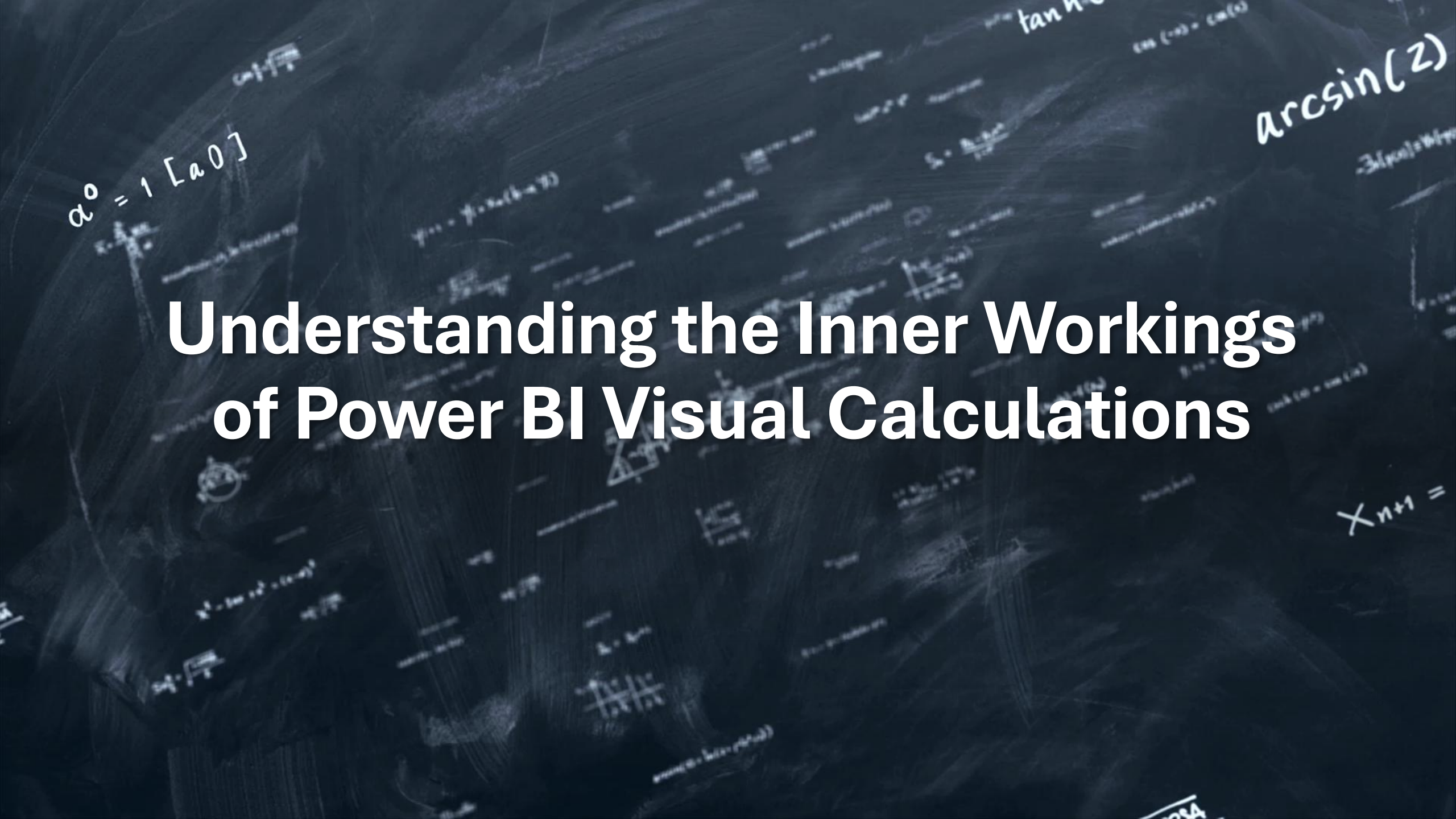
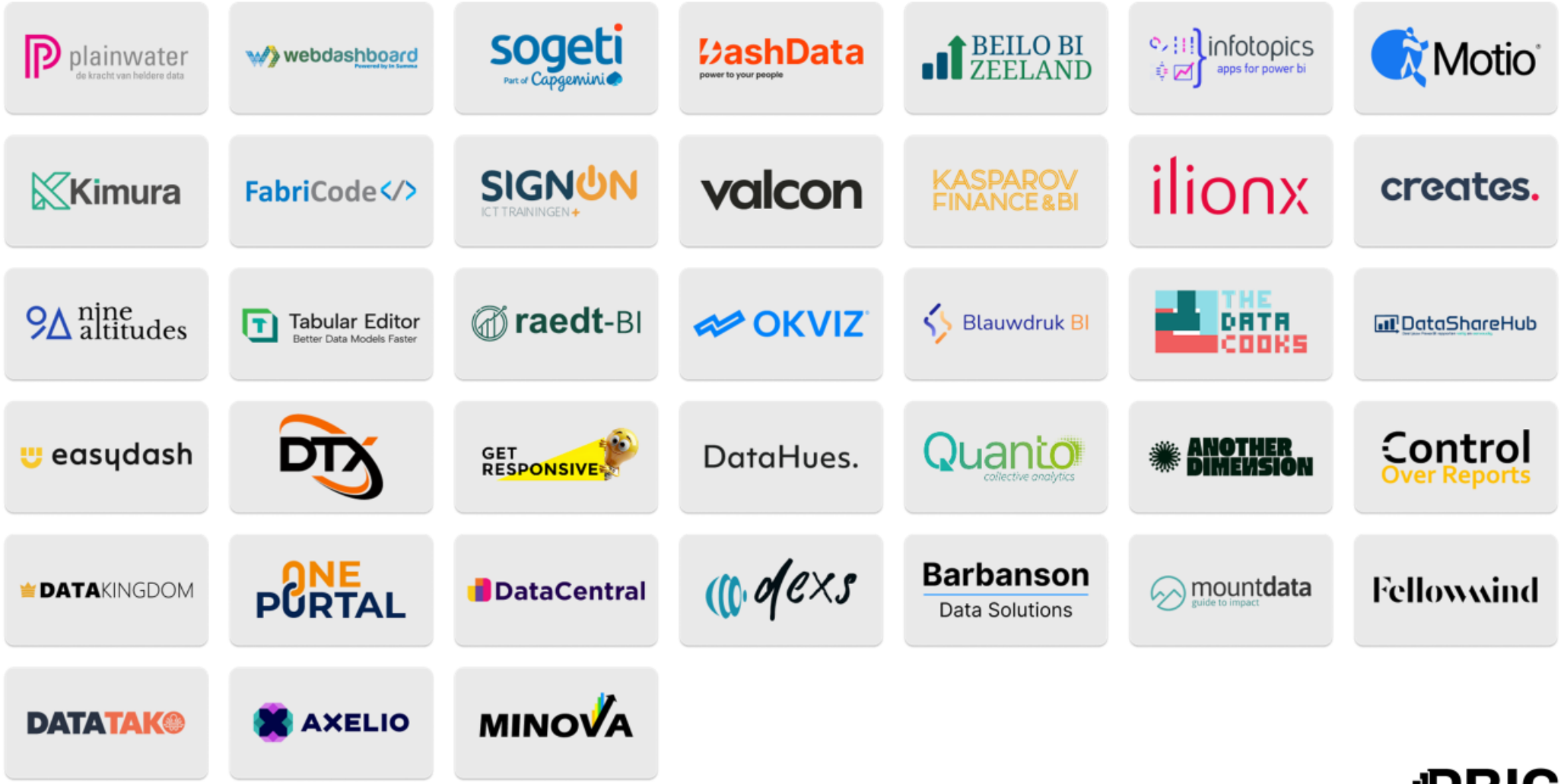


Understanding the Inner Workings of Power BI Visual Calculations

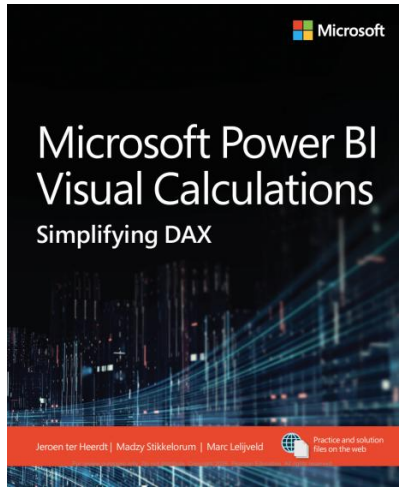
A big thank you to our partners



PBIG
POWER BI GEBRUIKERSGROEP

Marc Lelijveld

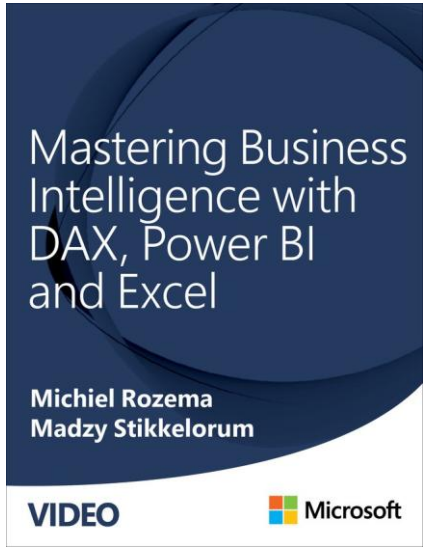
Technical Evangelist | Solution Architect |
Book Author
Macaw Netherlands

