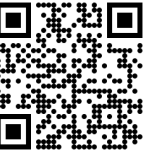
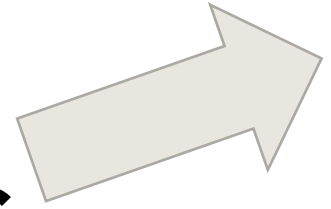


A series of thin, black, overlapping lines forming various geometric shapes like triangles and polygons, creating a complex, abstract pattern in the upper left portion of the slide.

**SLIDES**



# **TROUBLESHOOTING POWER BI REPORTS**

**aka ‘The It Depends Show’**

**Benni De Jagere**



**POWER PLATFORM  
BOOTCAMP**



**dataMinds**

# **GLOBAL POWER PLATFORM BOOTCAMP 2023 *BELGIUM EDITION***



GeoPostcodes

***U2U***



Microsoft



**SPONSORS**





# WHO AM I



Power BI CAT

dataMinds.be Member



@BenniDeJagere



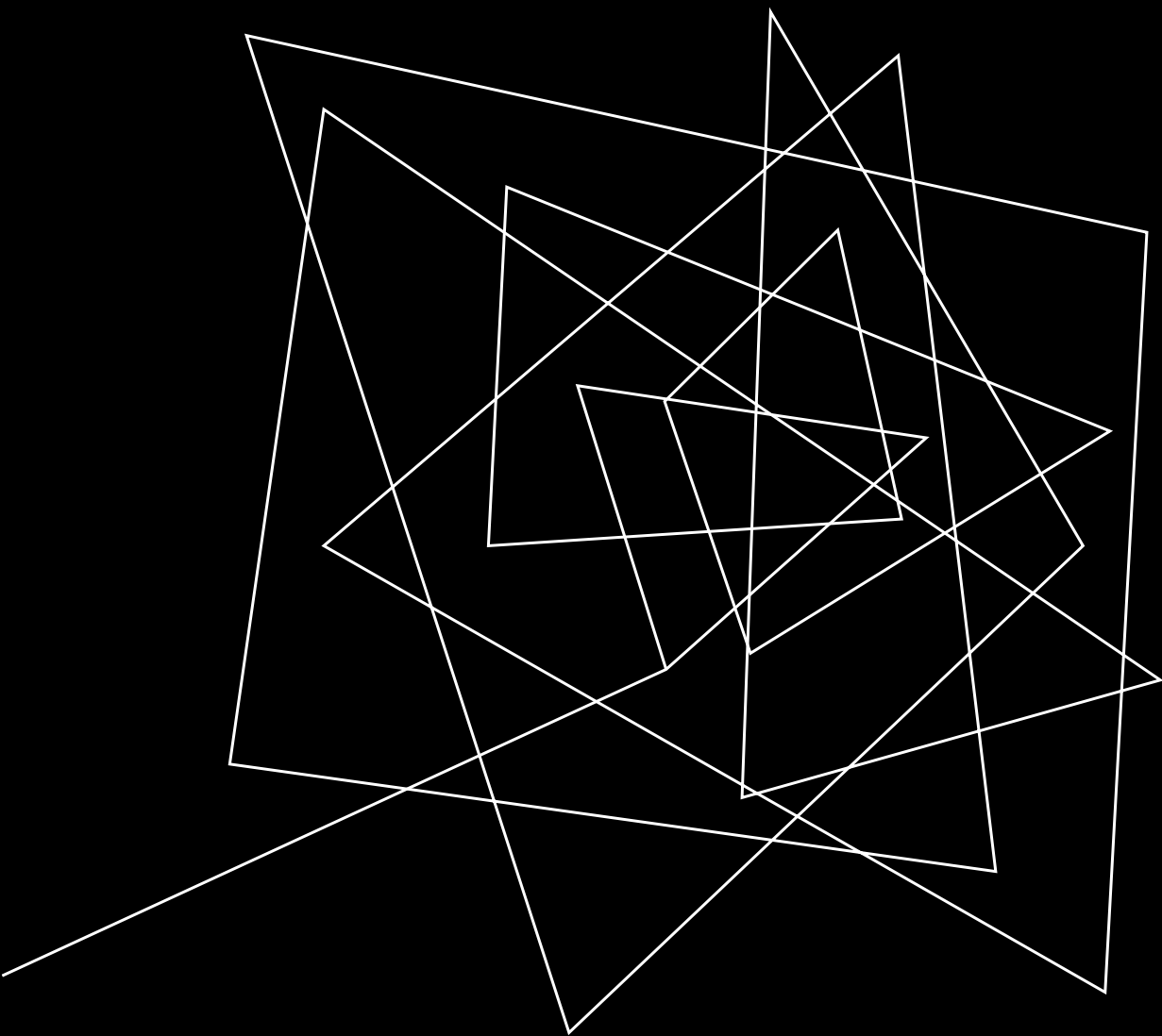
/bennidejagere



sessionize /bennidejagere



/bennidejagere



# **SESSION OBJECTIVES**

# SESSION OBJECTIVES

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

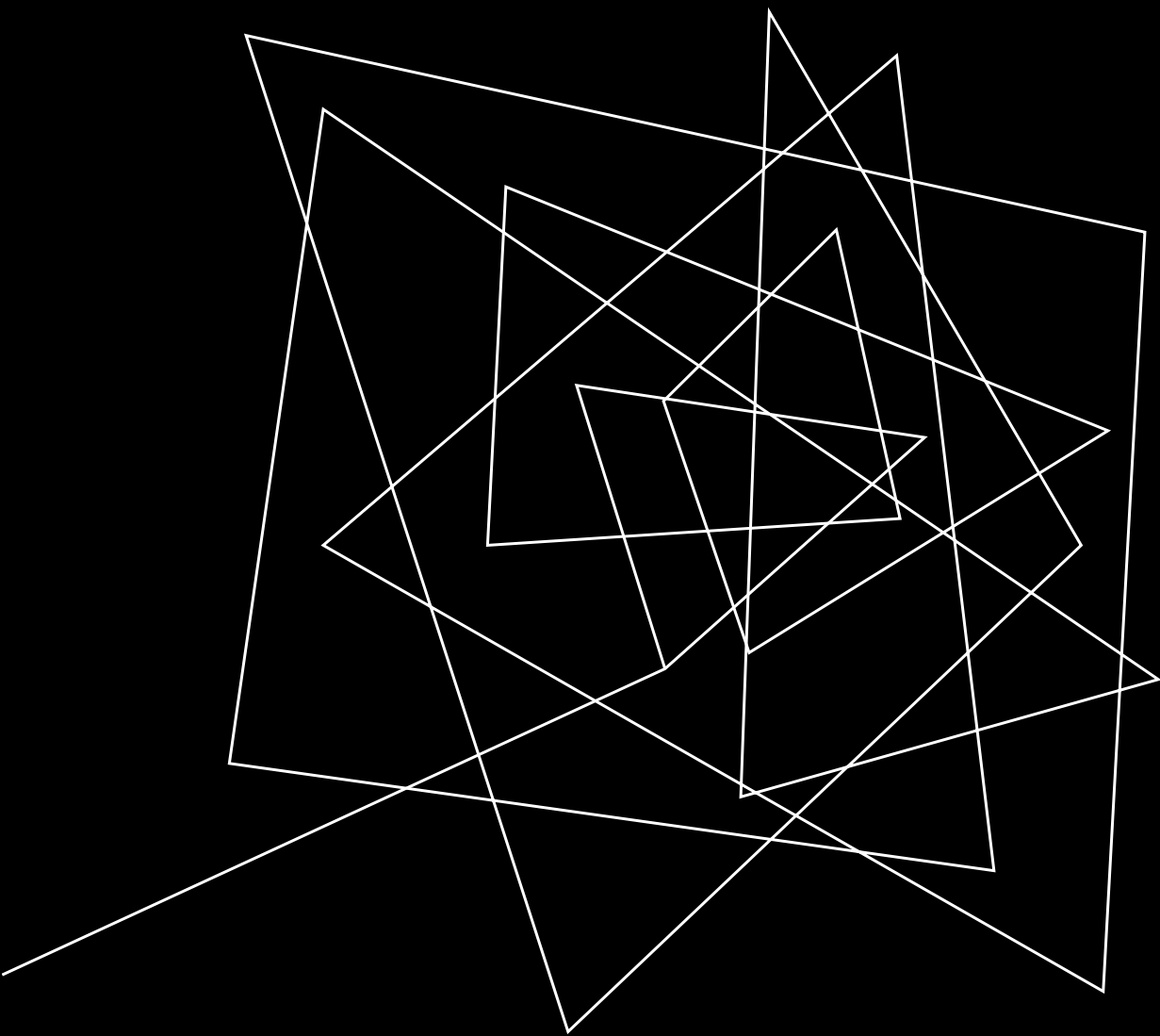
Aim for quick wins on heavily used reports

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

40% Science, 40% Art, 20% Luck

*It depends!*





**HOLD ON ..**



Noisy Neighbours

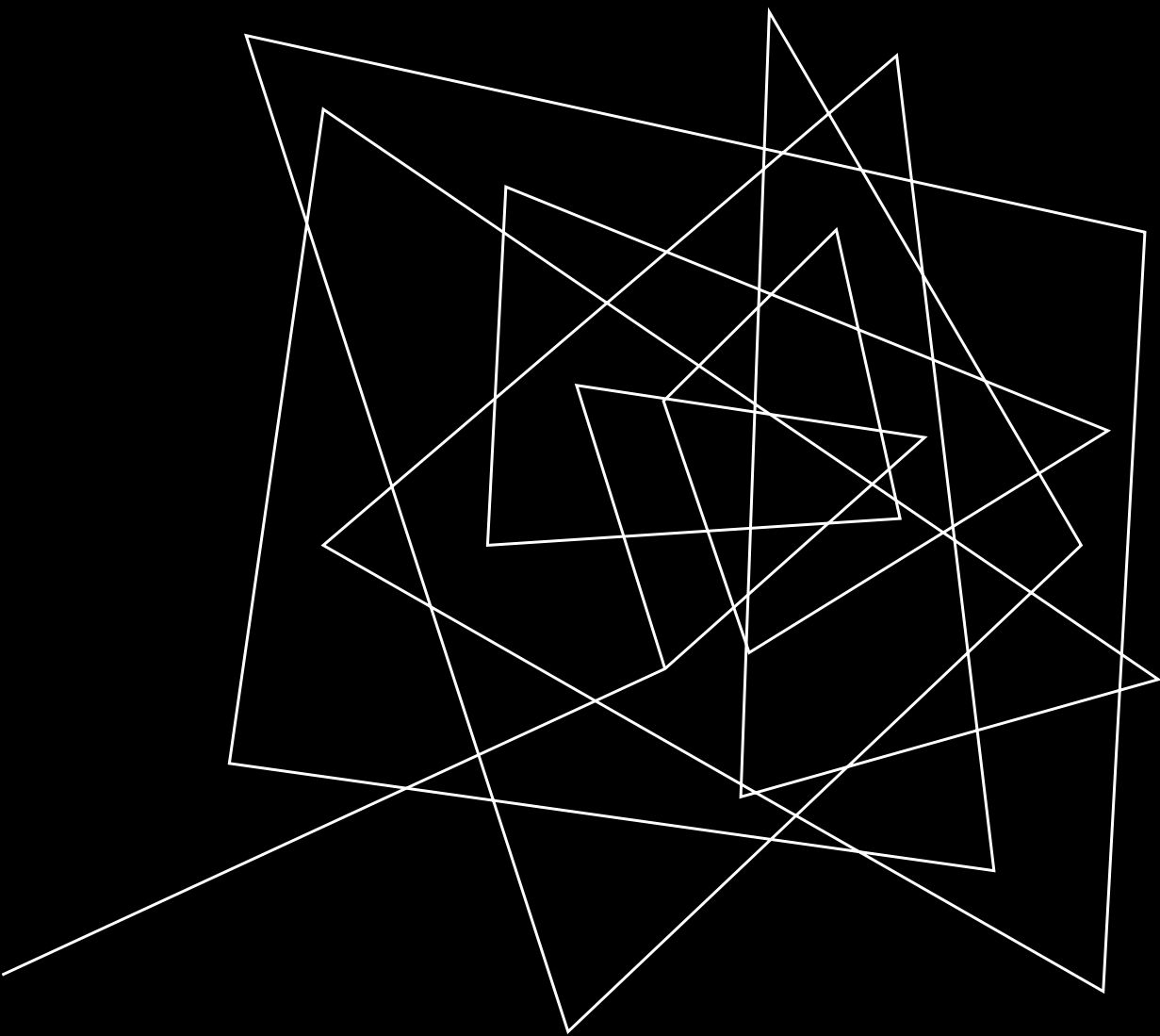
# **POWERBI.COM (AKA THE SERVICE)**

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](http://www.citibikenyc.com/system-data)

