The Use of Charts, Pivot Tables, and Array Formulas in Two Popular Spreadsheet Corpora

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95% US firms use spreadsheets for financial reporting

–Panko, 2008

90% of analysts use spreadsheets for their decisions

–Winston, 2001

Spreadsheet

Error

Fault

Information

Inaccurate?

Decision

Wrong?

Problem?

Spreadsheet Research

Testing

Code Smells

Reverse Engineering

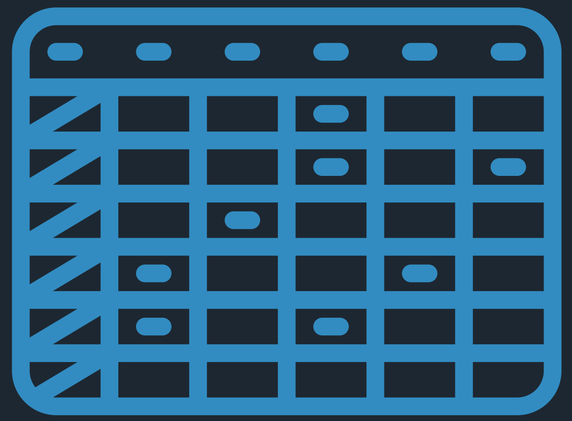
Refactoring

Spreadsheet Research

What about?

Charts

Pivot Tables



Array Formulas

Do the Future Work

B. Pivot tables, charts and VBA code

In this first detailed analysis of the Enron spreadsheets, we limited ourselves to metrics for size, coupling and use of functions. More elaborate constructs like Pivot tables, charts and VBA code could also have an impact on the complexity of spreadsheets. In future research, we plan to extend the current analysis with these constructs.

Our evaluations have shown that the resulting diagrams can be used for understanding a spreadsheet's design, to support re-implementing it and to ease the transfer of a spreadsheet from one employee to another. In the current implementation, however, some design elements are not covered: such as pivot tables, VBA code and array formulas.

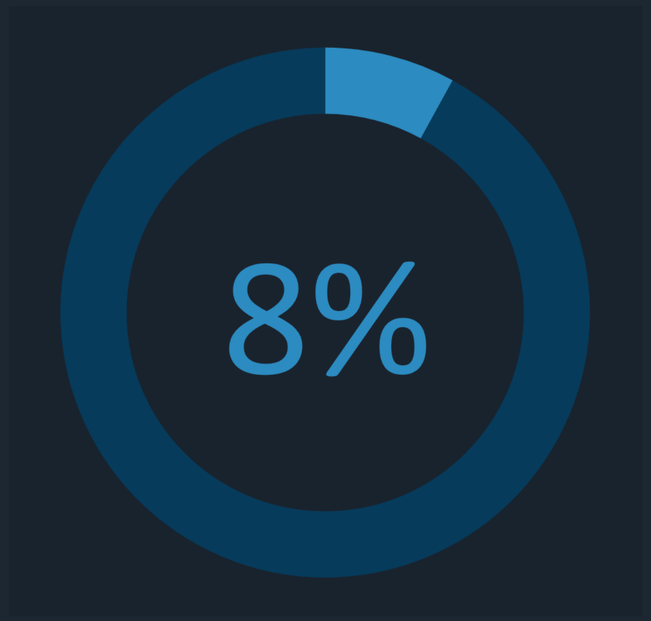
In our analysis, we limited ourselves to the described smells and metrics. However the improvements that were made by F1F9 could also affect the use of more elaborate structures like Pivot tables, charts and VBA code. In future research, we plan to specifically analyze these constructs.

pivot tables, charts, and VBA code. In future research, will shift our focus to these components.

