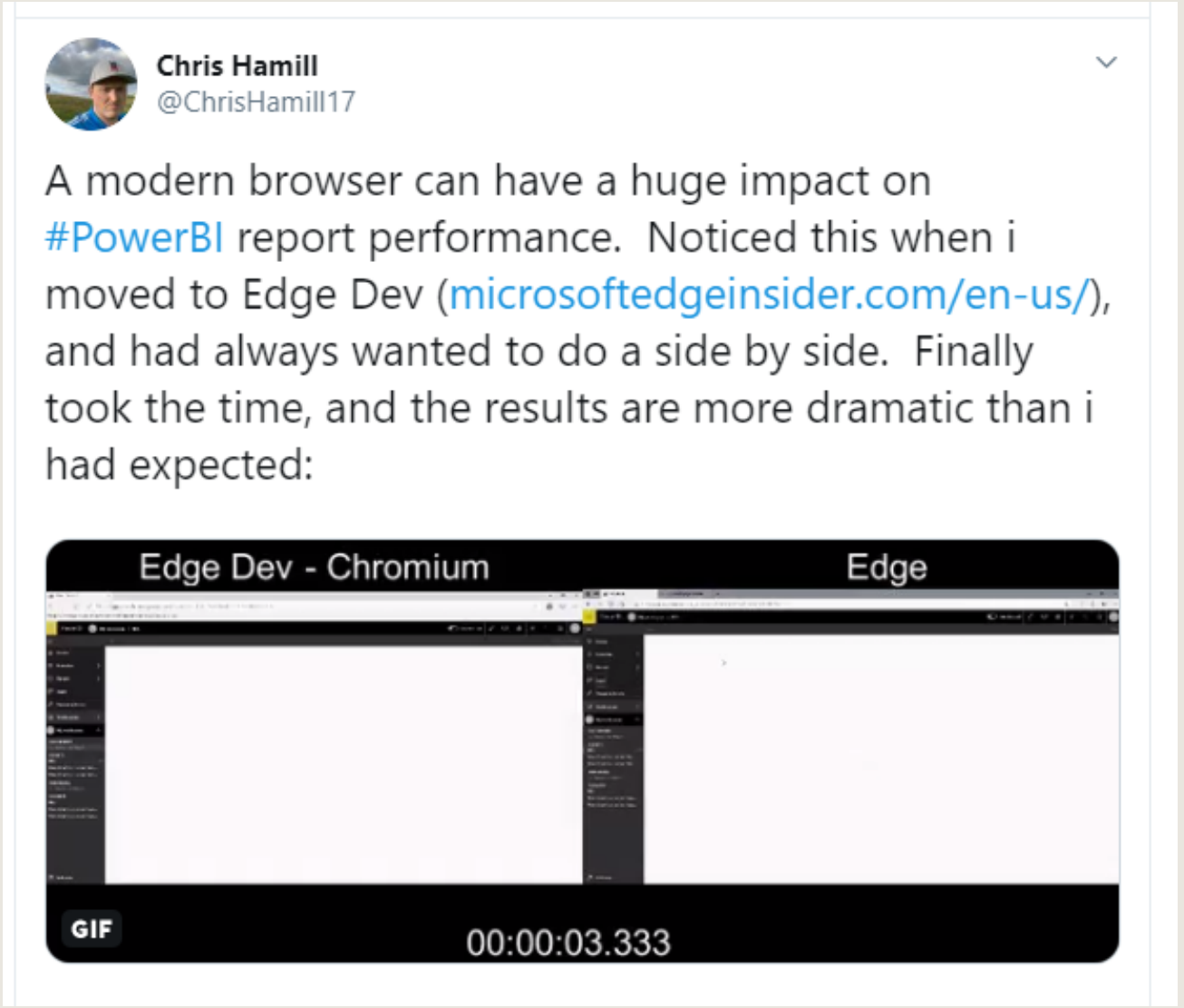


Category	Formula Engine	Storage Engine
Query received	Interpret DAX/MDX formula	Can handle single logic (xmSQL) from formula Engine
Target Data	Iterate over datacaches produced by storage engine (datacaches are in-memory tables)	Iterate over compressed data in vertipaq column stores
Result	Produce result set and send back to requestor	Produce Datacaches send back to formula Engine
Thread	Single – Threaded	Multi – Threaded
Cache utilization	No	Yes
Area of focus for Performance Tuning	Check physical plan for bottleneck	Check xmSQL query for bottleneck