Public Open Data

Starts June 2013

Information about every trip

Longer than 60 seconds

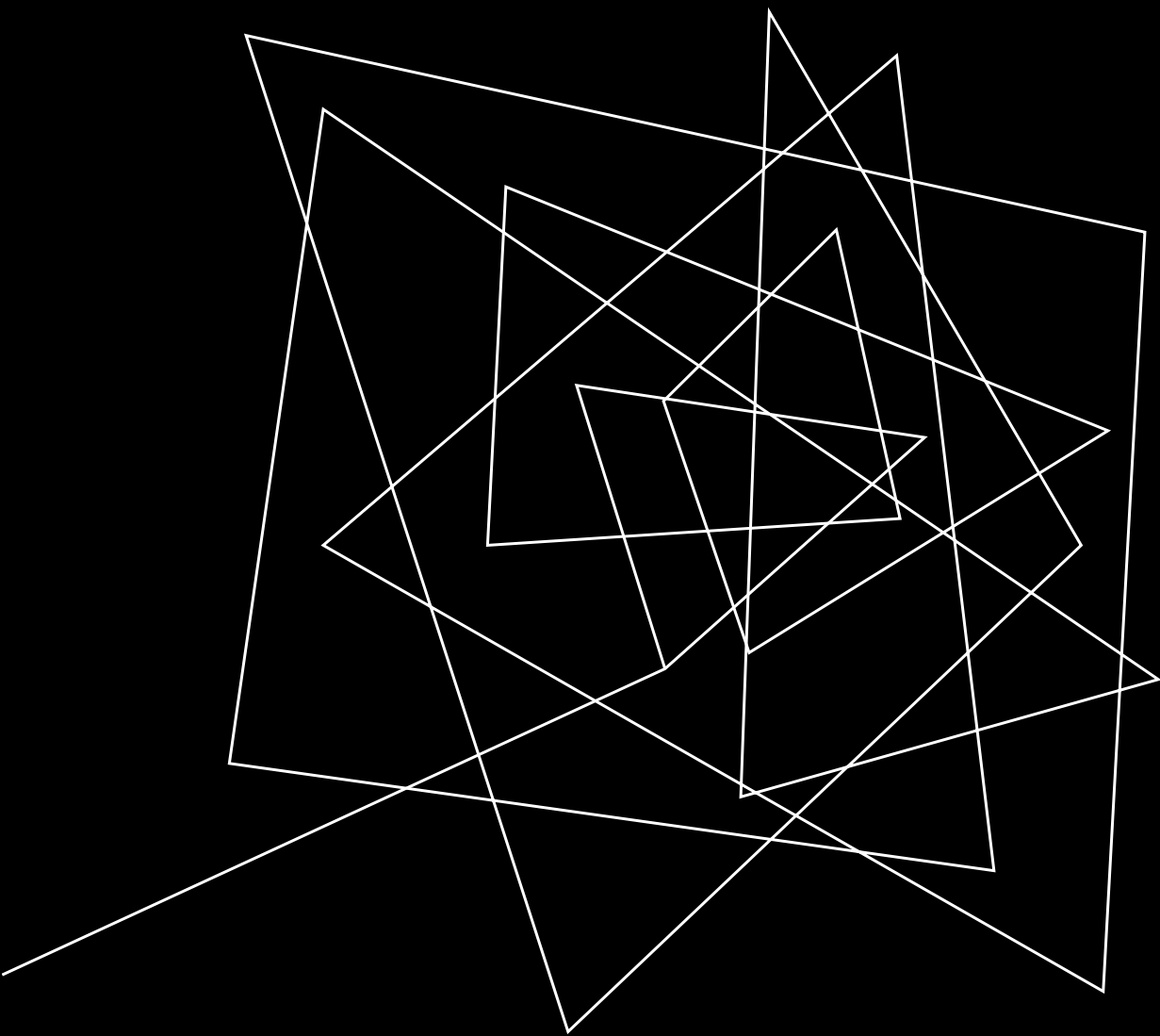
Starts at public station

Masterdata



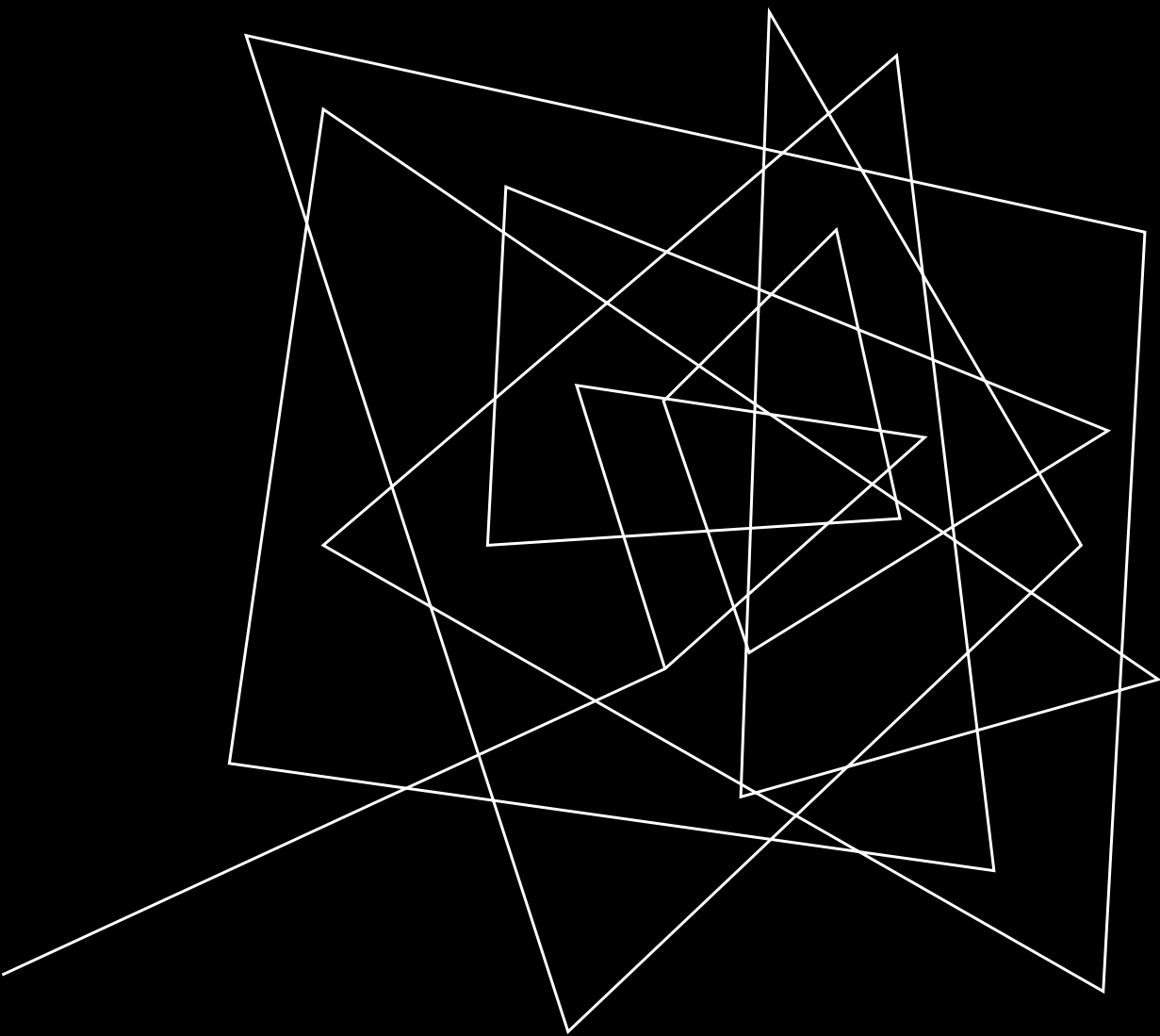
<https://i0.wp.com/thenypost.files.wordpress.com/2013/12/citibike1.jpg>





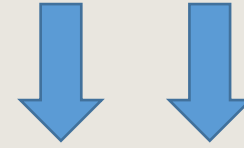
# THE REPORT(S)