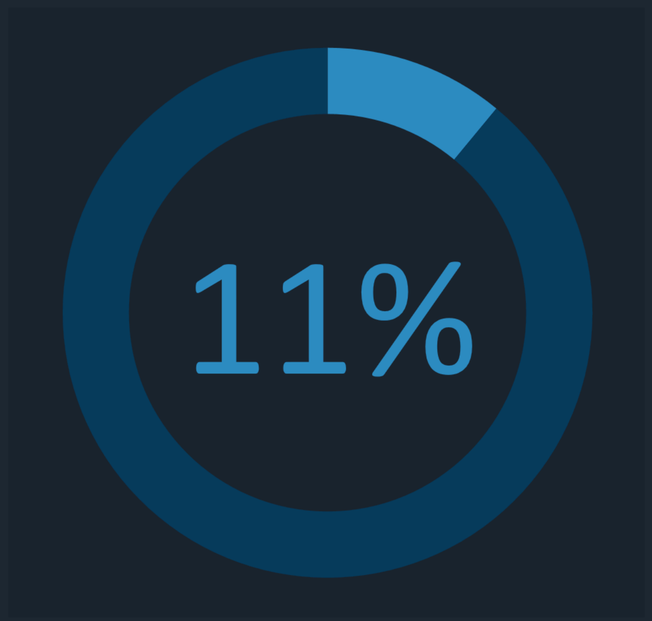
1) Array formulas: We use GemBox [4], a third-party library to process spreadsheets, which unfortunately does not support reading of array formulas [5]. Hence, we currently cannot detect smelly lookups used within array formulas. Therefore the analysis in the paper does not take formulas into account that use a lookup inside an array formulas.

Charts

Spreadsheets With Charts



EUSES



Enron

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The EUSES Spreadsheet Corpus: A Shared Resource for Supporting Experimentation with Spreadsheet Dependability Mechanisms

TABLE I
NUMBER OF SPREADSHEETS WITH AND WITHOUT CHARTS

	EUSES	%	Enron	%
Charts	340	8%	1,721	11%
No Charts	4,133	92%	14,078	89%
Total	4,473	100%	15,799	100%

	Charts	Macros
With	105	126
Without	4393	4372

Table 7: Number of spreadsheets with and without Charts and Macros

TABLE II
THE USE OF CHART SHEETS VS EMBEDDED CHARTS

	EUSES		Enron	
Type	# Charts	%	# Charts	%
Sheet	355	25%	1,149	13%
Embedded	1,090	75%	7,686	87%
Total	1,445	100%	8,835	100%

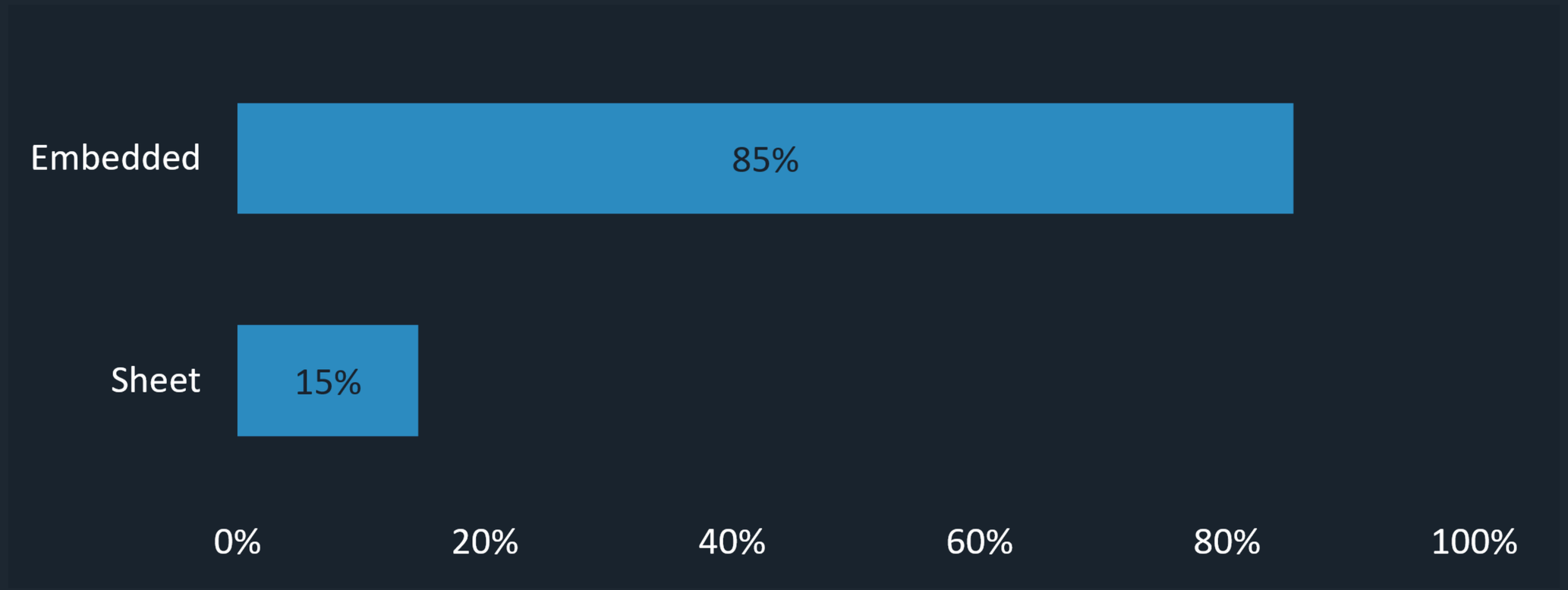
assumed to include macros. To detect charts (Measure 13) in s, `ProcessSheets` looks at $s.Charts\ .Count$, and if greater than 0, s is assumed to include charts.