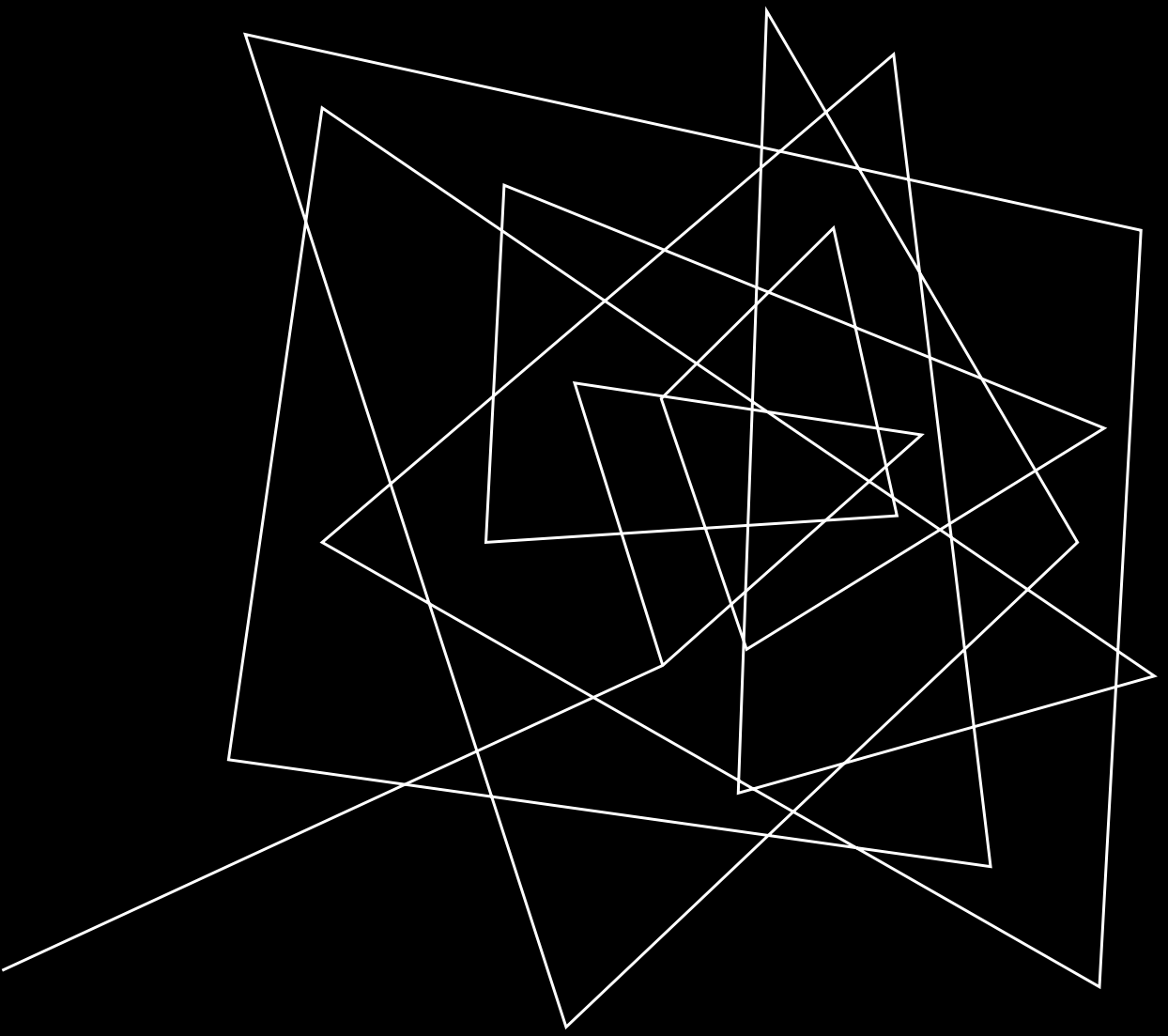


END USERS

BATTLE OF THE BROWSERS



https://twitter.com/ChrisHamill17/status/1160242636369694720



WRAP UP

TAKEAWAYS

Report performance should be thought of at design time

Think about your transforms

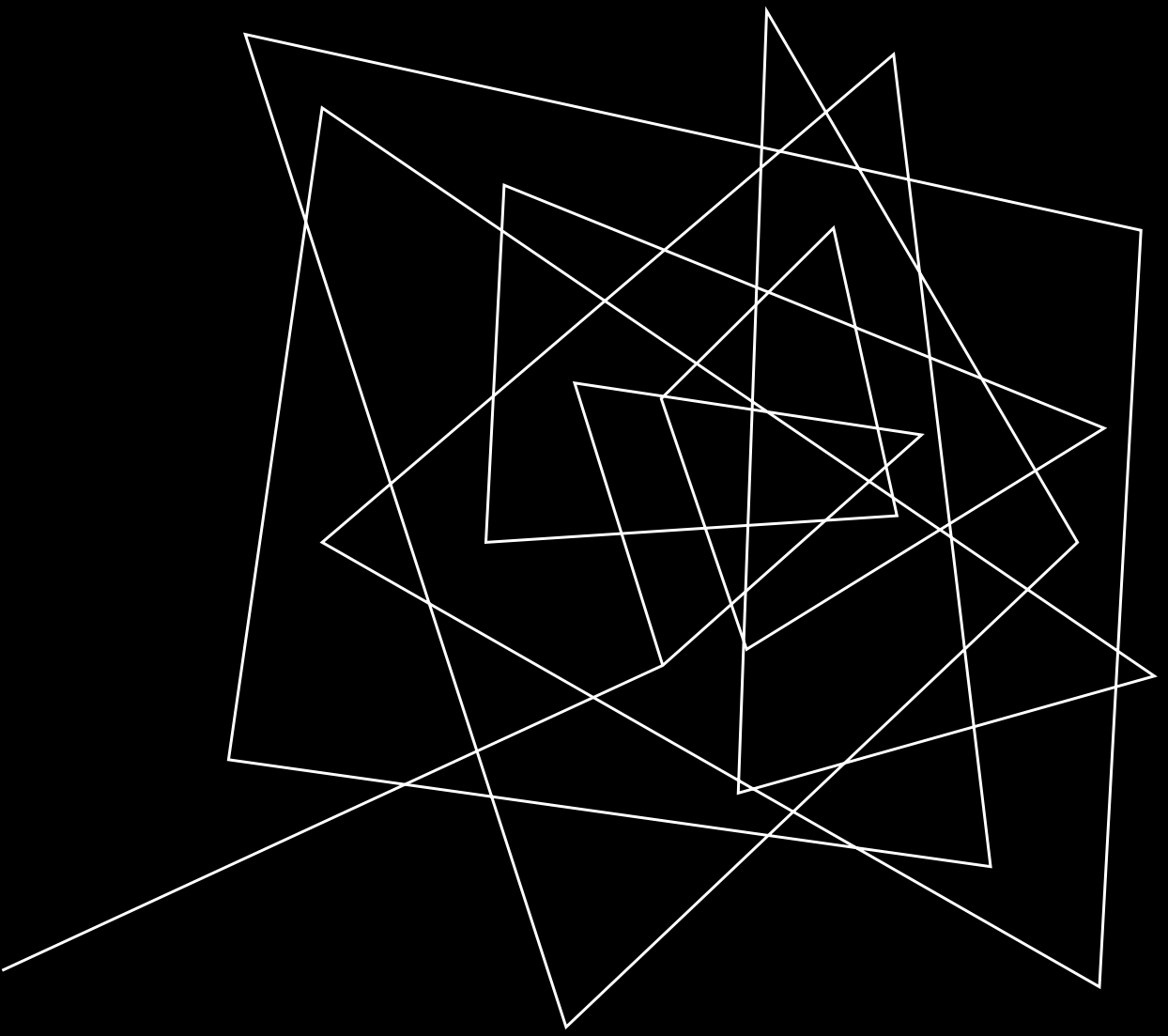
Modelling is key

Choice of browser and hardware matters

Create a personal set of best practices for Tabular Editor

Read public (online) resources

But start with the Power BI Guidance Docs



RESOURCES

RESOURCES

https://docs.microsoft.com/en-us/power-bi/power-bi-reports-performance

https://docs.microsoft.com/en-us/power-bi/guidance/import-modeling-data-reduction

https://docs.microsoft.com/en-us/power-bi/guidance/star-schema

https://sqlserverbi.blog/2019/08/24/power-bi-project-good-and-best-practices/

RESOURCES

https://docs.microsoft.com/en-us/power-bi/desktop-performance-analyzer

https://docs.microsoft.com/en-us/power-bi/visuals/power-bi-visualization-best-practices