DEMO



# **INSIDE POWER BI DESKTOP**

# INSIDE POWER BI DESKTOP

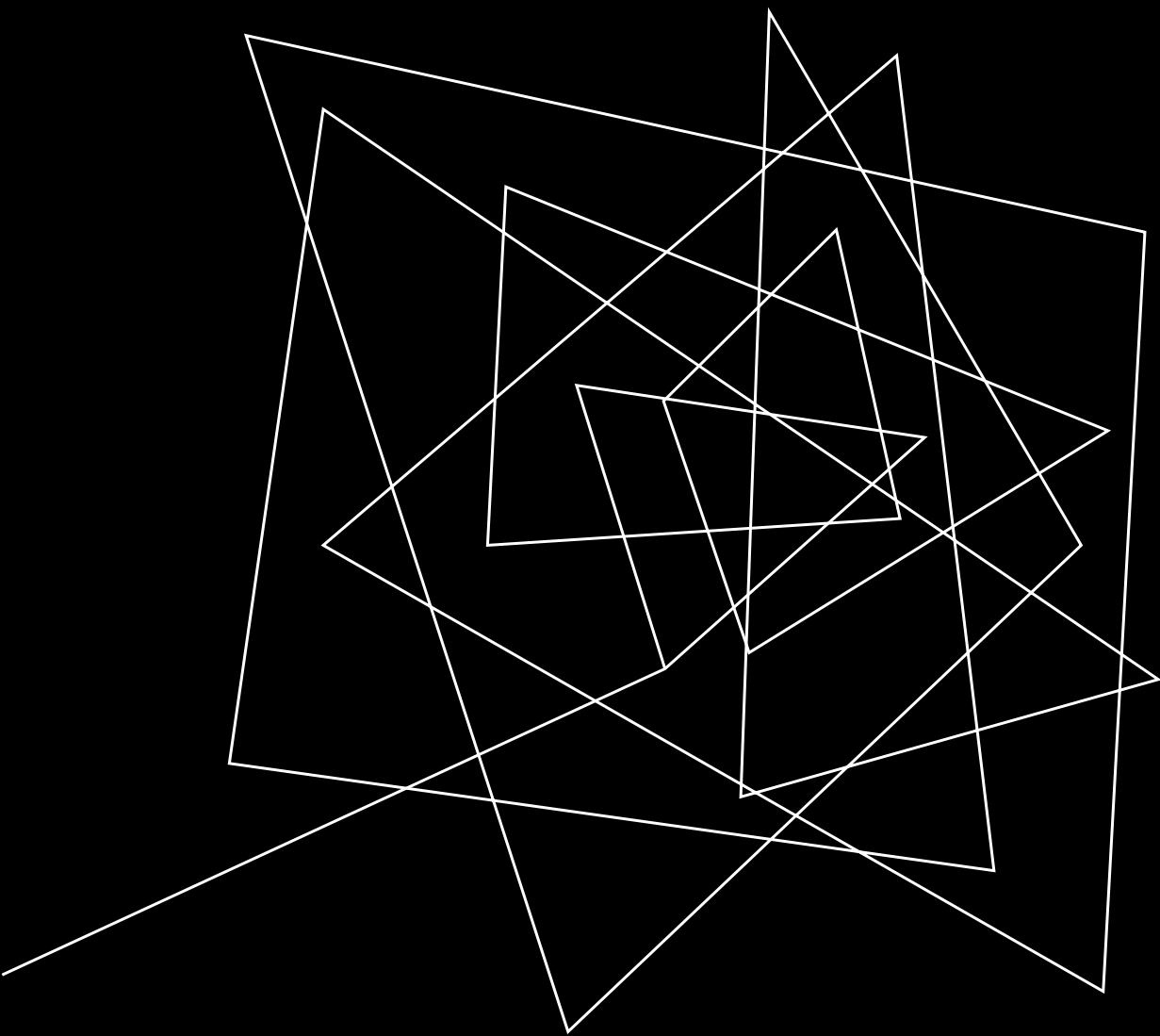


Name	Status	CPU	Memory	Disk	Network	GPU
Microsoft Power BI Desktop (12)		0,2%	2 351,1 MB	0 MB/s	0 Mbps	0%
		0%	894,0 MB	0 MB/s	0 Mbps	0%
CefSharp.BrowserSubprocess		0,2%	333,1 MB	0 MB/s	0 Mbps	0%
Microsoft Mashup Evaluation ...		0%	244,2 MB	0 MB/s	0 Mbps	0%
Microsoft Mashup Evaluation ...		0%	184,4 MB	0 MB/s	0 Mbps	0%
Microsoft Mashup Evaluation ...		0%	181,1 MB	0 MB/s	0 Mbps	0%
CefSharp.BrowserSubprocess		0%	125,4 MB	0 MB/s	0 Mbps	0%
Microsoft SQL Server Analysis ...		0%	123,7 MB	0 MB/s	0 Mbps	0%
CefSharp.BrowserSubprocess		0%	94,1 MB	0 MB/s	0 Mbps	0%
CefSharp.BrowserSubprocess		0%	93,8 MB	0 MB/s	0 Mbps	0%
CefSharp.BrowserSubprocess		0%	67,7 MB	0 MB/s	0 Mbps	0%
Console Window Host		0%	5,9 MB	0 MB/s	0 Mbps	0%
CefSharp.BrowserSubprocess		0%	3,8 MB	0 MB/s	0 Mbps	0%

# INSIDE POWER BI DESKTOP (WEBVIEW2)



Name	Status	29% CPU	67% Memory
Microsoft Power BI Desktop (14)		0.8%	1,751.3 MB
Microsoft Power BI Desktop		0.6%	595.7 MB
Microsoft SQL Server Analysis Services		0%	565.8 MB
Microsoft Power BI Desktop		0%	164.6 MB
Microsoft Power BI Desktop		0.1%	123.8 MB
Microsoft Power BI Desktop		0%	94.6 MB
Microsoft Power BI Desktop		0%	58.7 MB
Microsoft Power BI Desktop		0%	49.3 MB
Microsoft Power BI Desktop		0%	33.8 MB
Microsoft Mashup Evaluation Container		0%	25.5 MB
Microsoft Mashup Evaluation Container		0%	25.2 MB
Microsoft Power BI Desktop		0%	5.5 MB
Console Window Host		0%	4.9 MB
Microsoft Power BI Desktop		0%	2.6 MB
Microsoft Power BI Desktop		0%	1.3 MB



# **TOOLS FOR THE TRADE**







# TOOLS FOR THE TRADE

[Performance Analyzer Pane](#)

[Power BI Field Finder](#)

[DAX Studio](#)

[Power BI Sentinel \(€\)](#)

[VertiPaq Analyzer \(SQLBI.com\)](#)

[Power Query Diagnostics Tool](#)

[Tabular Editor](#)

[Power BI Sidetools](#)

[Report Analyzer](#)

[Power BI Cleaner](#)

[Power BI Helper](#)

[PBI Tools](#)

[Bravo](#)

And more ..

[ALM Toolkit](#)