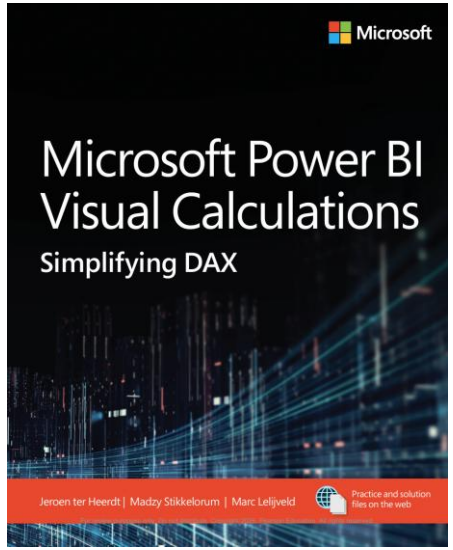


Madzy Stikkelorum

Mathematician | Author | Video trainer
Organizer of Power BI Summer School

Data Analytics Consultant at Quanto

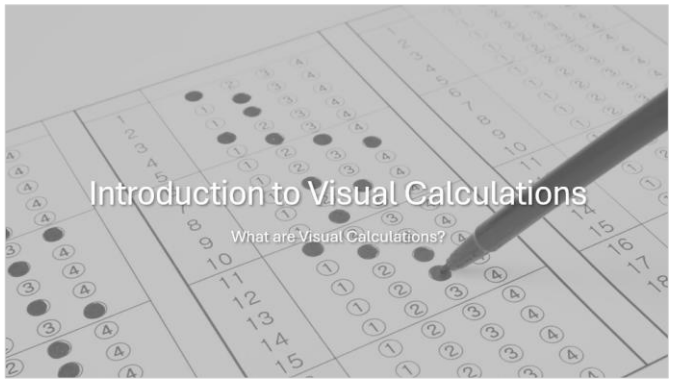


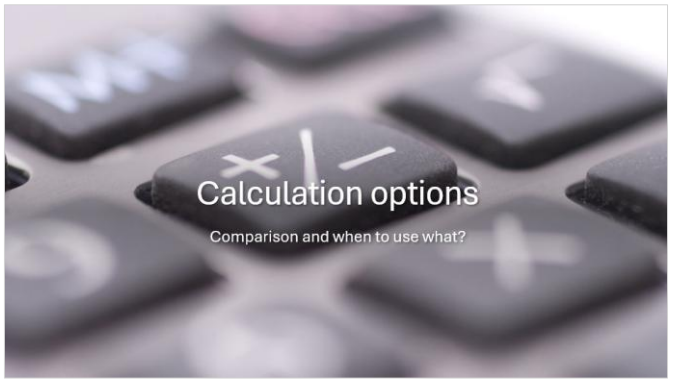


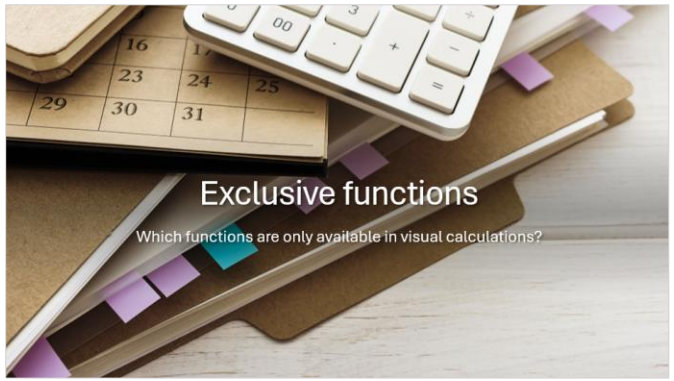
Quanto
collective analytics

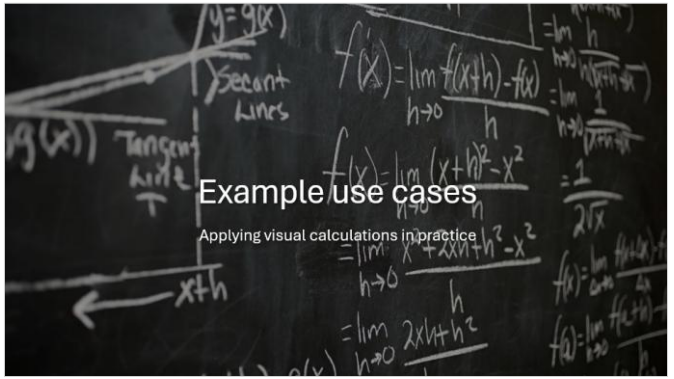
Madzy Stikkelorum & Marc Lelijveld

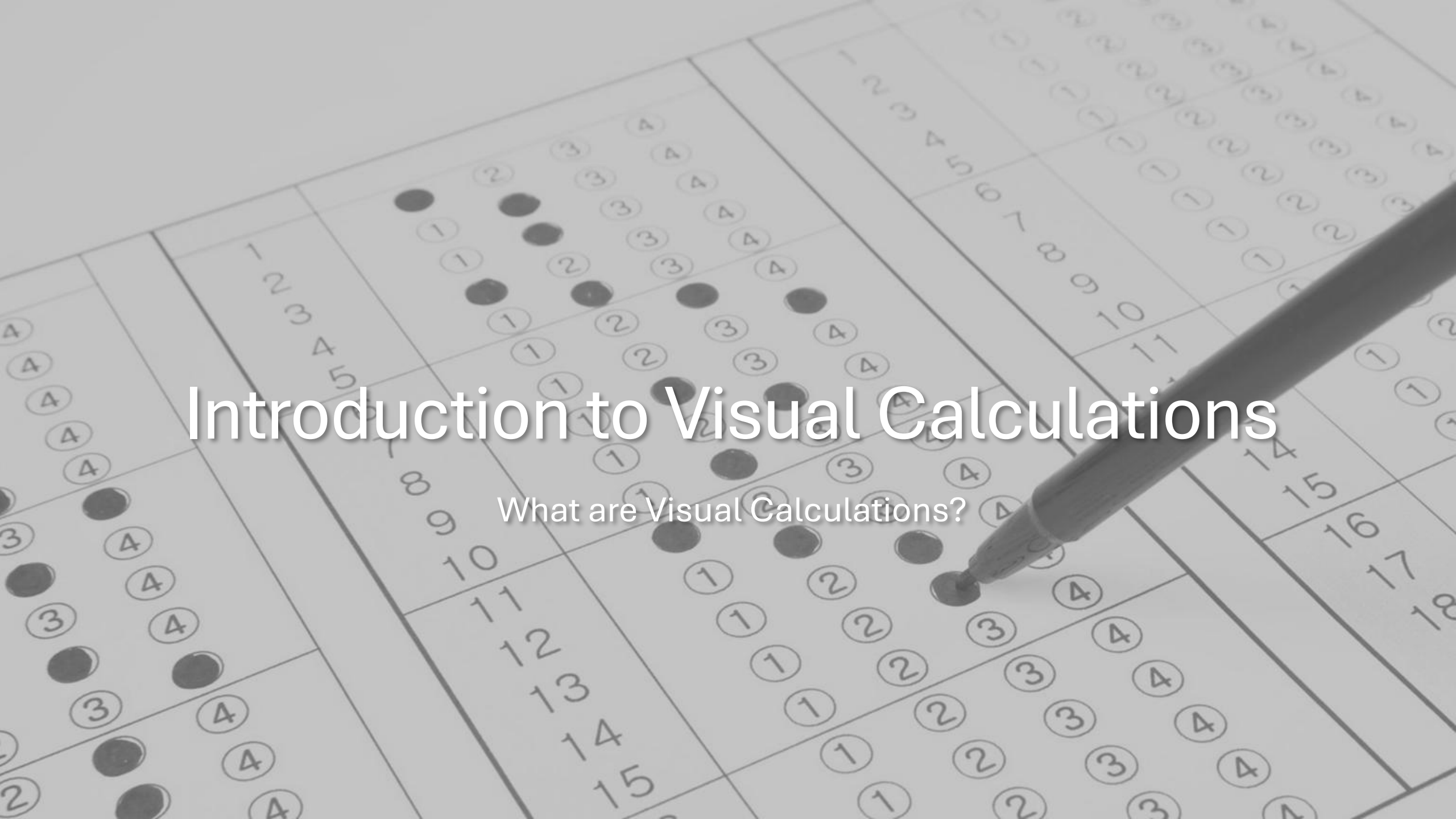
Topics to cover











Introduction to Visual Calculations

What are Visual Calculations?

What are Visual Calculations?

Visual Calculations are DAX calculations executed in the scope of a visual.

In support thereof:

- new functions
- new concepts

Visual calculations are easy and flexible

- Part of a visual
- WYSIWYG
- Just “visible context”
- High-level functions for common business calculations
- Refer to visual structure

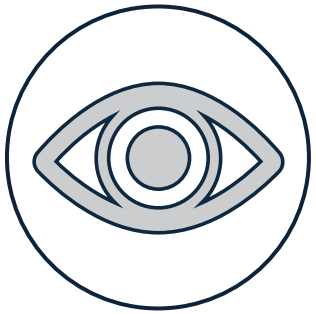
Benefits of visual calculations

Simpler DAX

- Easier to write and maintain
- Higher level functions
- Less stuff to consider

Just “visible context”