https://www.sqlbi.com/books/the-definitive-guide-to-dax-2nd-edition/

RESOURCES

https://www.sqlbi.com/tools/

https://github.com/otykier/TabularEditor

https://powerbi.tips/2020/04/tabular-editor-rocks/

https://www.youtube.com/playlist?list=PLn1m_aBmgsbGDZb7ydd8_LS1AfosdRndQ

https://alluringbi.com/2020/08/06/consolidating-report-elements-for-improved-performance/

https://powerbi.microsoft.com/en-gb/blog/best-practice-rules-to-improve-your-models-performance/

RESOURCES

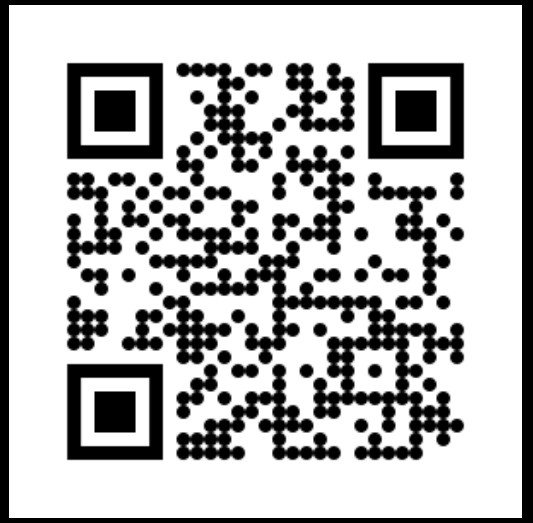
https://github.com/stephbruno/Power-BI-Field-Finder

https://www.sqlbi.com/articles/comparing-dax-calculated-columns-with-power-query-computed-columns/

https://www.sqlbi.com/tv/my-power-bi-report-is-slow-what-should-i-do-2/

https://www.biinsight.com/four-different-ways-to-find-your-power-bi-desktop-local-port-number/

https://blog.crossjoin.co.uk/2019/12/02/testing-performance-of-power-bi-reports-in-the-browser-part-1/

SLIDES CAN BE FOUND AT :

https://github.com/BenniDeJagere/Presentations/{Year}/{Date}_{Event}