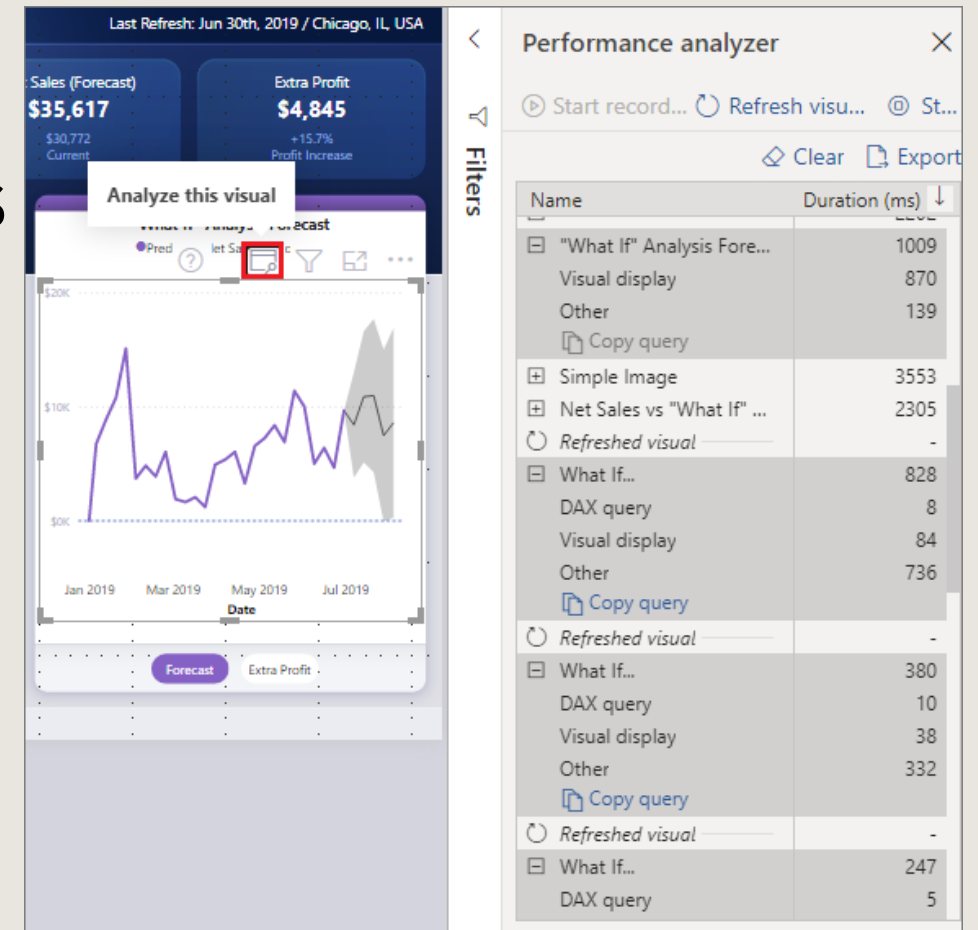
# POWER BI PERFORMANCE ANALYZER PANE

Public Release in May 2019

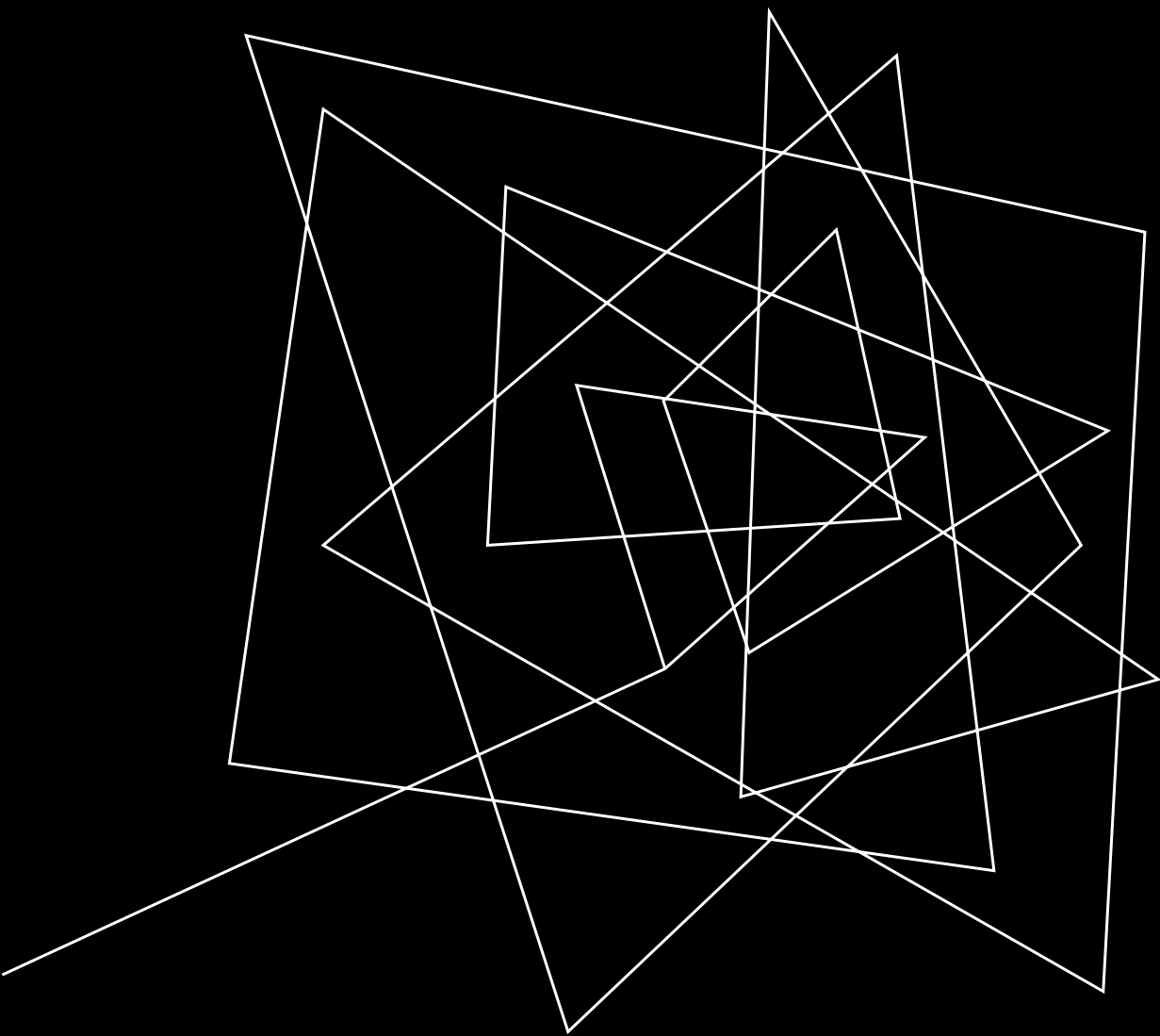
Flight Recorder for all operations

Breaks down execution times

Export results with ease

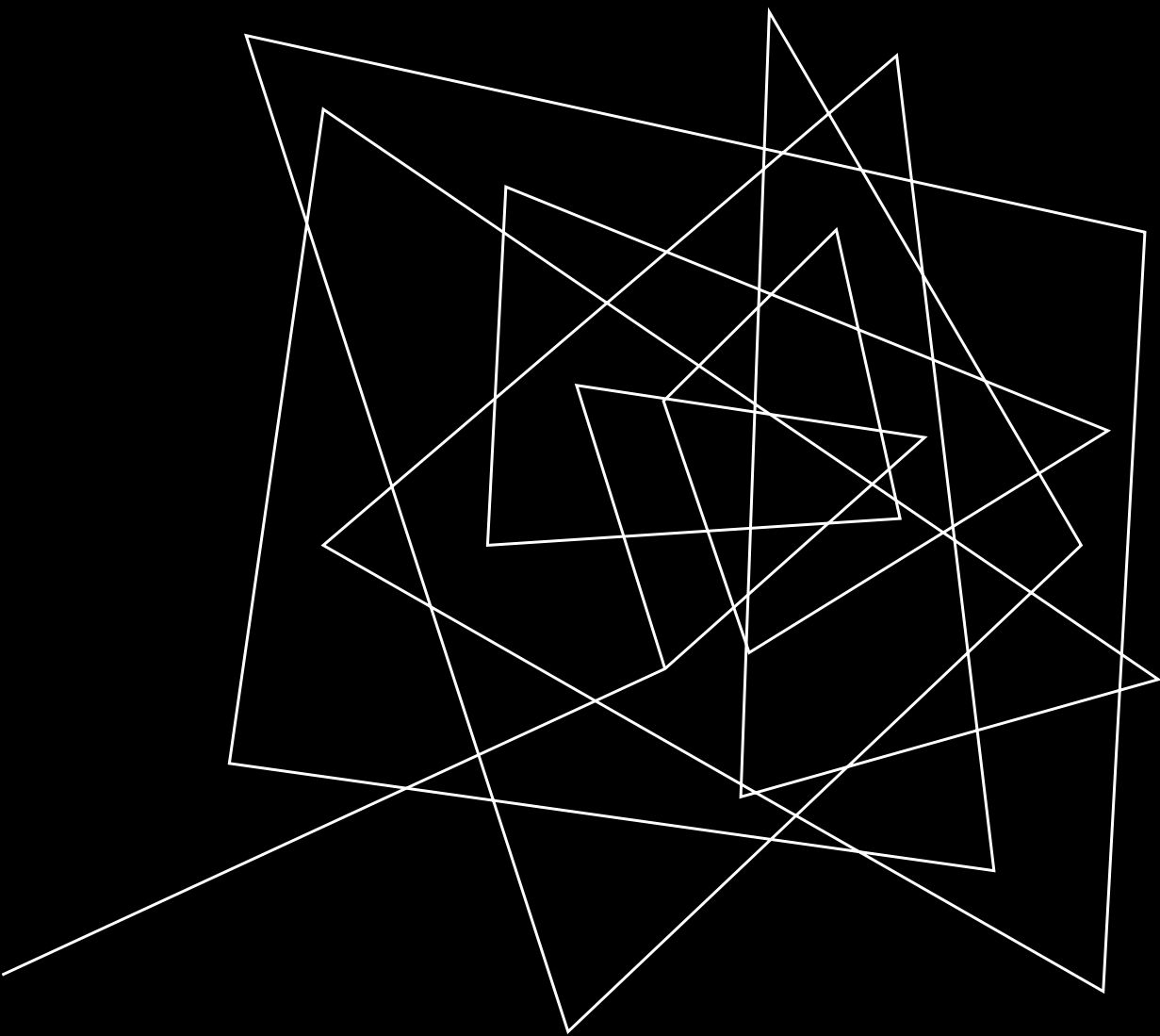


<https://docs.microsoft.com/en-us/power-bi/create-reports/media/desktop-performance-analyzer/performance-analyzer-07.png>