- Easier to predict results
- Outcome is directly visible

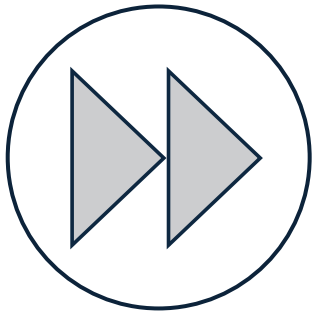


WYSIWYG

- Easier to validate results

Flexibility

- Refer to visual structure instead of fields

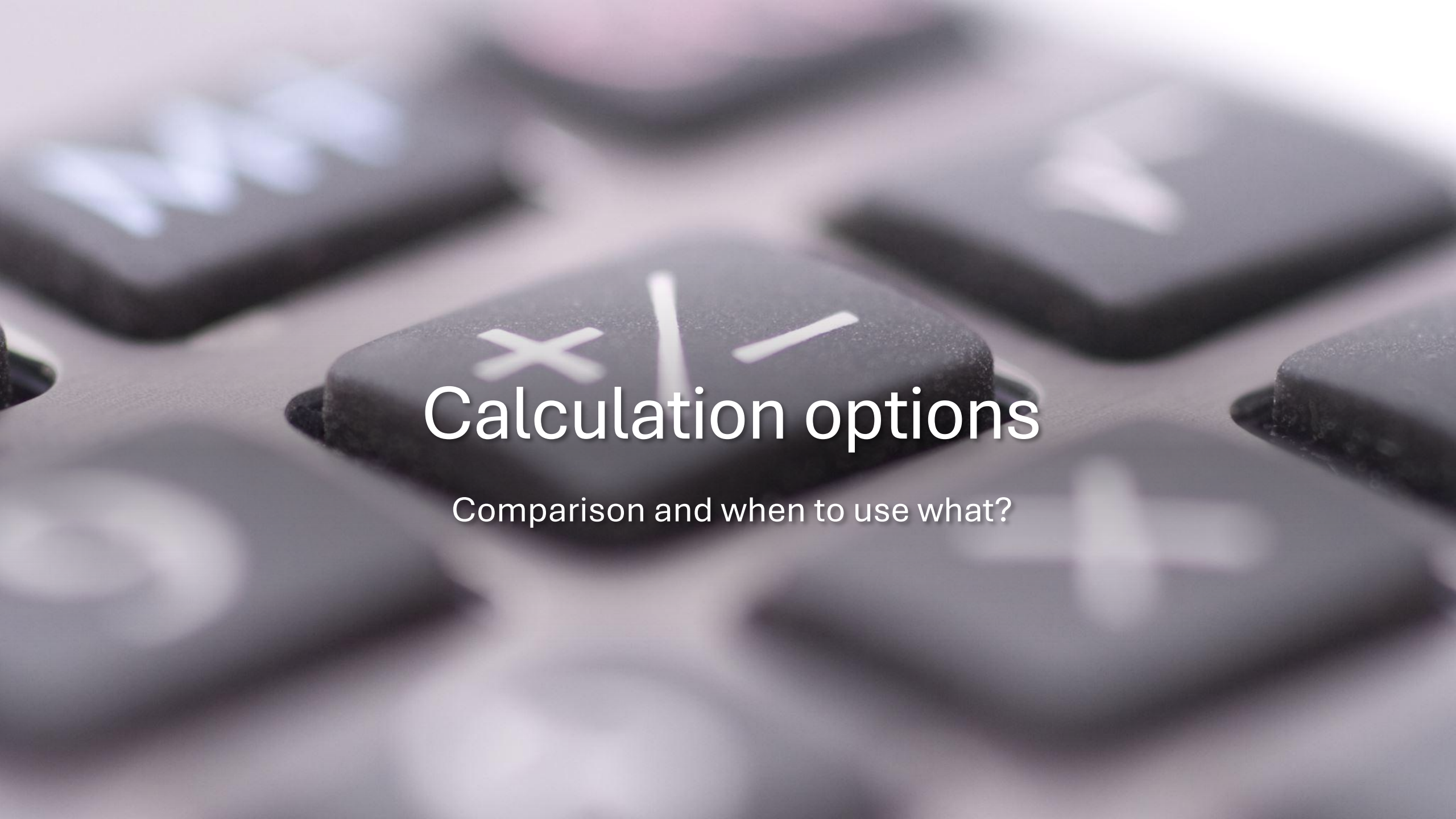


Better performance

- Work with pre-aggregated results

Demo

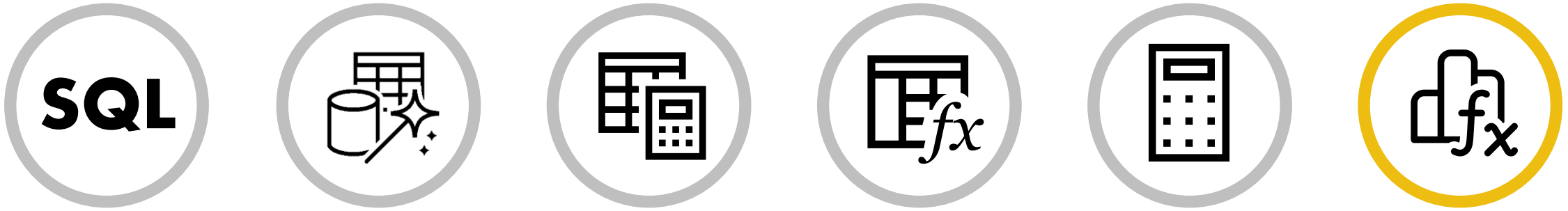
Visual Calculations



Calculation options

Comparison and when to use what?

What calculation options do we have?

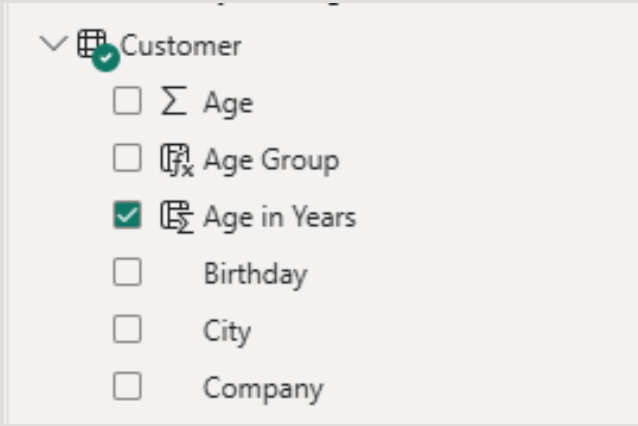


Which option fits in where?

Calculated Column

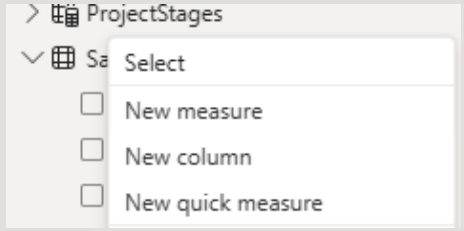
- To create a calculated column using a DAX formula, select the New column button from the Modeling tab.
- A calculated column:
  - Is useful for slicing or filtering a value, or for doing a calculation on every row in the table
  - Saves its result in the data model
  - Evaluates while reloading the data model, not while executing the query
  - Consumes **memory**! (increases model size)
  - Evaluates per row

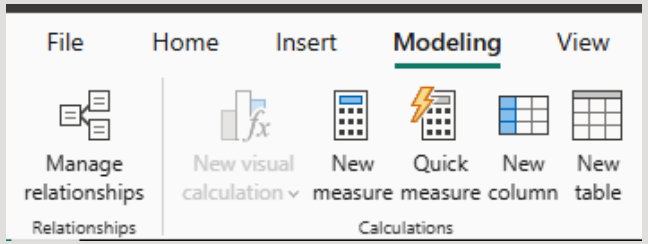
```
1 Age in Years =
2 DATEDIFF (
3     Customer[Birthday],
4     TODAY( ),
5     YEAR )
6
```

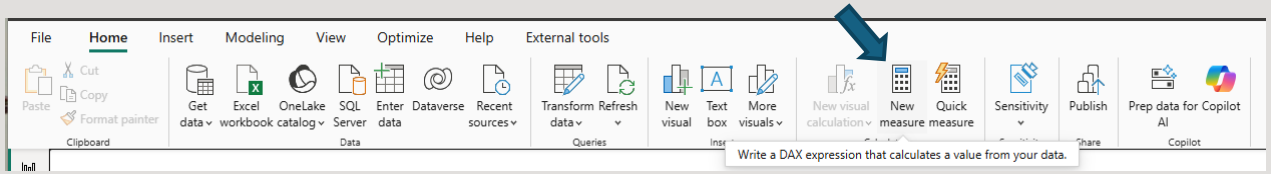


Measure

- To create a measure using a DAX formula, select the New measure button from the Modeling tab.
- A measure:
  - Aggregates a column
  - Evaluates a total, not row-per-row
  - Evaluates while executing the query
  - Costs **CPU-power** instead of memory
  - Always has one answer

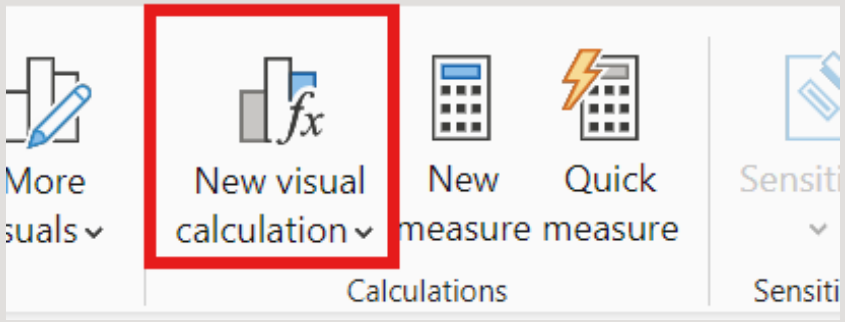


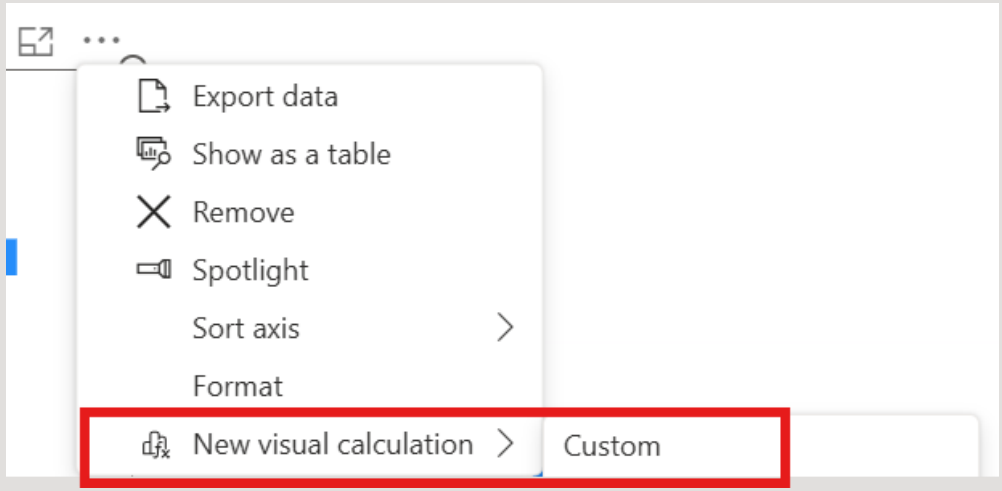




Visual Calculation

- To create a visual calculation, right-click a visual, use the visual context menu or the ribbon when the visual is selected
- A visual calculation:
  - Only works with data that is present in the visual
  - Can refer to the visual structure as well, instead of just referencing fields
  - Is dynamic and re-calculates based on cross-filtering / highlighting
  - Is saved in the visual definition





Comparison of calculation options



Aspect	Calculated columns	Measures	Visual calculations
Computed at	Data refresh	On demand	On demand
Persistence	Results saved	Calculated as required	Calculated as required
Context	Row	Filter	Visual
Stored in	Model	Model	Visual
Changes with user interaction in report	No	Yes	Yes
Usage	Slicers, filters, rows, columns	Calculations that return a single answer, values in visuals and visual level filters	Values in visuals and visual level filter

CASE 1

Requirement: I am responsible to build a semantic model which reflects all central KPIs for the finance department. This semantic model will be used for both central reporting and the finance team wants to build pivot tables in Excel as well.

How should I calculate the KPIs?