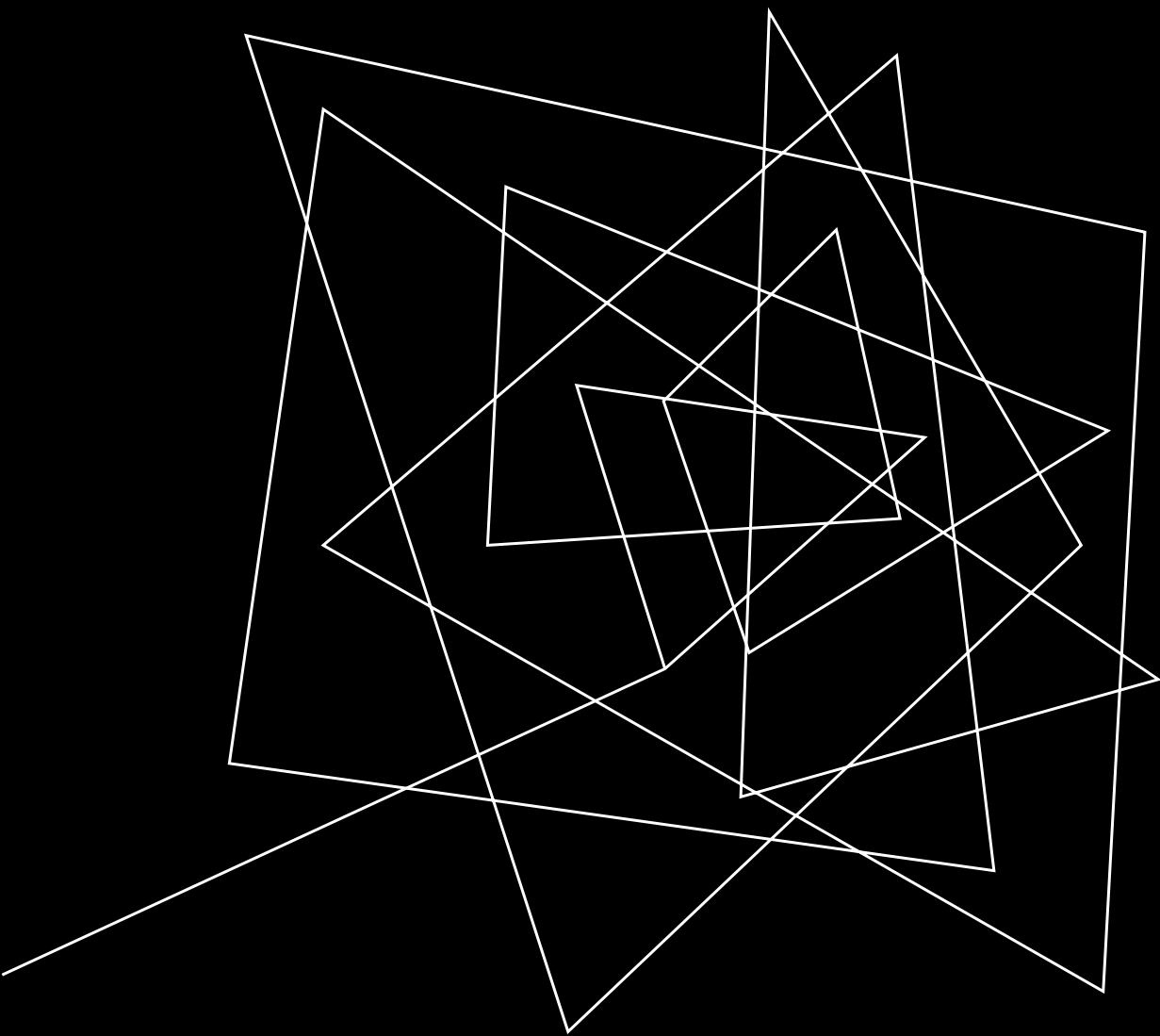
# **PERFORMANCE ANALYZER PANE**

**DEMO**



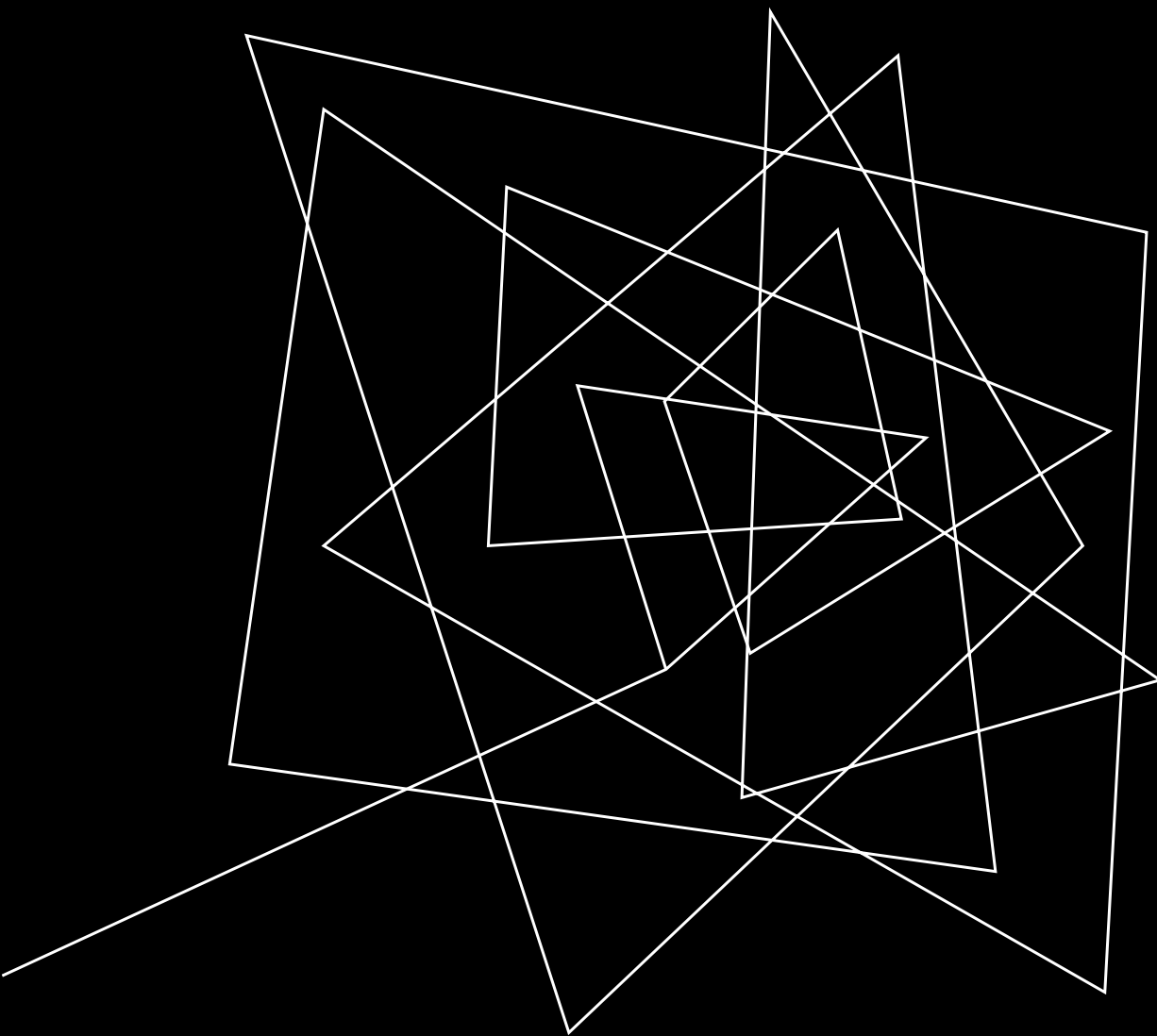
# REPORT ANALYZER

DEMO



# TABULAR EDITOR (2)

DEMO

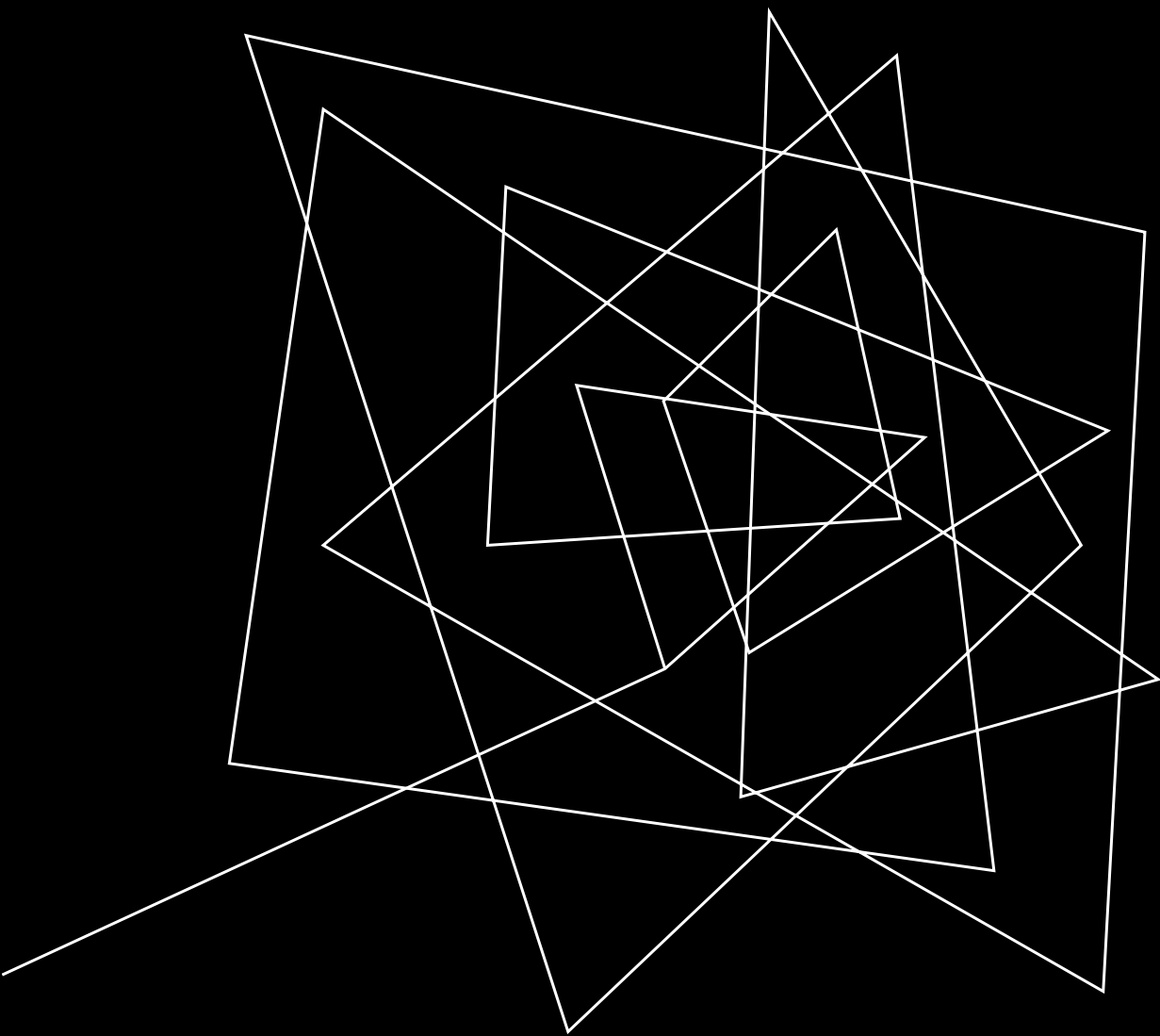


# **DAX STUDIO**

# **VERTIPAQ ANALYZER**

**DEMO**





# **THE TIPS & BEST PRACTICES**

# THE GOLDEN RULE(S)

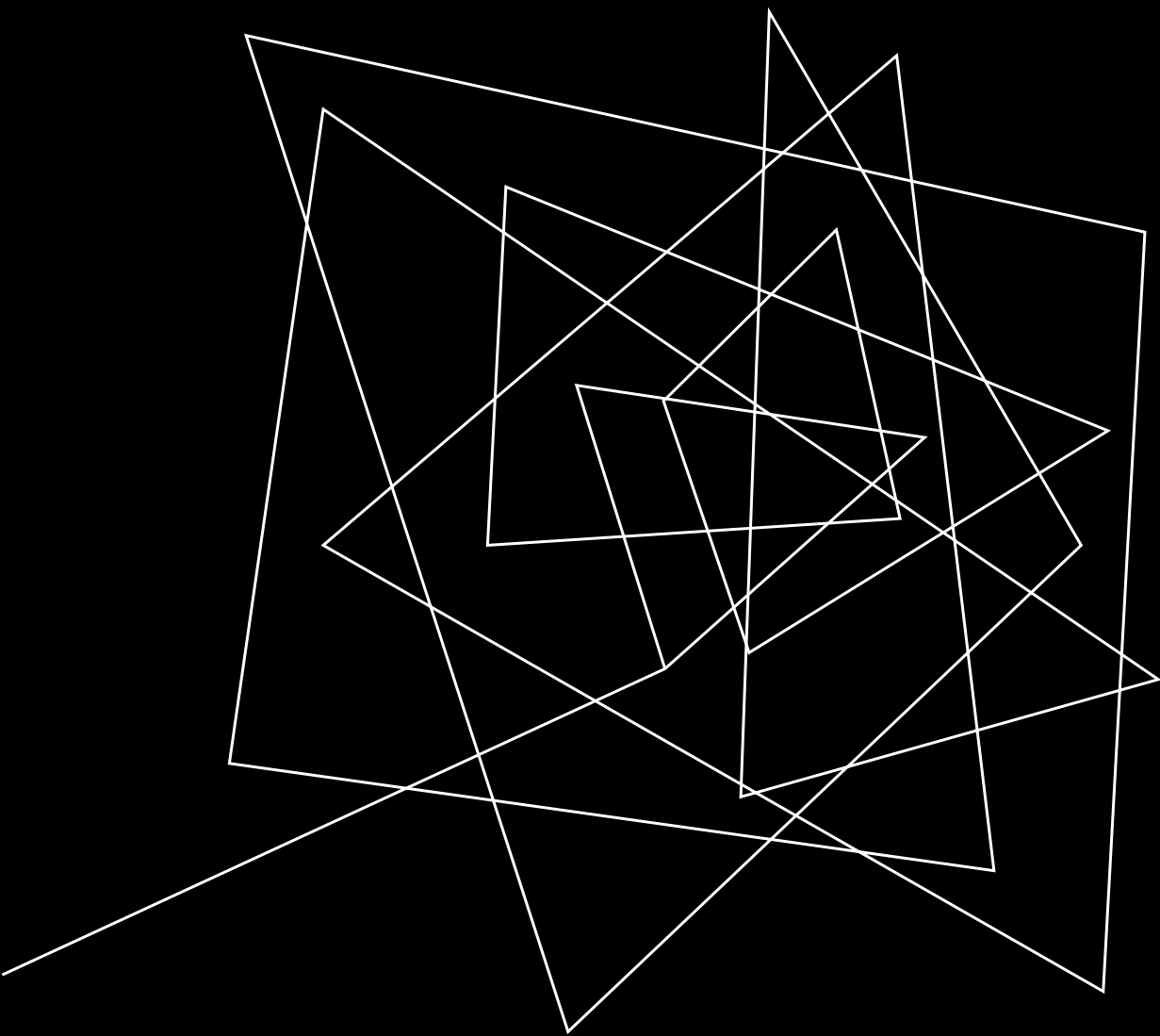
Transform early

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**

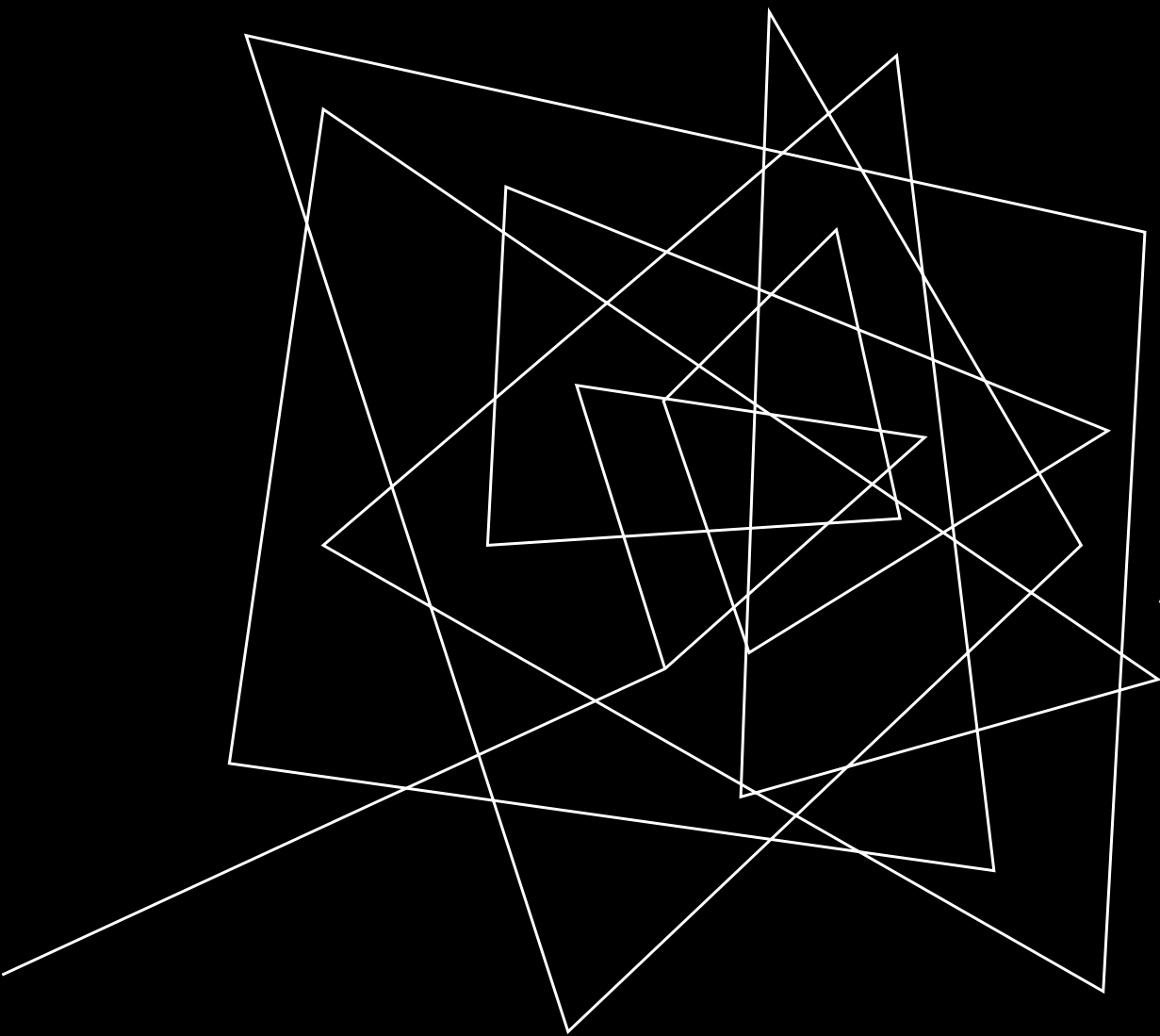
# DATA TYPES

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

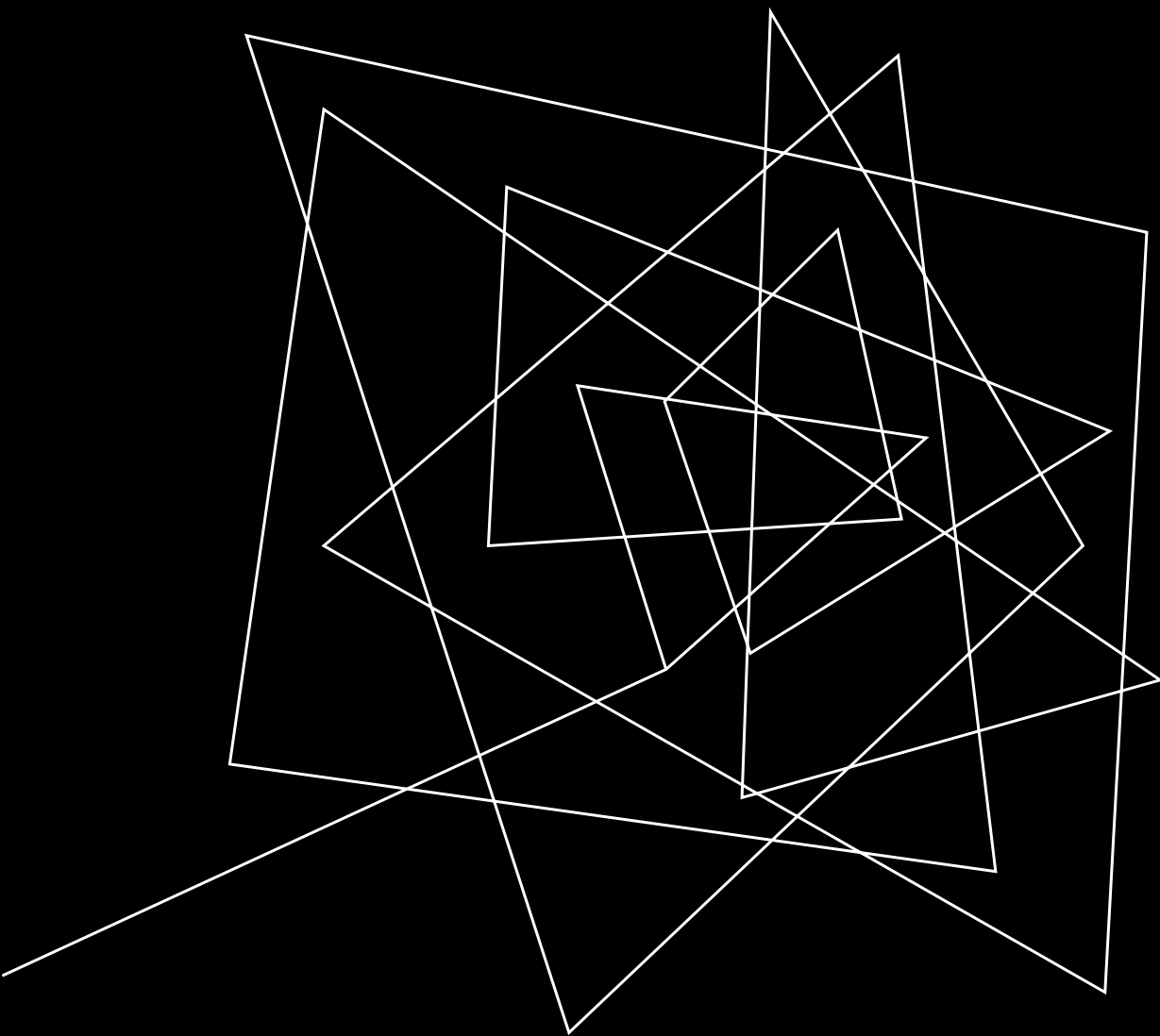
Enabled by default

Control behaviour in PBI Desktop Settings

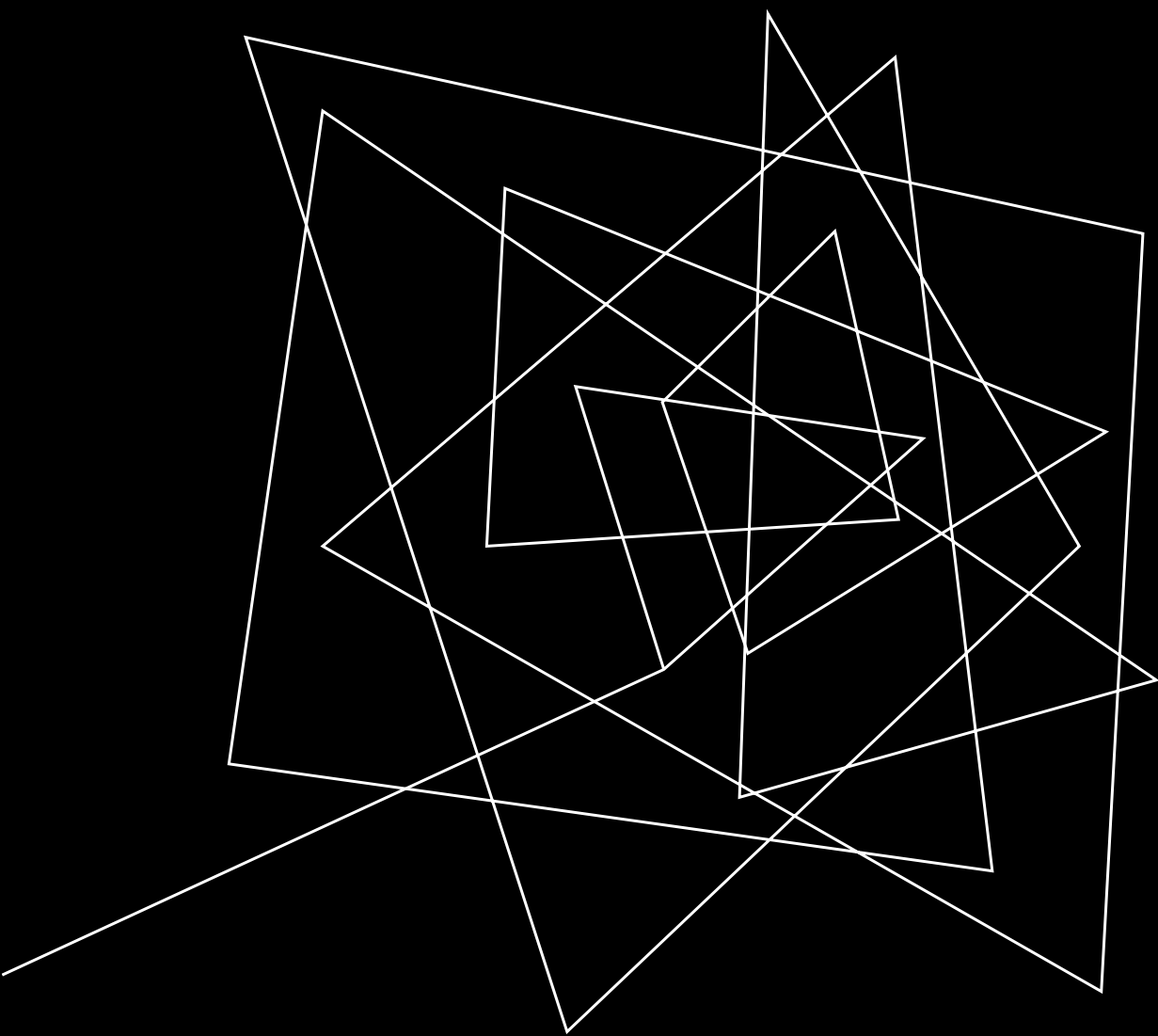
Creates a Calculated Table for every date/time