A: Measures

B: Calculated Columns

C: Visual Calculations

CASE 2

Requirement: I am developing a report where I am using a matrix visual, in this visual I want to apply conditional formatting to color the value red / orange / green based on the value. The condition is not straightforward based on the value but based on the percentage of grand total.

How should I define the logic for the conditional formatting?

A: Measures

B: Calculated Columns

C: Visual Calculations

When to use what

- Row-based and does not make sense to take a sum / average / … and result is not dynamic: **Calculated column**
- Reusable across reports, dynamic and recalculated based on slicing & dicing, and filter conditions: **Measure**
- Specific for one visual, conditional formatting, simplifying complex calculations like running sum: **Visual calculation**

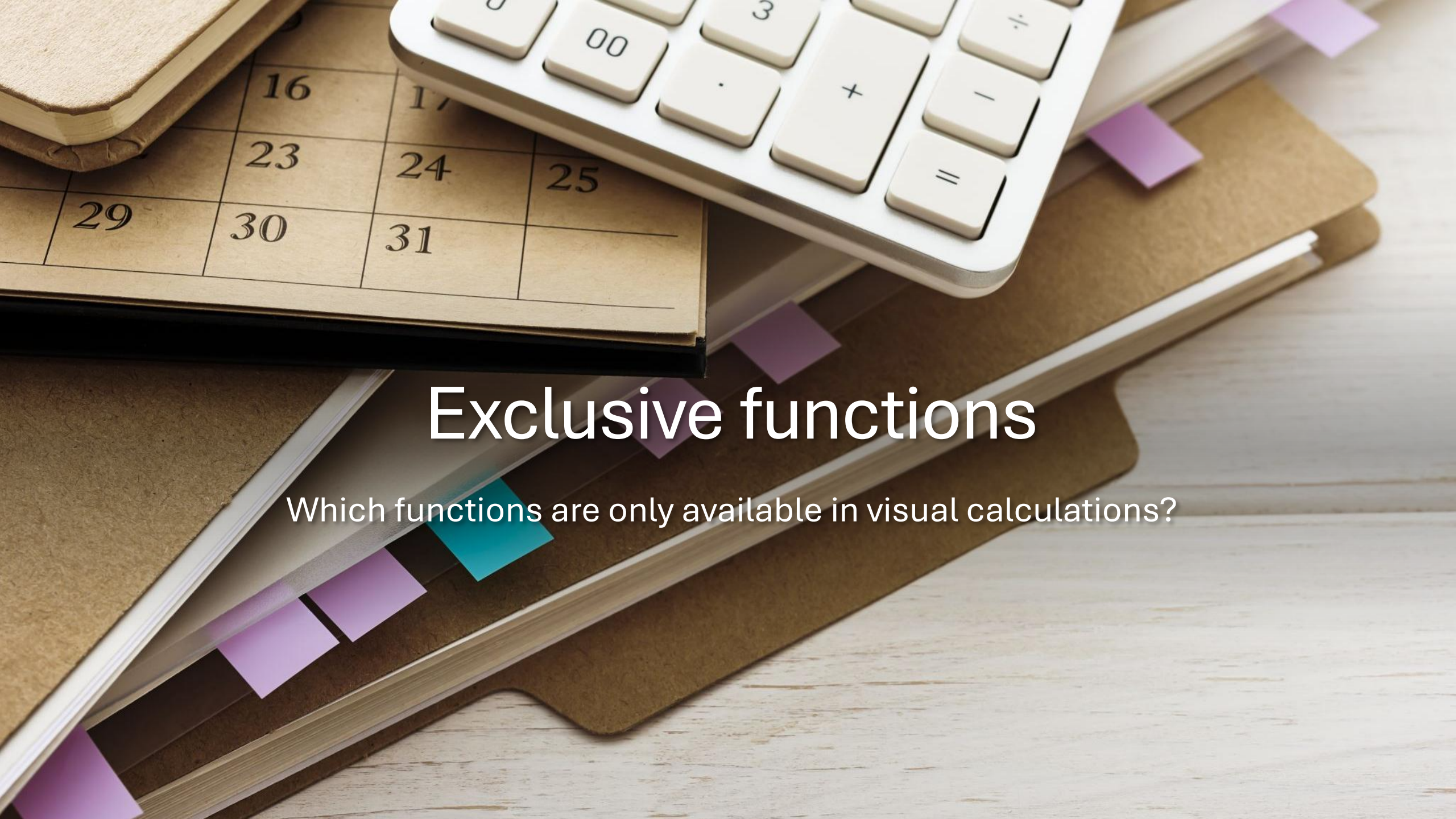
Conclusion for this section

When to use Visual Calculations

- Exploratory analytics
- Self-service BI scenarios
- Rapid prototyping
- Presentation-layer logic only

When not to use Visual Calculations

- Enterprise reusable KPIs
- Complex business logic
- Calculations needed across many reports
- Semantic model standardization



Exclusive functions

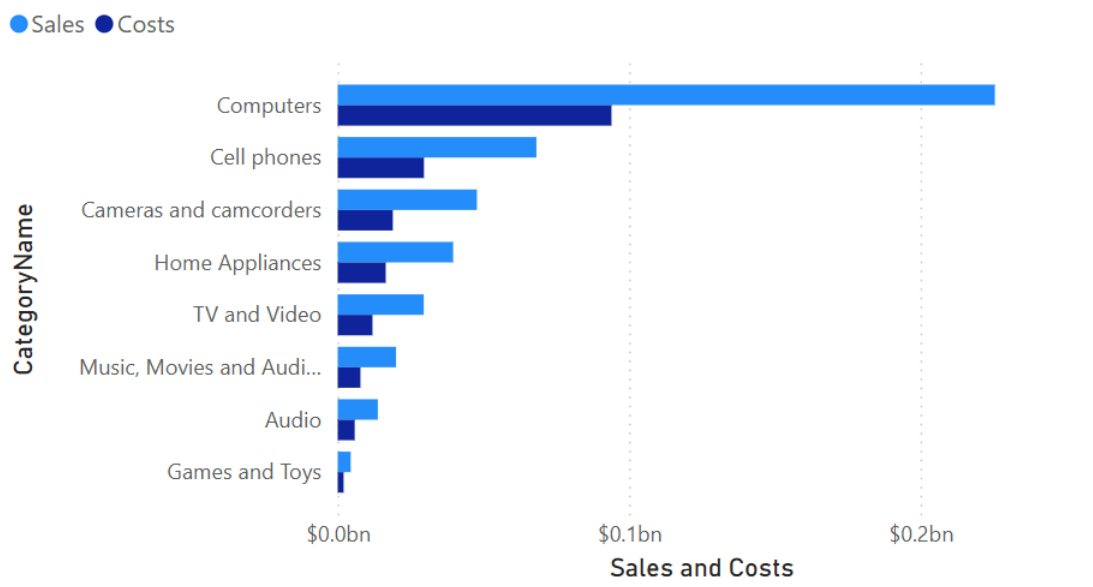
Which functions are only available in visual calculations?

Functions in DAX

- Functions in DAX are calculated in the context in which they are called
- Visual calculation are calculated in the “visible context”

From visual to visual calculation

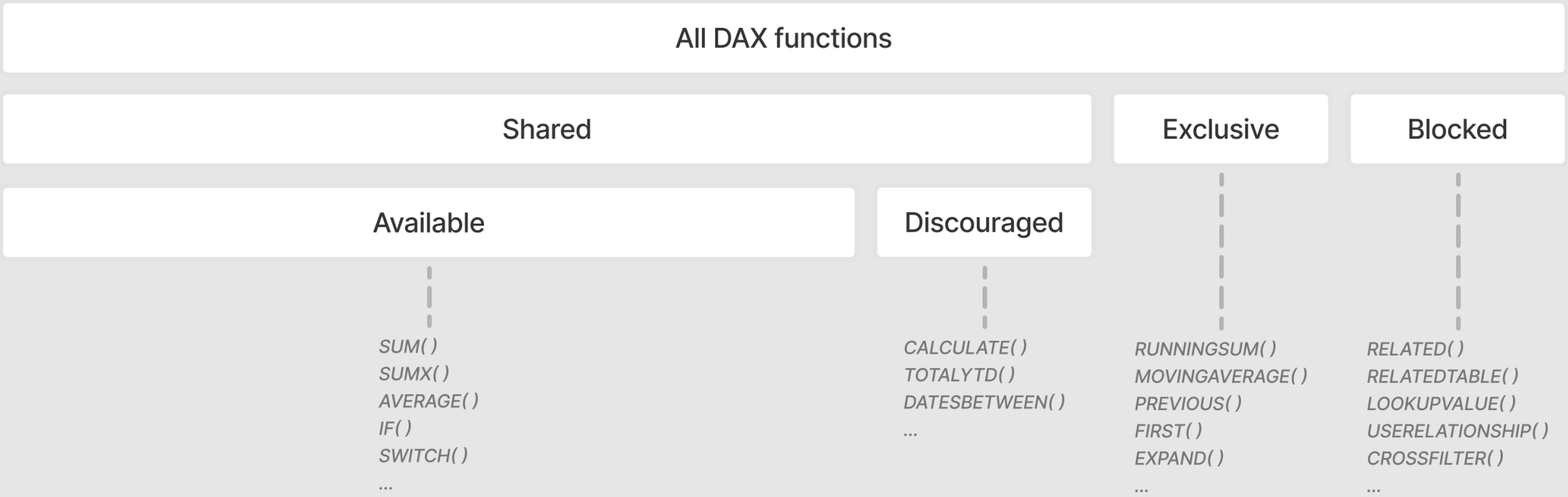
- Any visual can be represented as a matrix of data
- A visual calculation adds a column to that matrix
- A visual calculation can refer to any field / visual calculation on the visual
- A visual calculation can only calculate using the data in the visual matrix




```
1 Calculation =
```