Range is the min to max



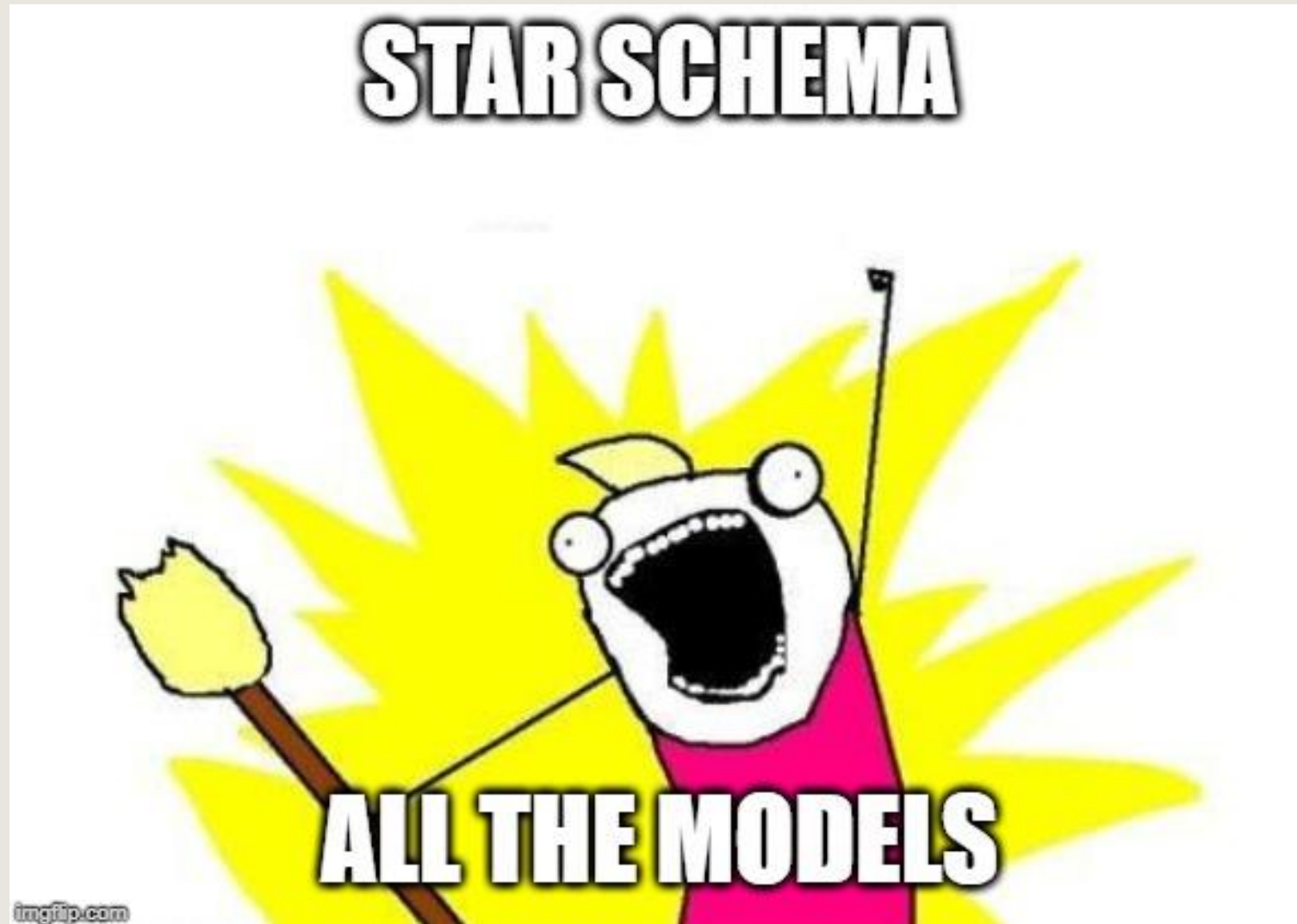


**COLUMN/ROW  
USAGE**



# **DATA MODELLING**

# DATA MODELLING



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

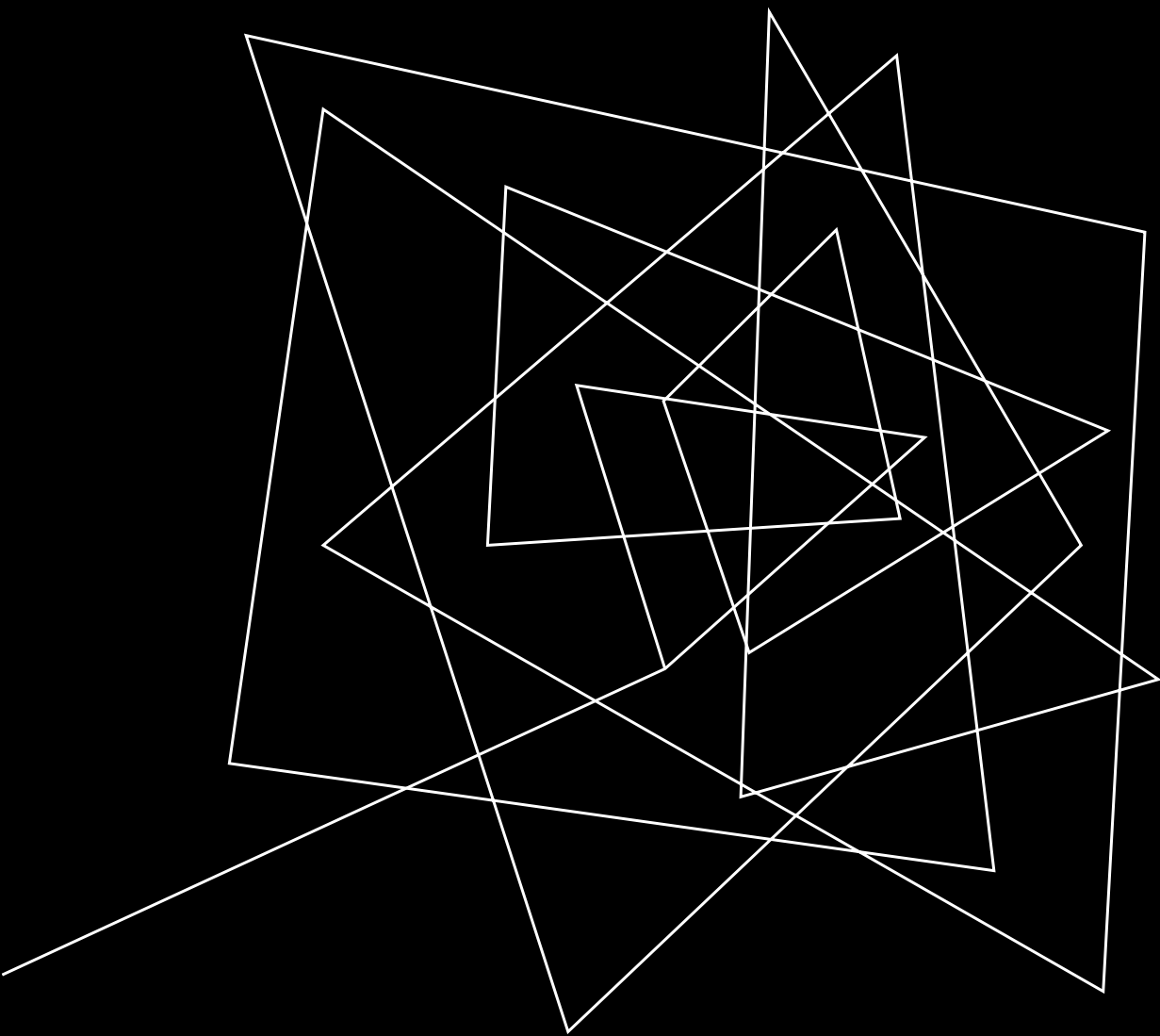
Reduce inappropriate summarization

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

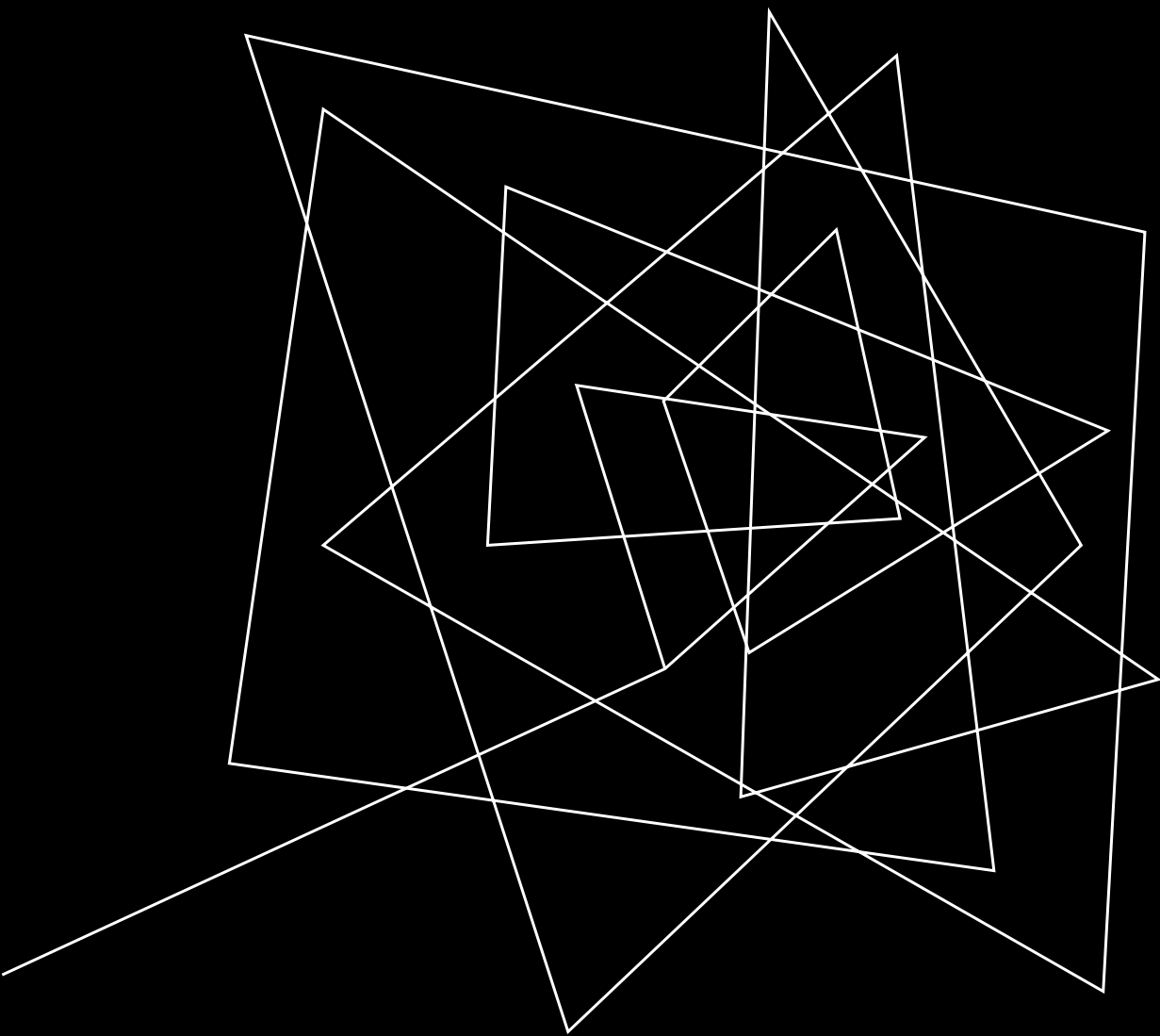
Filtering and slicing before rendering is a valid option (ie. Landing page, Report Filters, Query Reduction, ..)

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)

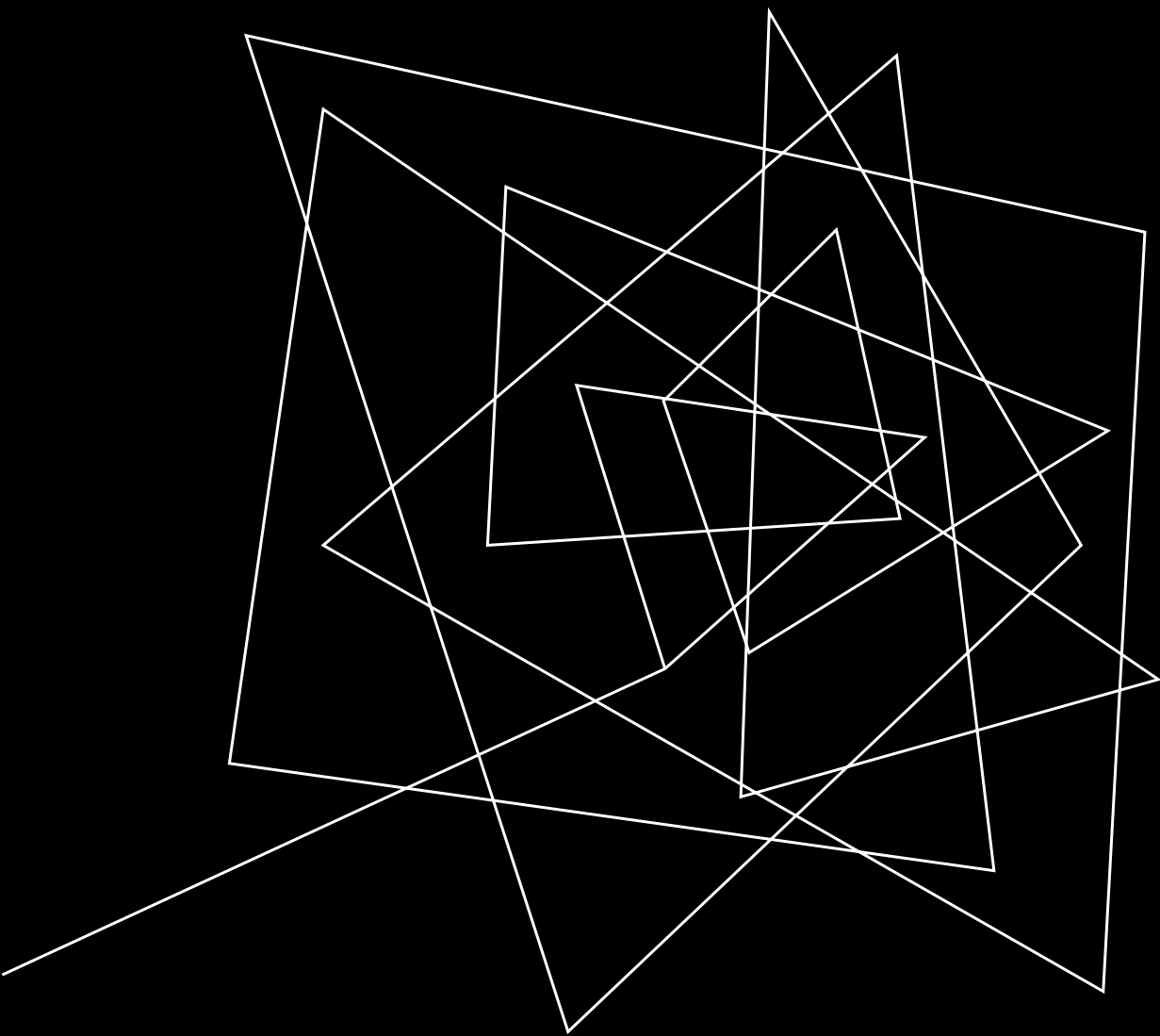
# POWER QUERY TIPS (CONTINUED)

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

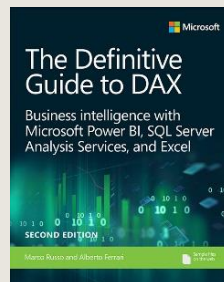
Avoid calculated columns and tables

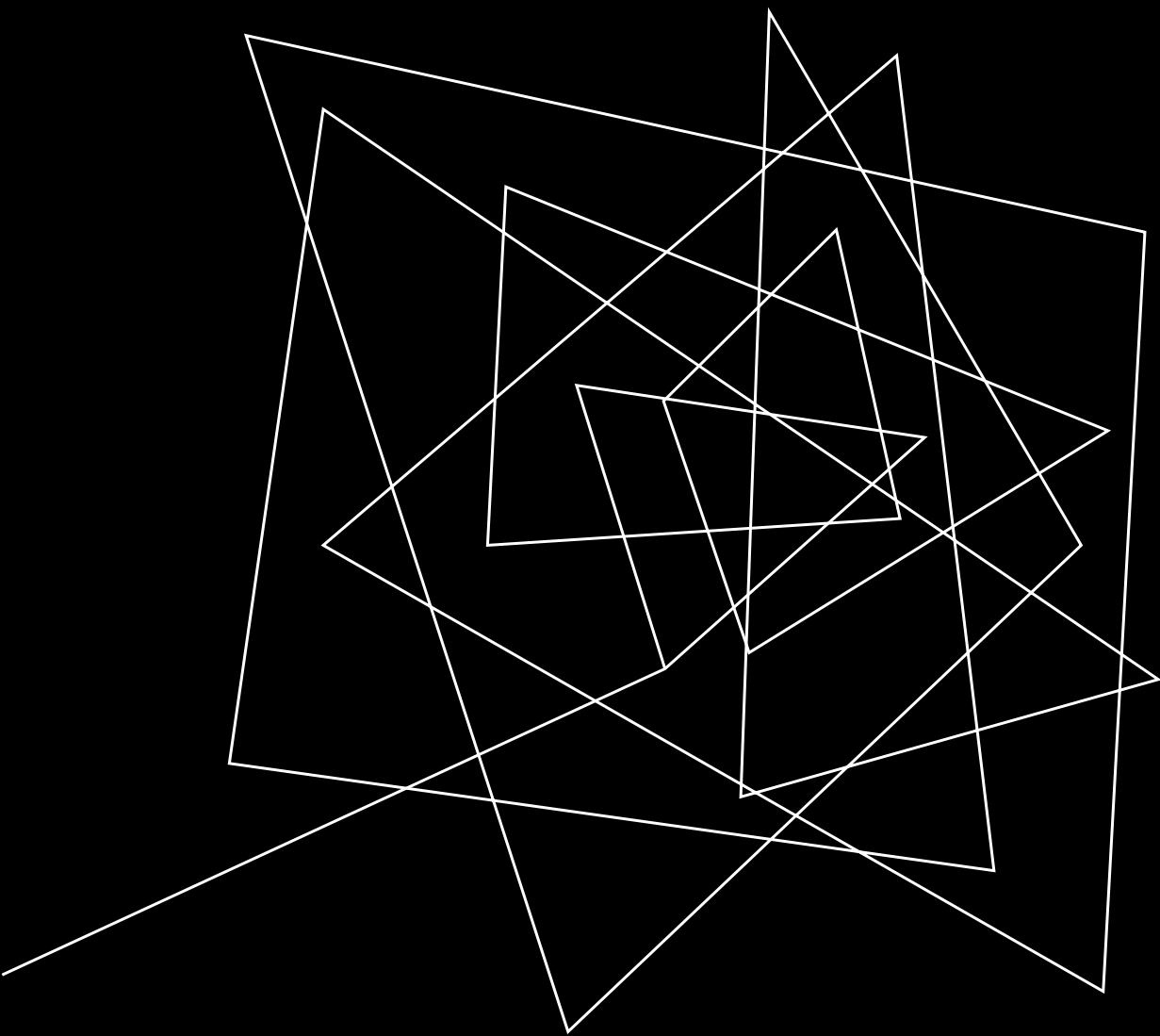
Keep measures simple initially, add complexity later