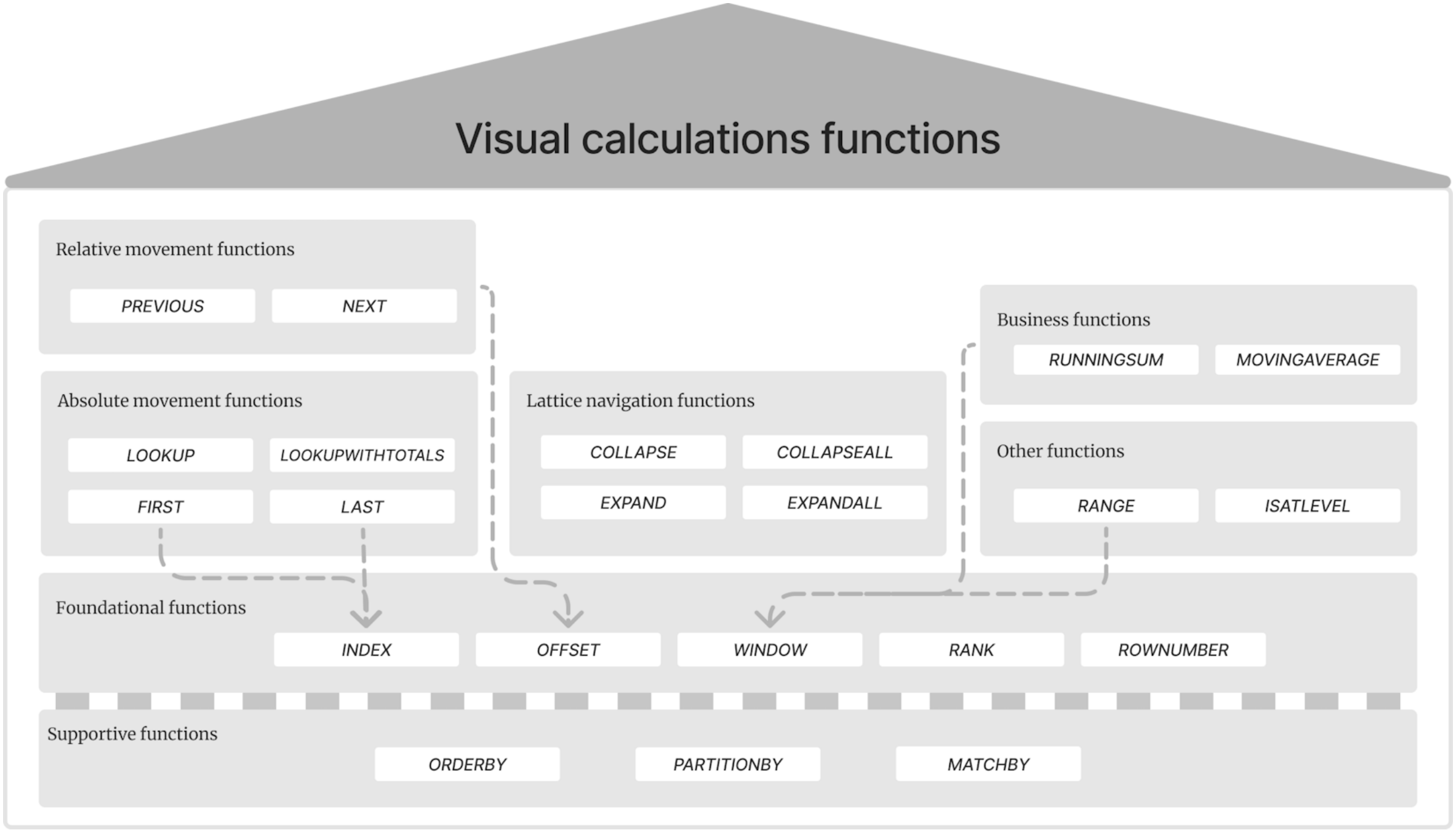
CategoryName	Sales	Costs	Calculation
Audio	$13,765,422.62	5,829,616.19	
Cameras and camcorders	$47,767,301.24	18,911,017.28	
Cell phones	$68,195,741.37	29,601,158.73	
Computers	$225,519,726.55	93,950,645.45	
Games and Toys	$4,452,061.96	2,013,339.74	
Home Appliances	$39,613,959.72	16,473,529.78	
Music, Movies and Audio Books	$20,022,708.59	7,796,987.04	
TV and Video	$29,526,412.37	11,933,364.18	
Total	**$448,863,334.43**	**186,509,658.40**	

Breakdown of DAX Functions for Visual Calculations



Applies to: ✗ Calculated column ✗ Calculated table ✗ Measure ✓ Visual calculation

Visual calculations functions



Madzy Stikkelorum & Marc Lelijveld

CASE 1

Requirement: I have a column chart visual that shows the sales per month, but I want to view the year-to-date sales instead in just this visual.

Which function should I use?

A: TOTALYTD

B: CALCULATE with DATESBETWEEN

C: RUNNINGSUM

CASE 2

Requirement: I have a table visual that shows sales per country, and a visual calculation that subtracts $100M for each country, these are the fixed costs. The current total for this column is also calculated as such (total sales minus $100M), but I want a custom total for this table that shows me the sales minus $100M times all the countries shown instead.

Which function should I use?

A: ISATLEVEL

B: SWITCH / IF

C: EXPAND

CASE 3

Requirement: I have a matrix visual that shows sales per month and per country, and I want to compare each of the values with the reference value of March for the Netherlands. I want to show the percentual difference to this reference value.

Which function should I use?