Solve the model, then solve DAX

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

Read [the Bible](#) 😊





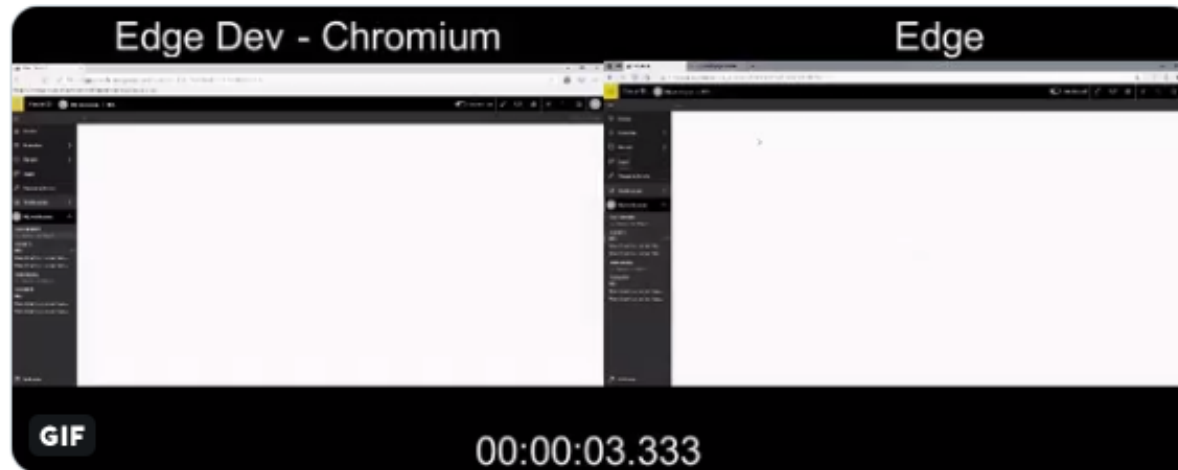
**END USERS**

# BATTLE OF THE BROWSERS

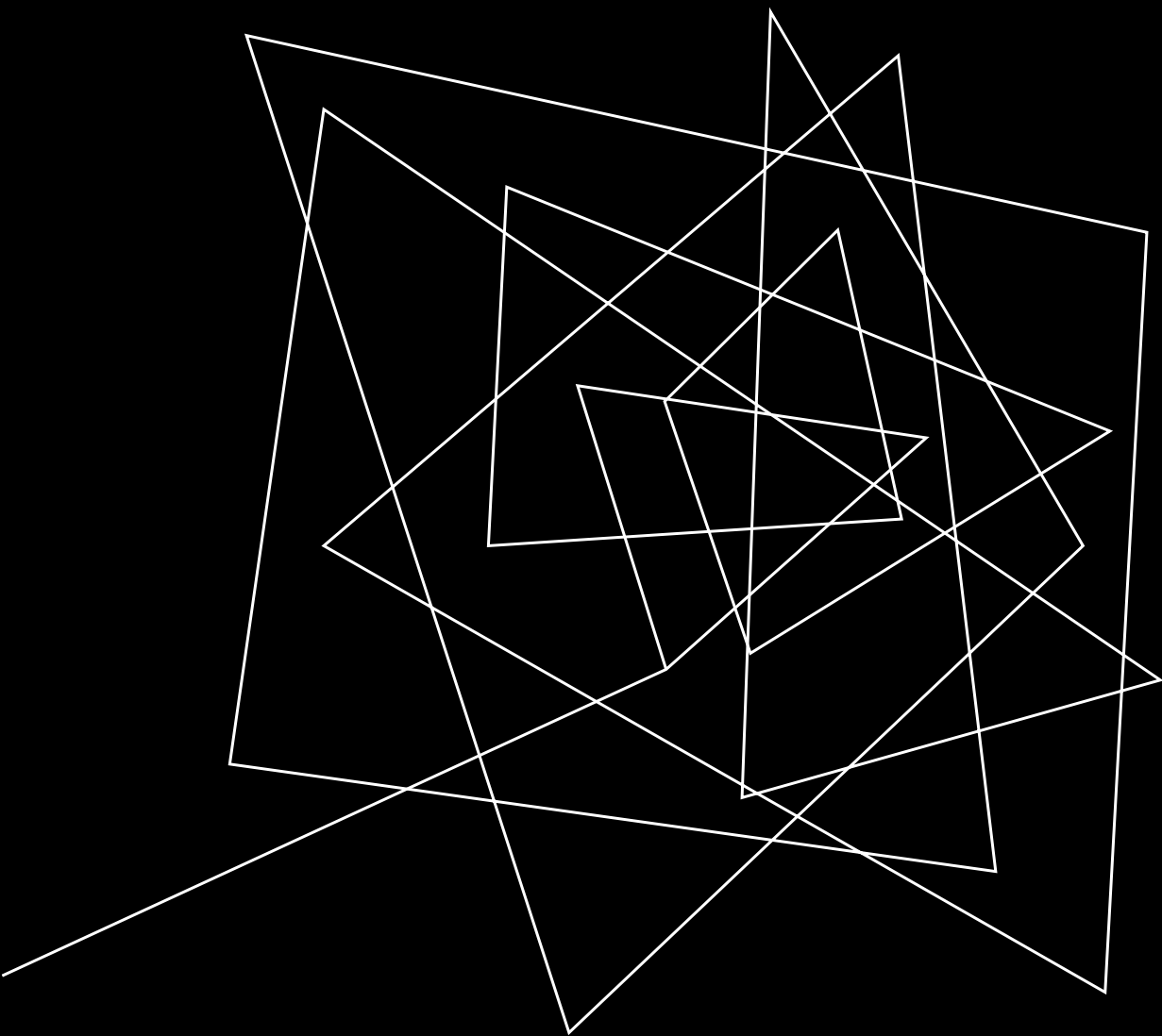


Chris Hamill  
@ChrisHamill17

A modern browser can have a huge impact on [#PowerBI](#) report performance. Noticed this when i moved to Edge Dev ([microsoftedgeinsider.com/en-us/](https://microsoftedgeinsider.com/en-us/)), and had always wanted to do a side by side. Finally took the time, and the results are more dramatic than i had expected:



<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

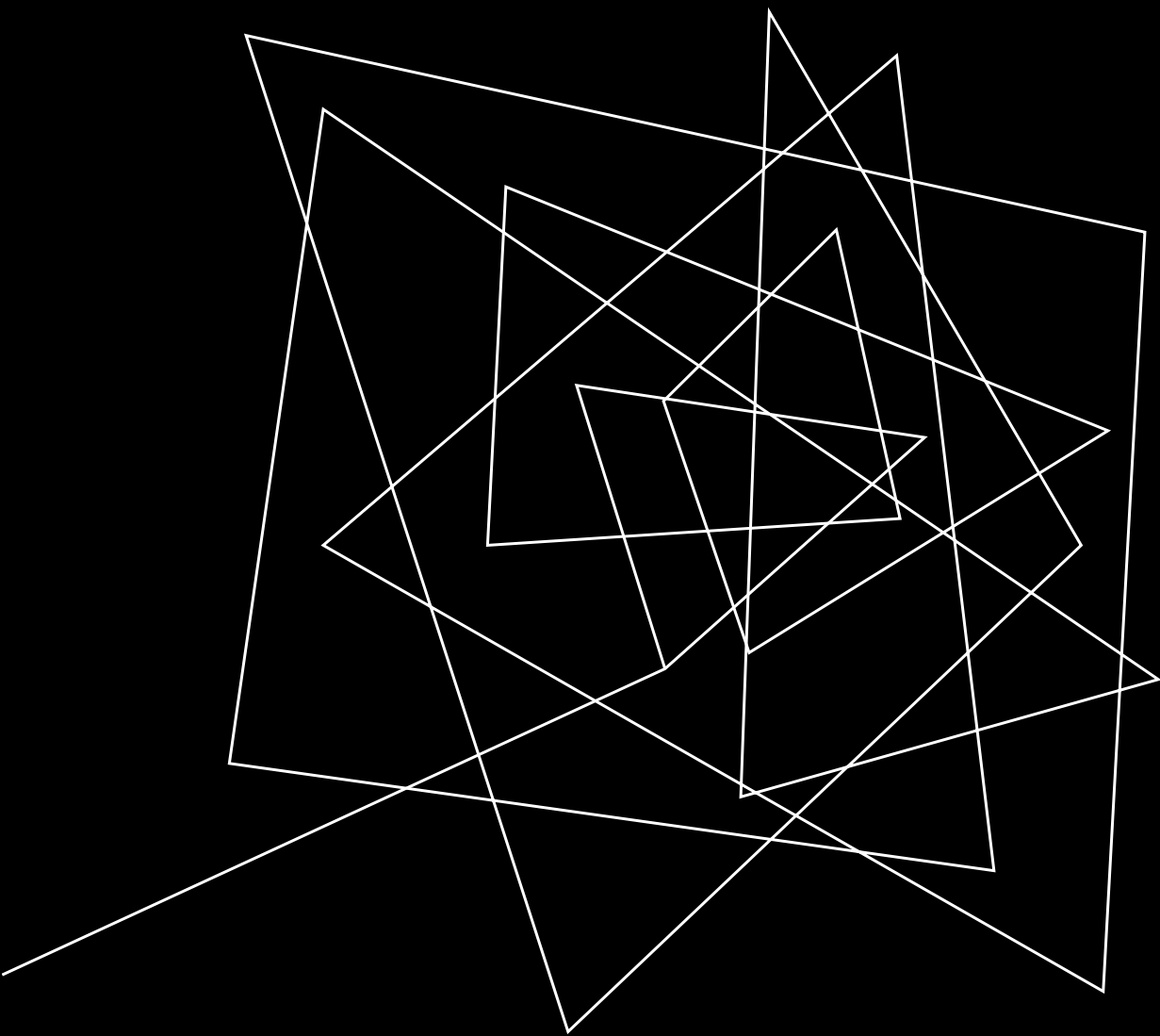
Choice of browser and hardware matters

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://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/>

A series of white, overlapping geometric lines and polygons on a black background, located on the left side of the slide.

**SLIDES CAN BE FOUND AT :**

[https://github.com/BenniDeJagere/Presentations  
/{Year}/{Date}\\_{Event}](https://github.com/BenniDeJagere/Presentations/{Year}/{Date}_{Event})