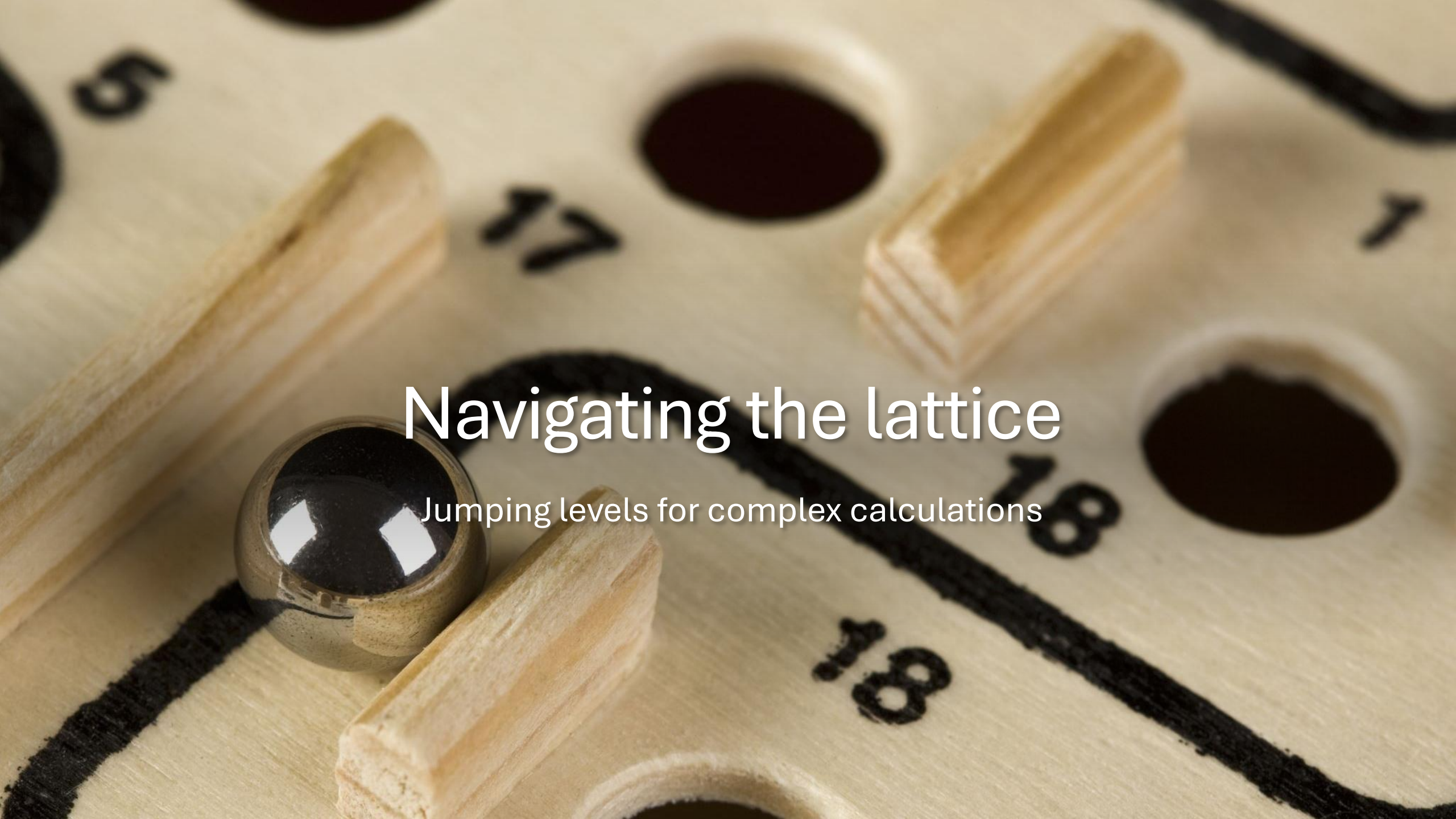
A: COLLAPSE

B: LOOKUPWITHTOTALS

C: CALCULATE

Demo

Exclusive functions

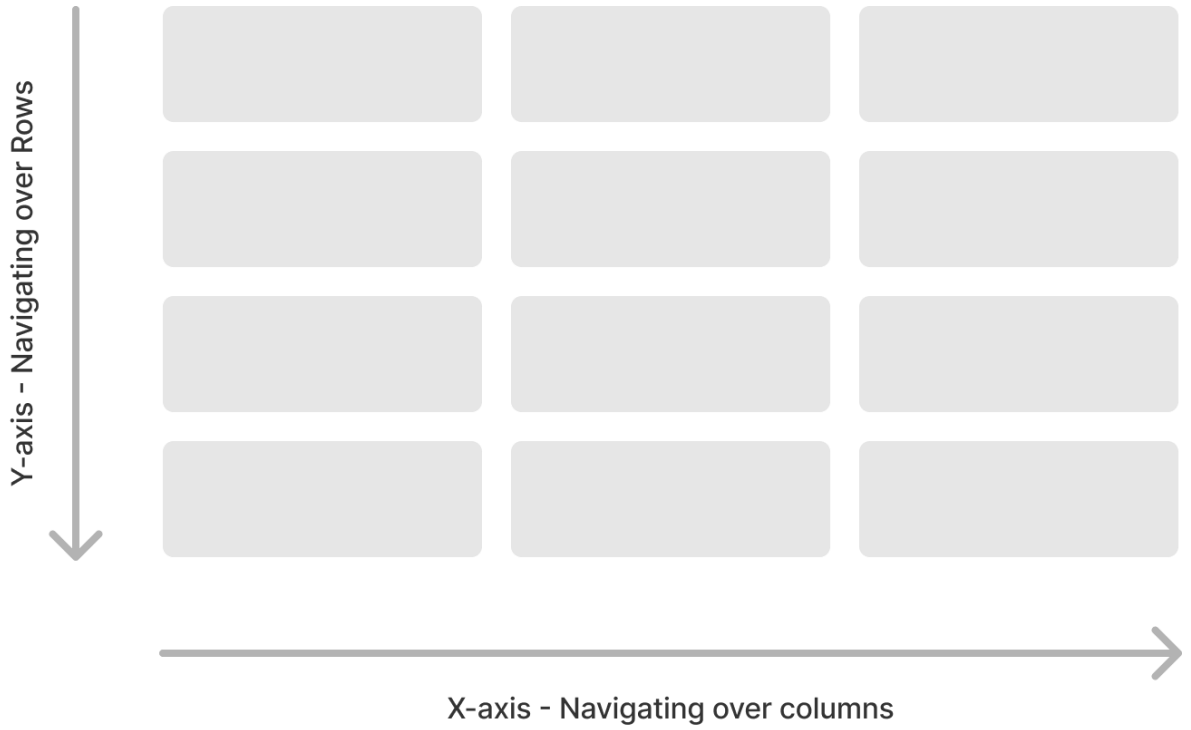


Navigating the lattice

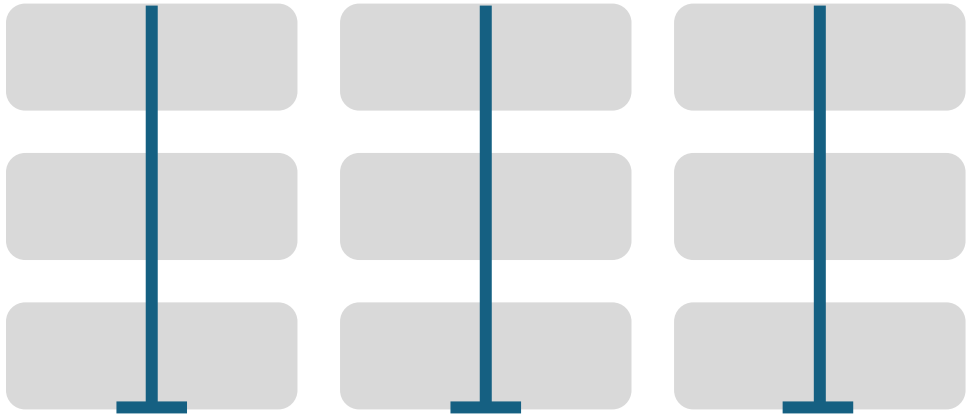
Jumping levels for complex calculations

Understanding the *axis* parameter

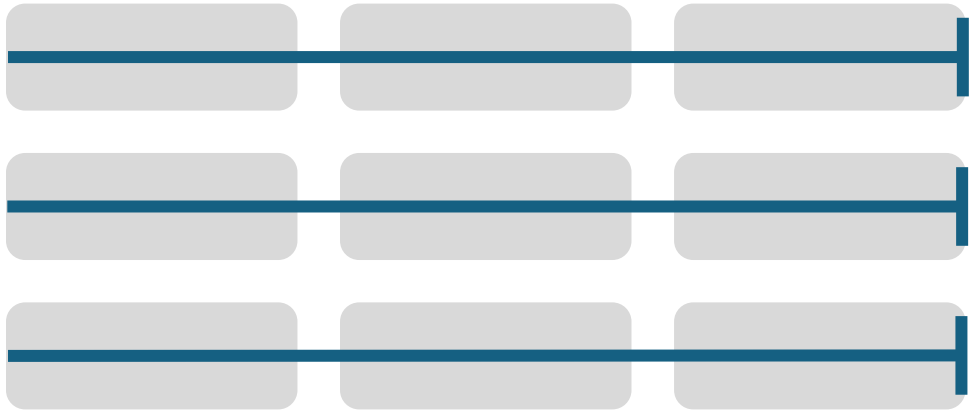
- Some functions come with an axis parameter
- Defines the direction or dimension along which the calculation operates inside a visual
- Typically used for functions like:
  - Running totals
  - Comparisons
  - Ranking
  - Window-style calculations



Simplest applications of axis

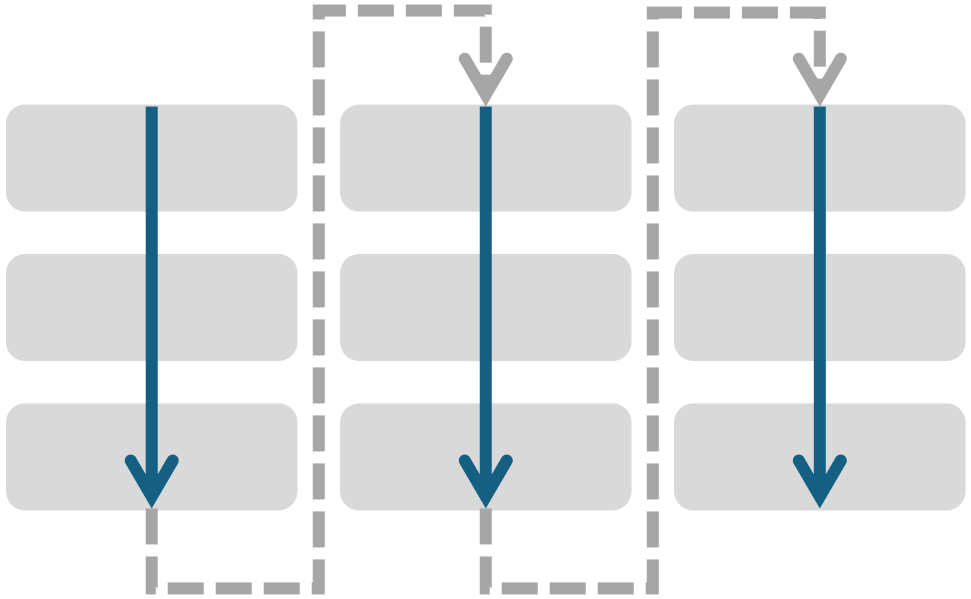


Rows

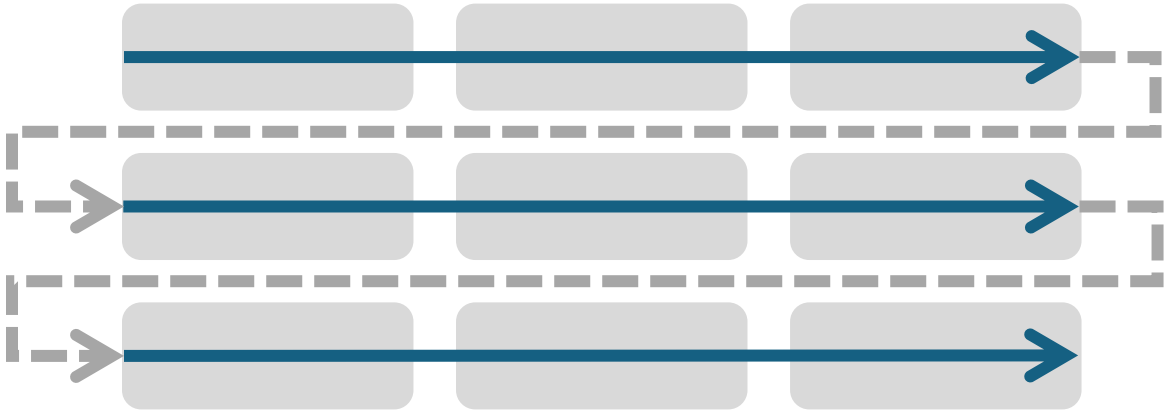


Columns

More complex applications of axis



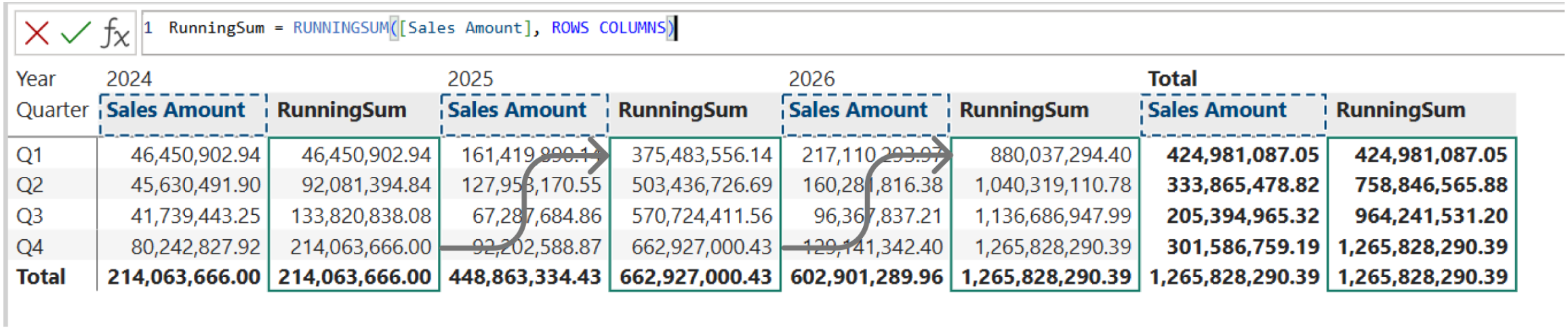
Rows Columns



Columns Rows

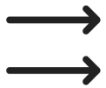
Practical example

RUNNINGSUM across multiple years:



Year	2024		2025		2026		Total	
Quarter	Sales Amount	RunningSum	Sales Amount	RunningSum	Sales Amount	RunningSum	Sales Amount	RunningSum
Q1	46,450,902.94	46,450,902.94	161,419,890.14	375,483,556.14	217,110,293.97	880,037,294.40	**424,981,087.05**	**424,981,087.05**
Q2	45,630,491.90	92,081,394.84	127,953,170.55	503,436,726.69	160,281,816.38	1,040,319,110.78	**333,865,478.82**	**758,846,565.88**
Q3	41,739,443.25	133,820,838.08	67,287,684.86	570,724,411.56	96,367,837.21	1,136,686,947.99	**205,394,965.32**	**964,241,531.20**
Q4	80,242,827.92	214,063,666.00	92,202,588.87	662,927,000.43	129,141,342.40	1,265,828,290.39	**301,586,759.19**	**1,265,828,290.39**
Total	**214,063,666.00**	**214,063,666.00**	**448,863,334.43**	**662,927,000.43**	**602,901,289.96**	**1,265,828,290.39**	**1,265,828,290.39**	**1,265,828,290.39**

Axis parameter summary

Icon	Axis name	Description
	ROWS	Calculates vertically across rows from top to bottom.
	COLUMNS	Calculates horizontally across columns from left to right.
	ROWS COLUMNS	Calculates vertically across rows from top to bottom, continuing column by column from left to right.
	COLUMNS ROWS	Calculates horizontally across columns from left to right, continuing row by row from top to bottom.

How does axis relate to the lattice?

Some visual calculation exclusive functions rely on a mandatory axis parameter

Lattice navigation functions:

- COLLAPSE
- COLLAPSEALL
- EXPAND
- EXPANDALL

These functions can be used to move relatively and absolute across the lattice.

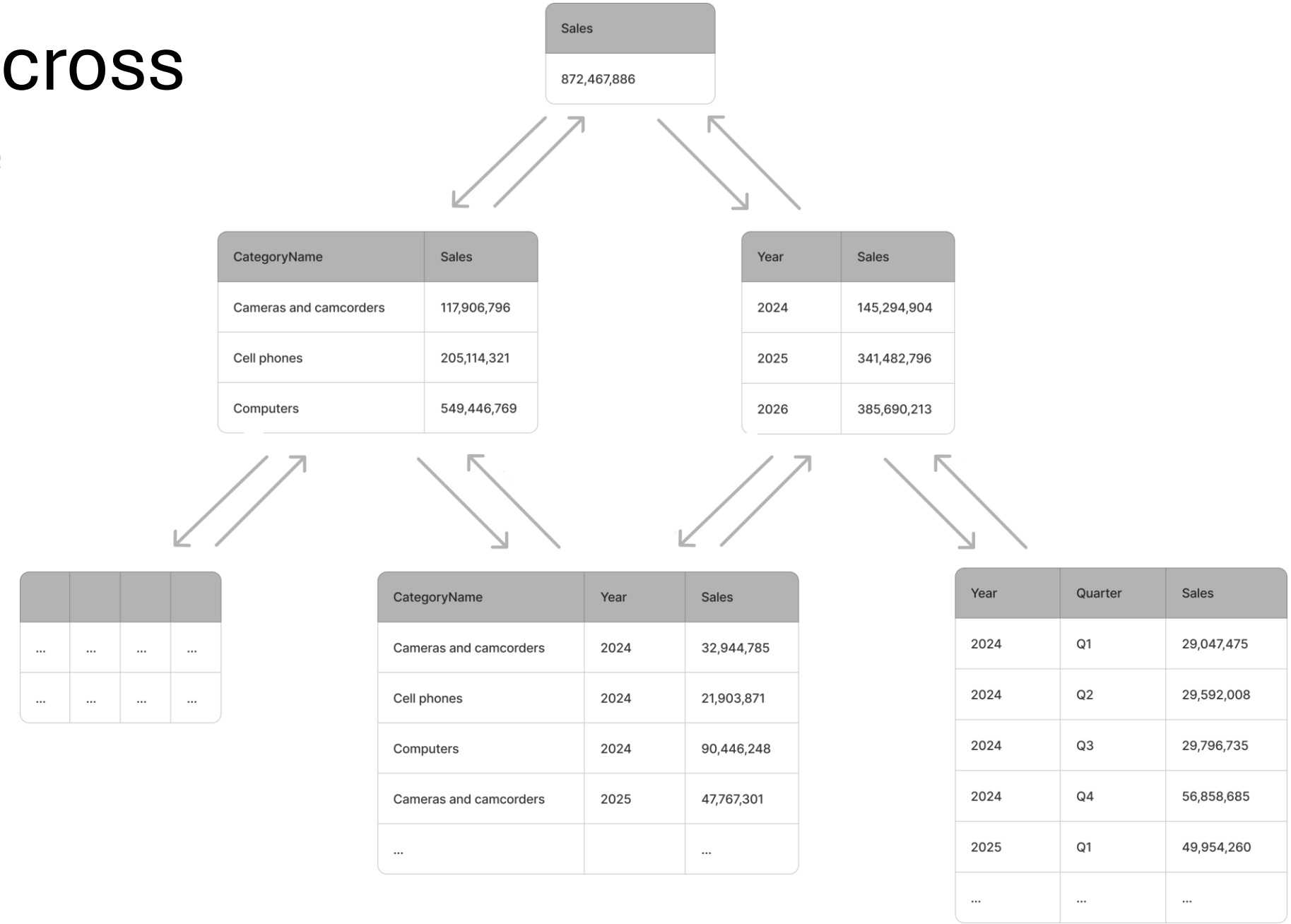
Understanding the lattice

- The lattice is formed by all the fields on all the axes.
- Lattice navigation functions can be used to create calculations on different levels of the lattice (hierarchy).

CategoryName	SubcategoryName	Year	Quarter	Sales
Cameras and camcorders	Camcorders	2024	Q1	6,556,128
Cameras and camcorders	Camcorders	2024	Q2	4,110,669
...	...	...	...	...
Cameras and camcorders	Digital SLR cameras	2025	Q1	8,906,966
...	...	...	...	...
Cell phones	Cell phones accessoires	2024	Q1	68,541
...	...	...	...	...

The lattice is formed as follows →
CategoryName / SubcategoryName / Year / Quarter

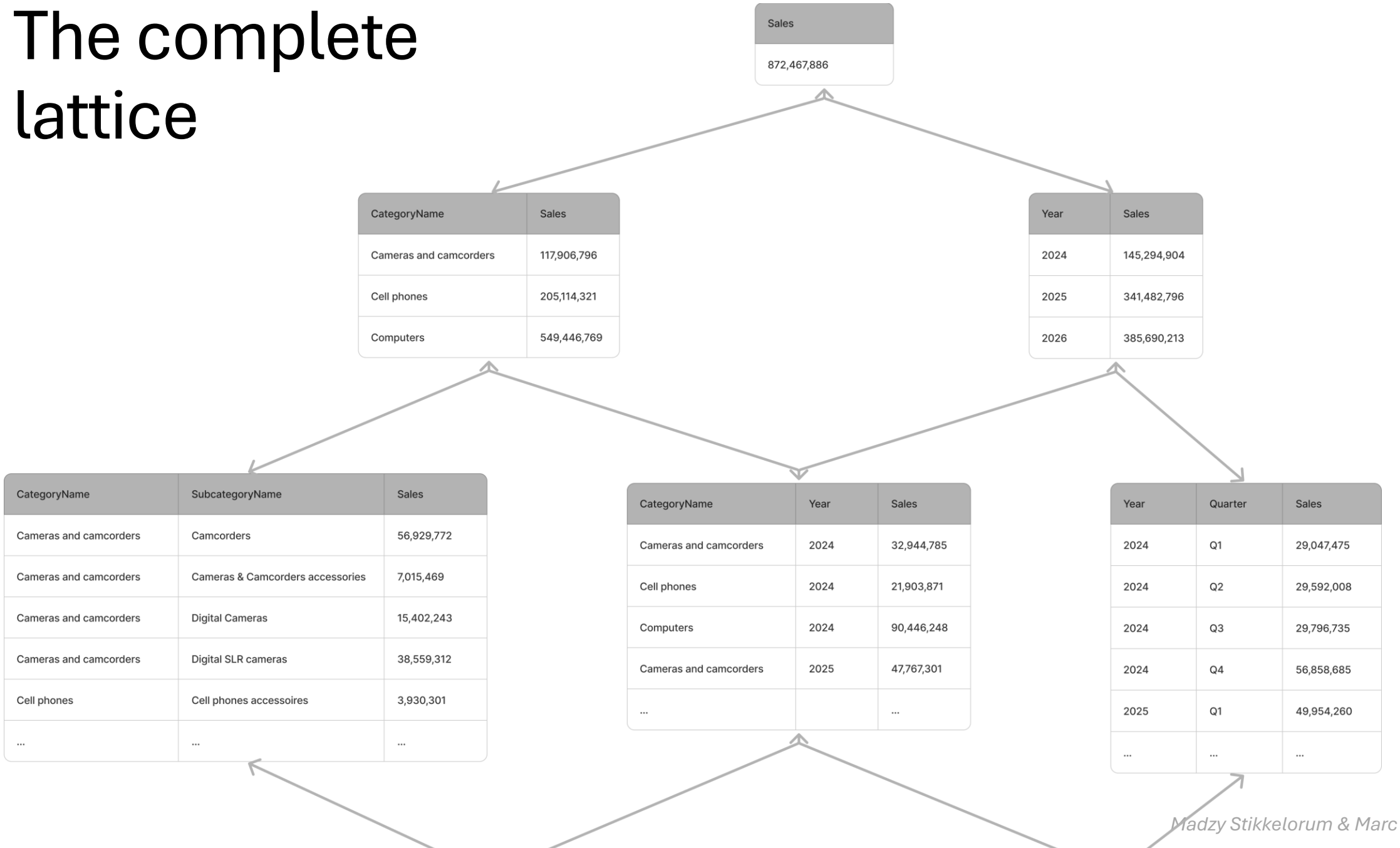
Jumping across the lattice



Demo

Lattice navigation functions

The complete lattice



Sales
872,467,886

CategoryName	Sales
Cameras and camcorders	117,906,796
Cell phones	205,114,321
Computers	549,446,769

Year	Sales
2024	145,294,904
2025	341,482,796
2026	385,690,213

CategoryName	SubcategoryName	Sales
Cameras and camcorders	Camcorders	56,929,772
Cameras and camcorders	Cameras & Camcorders accessories	7,015,469
Cameras and camcorders	Digital Cameras	15,402,243
Cameras and camcorders	Digital SLR cameras	38,559,312
Cell phones	Cell phones accessoires	3,930,301
...	...	...

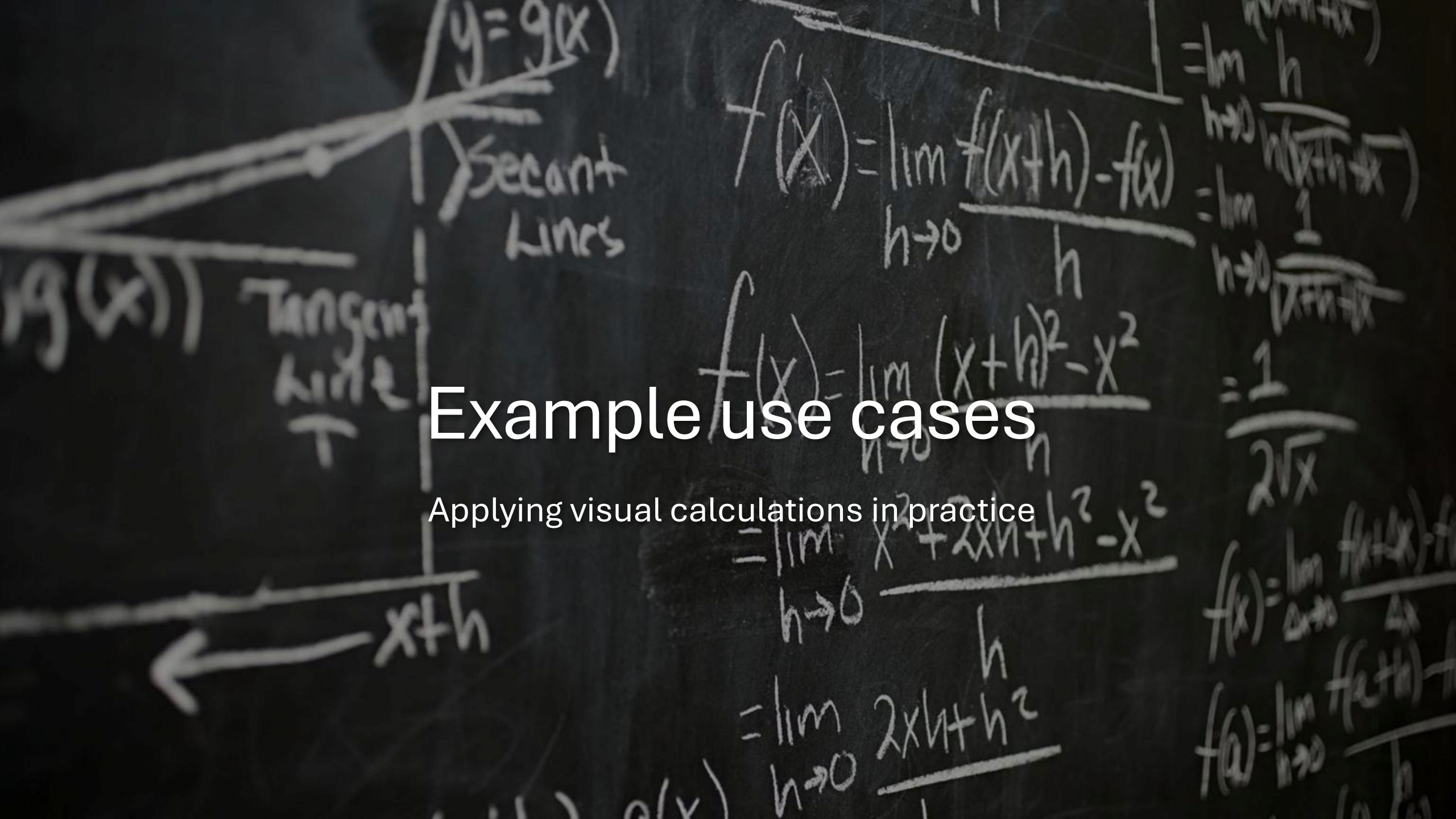
CategoryName	Year	Sales
Cameras and camcorders	2024	32,944,785
Cell phones	2024	21,903,871
Computers	2024	90,446,248
Cameras and camcorders	2025	47,767,301
...		...

Year	Quarter	Sales
2024	Q1	29,047,475
2024	Q2	29,592,008
2024	Q3	29,796,735
2024	Q4	56,858,685
2025	Q1	49,954,260
...	...	...

CategoryName	SubcategoryName	Year	Sales
Cameras and camcorders	Camcorders	2024	16,641,042
Cameras and camcorders	Camcorders	2025	24,302,960
Cameras and camcorders	Camcorders	2026	15,985,770
Cameras and camcorders	Digital SLR cameras	2024	2,110,990
Cell phones	Cell phones accessoires	2025	439,627
...	...	...	...

CategoryName	Year	Quarter	Sales
Cameras and camcorders	2024	Q1	13,103,481
Cell phones	2024	Q1	3,457,962
Computers	2024	Q1	12,486,032
Cameras and camcorders	2024	Q2	8,068,930
Cell phones	2025	Q2	4,192,581
...	...	...	...

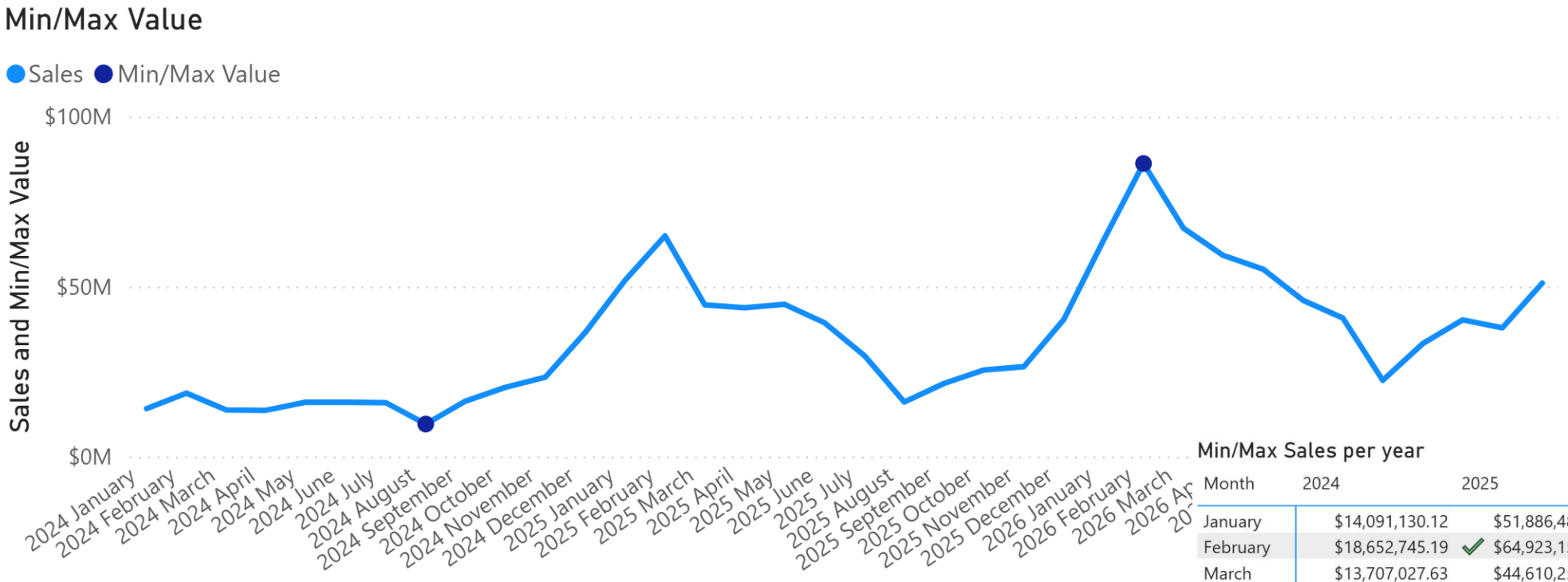
CategoryName	SubcategoryName	Year	Quarter	Sales
Cameras and camcorders	Camcorders	2024	Q1	6,556,128
Cameras and camcorders	Camcorders	2024	Q2	4,110,669
...	...	...	...	...
Cameras and camcorders	Digital SLR cameras	2025	Q1	8,906,966
...	...	...	...	...
Cell phones	Cell phones accessoires	2024	Q1	68,541
...	...	...	...	...



Example use cases

Applying visual calculations in practice

Highlighting minimum and maximum values



Min/Max Sales per year

Month	2024	2025	2026	Total
January	$14,091,130.12	$51,886,482.12	$63,672,376.76	**$129,649,988.99**
February	$18,652,745.19 ✓	$64,923,153.55 ✓	$86,214,246.78	**$169,790,145.52**
March	$13,707,027.63	$44,610,254.48	$67,223,670.43	**$125,540,952.54**
April	$13,617,953.40	$43,794,064.91	$59,185,328.15	**$116,597,346.46**
May	$16,025,489.67	$44,782,137.77	$55,118,198.36	**$115,925,825.79**
June	$15,987,048.83	$39,376,967.87	$45,978,289.87	**$101,342,306.57**
July	$15,846,857.82	$29,708,944.66	$40,754,203.12	**$86,310,005.60**
August	✗ $9,561,371.47	✗ $16,054,829.64	✗ $22,415,217.90	**$48,031,419.01**
September	$16,331,213.97	$21,523,910.57	$33,198,416.18	**$71,053,540.72**
October	$20,374,371.26	$25,471,590.22	$40,210,297.84	**$86,056,259.31**
November	$23,371,076.56	$26,442,100.96	$37,896,676.95	**$87,709,854.47**
December	✓ $36,497,380.10	$40,288,897.70	$51,034,367.61	**$127,820,645.41**
Total	**$214,063,666.00**	**$448,863,334.43**	**$602,901,289.96**	**$1,265,828,290.39**

Gantt Chart

ID	TaskName	StartDate	EndDate	Days	Timeline + Completion %
1	Project Kickoff	19/02/2026	19/02/2026	1	100%
2	Requirements Gathering	19/02/2026	01/03/2026	11	95%
3	Functional Specification	21/02/2026	08/03/2026	16	85%
4	Technical Specification	24/02/2026	14/03/2026	19	70%
5	Development	28/02/2026	20/03/2026	21	40%
6	Test	21/03/2026	04/04/2026	15	0%
7	Go-Live	05/04/2026	09/04/2026	5	0%


Wrap-up

Wrap up

- Visual calculations bring **DAX closer to the visual**, enabling faster and more intuitive analysis.
- They operate on **visible context**, making results easier to predict, validate, and explain.
- Visual calculations **complement** measures and calculated columns, each serving a distinct purpose in the model.
- **Exclusive functions** and **axis-based logic** unlock powerful patterns like running totals, rankings, and comparisons.
- **Lattice navigation** enables advanced calculations across hierarchy levels within a single visual.
- Best suited for **exploratory** analysis, rapid **prototyping**, and **presentation-layer logic -** not enterprise-wide KPIs.

Loved it? Learned something? Tell us!
Share your feedback in just 1 minute

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