Workbook.Charts Property (Excel)

06/08/2017 • 2 minutes to read • Contributors

Returns a Sheets collection that represents all the chart sheets in the specified workbook.

Chart Sheets vs Embedded Charts



Grouping of Chart Types

Column

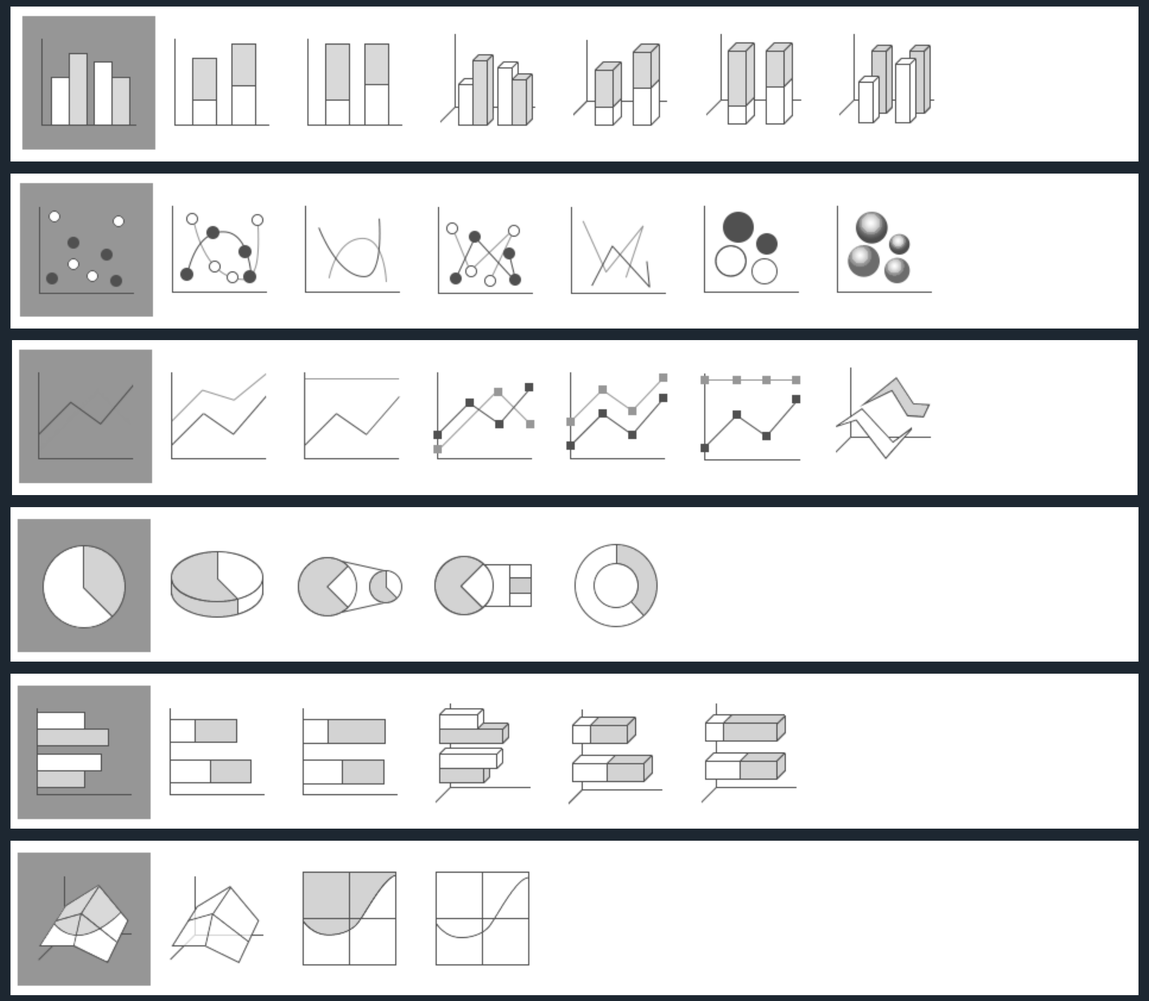
Scatter

Line

Pie

Bar

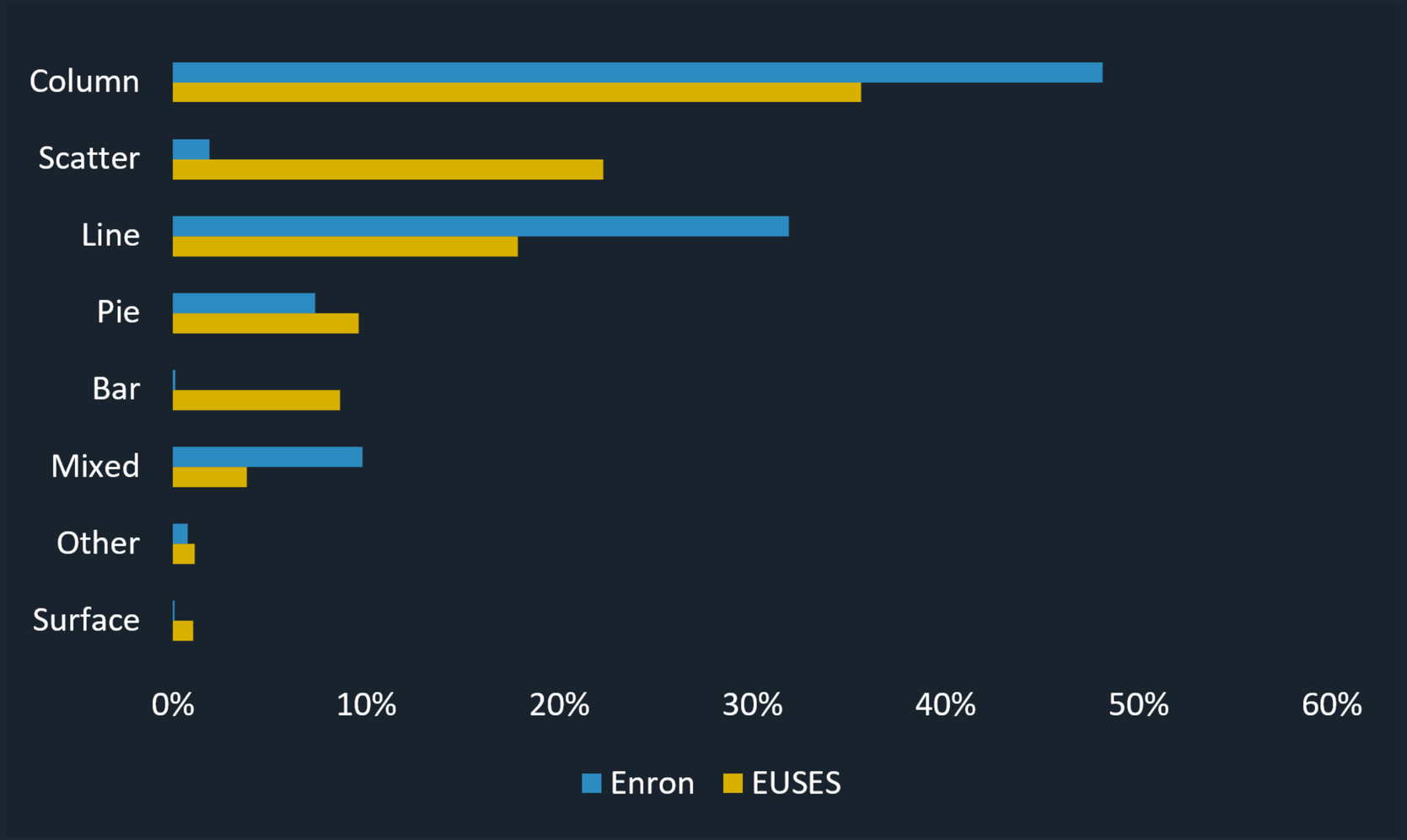
Surface



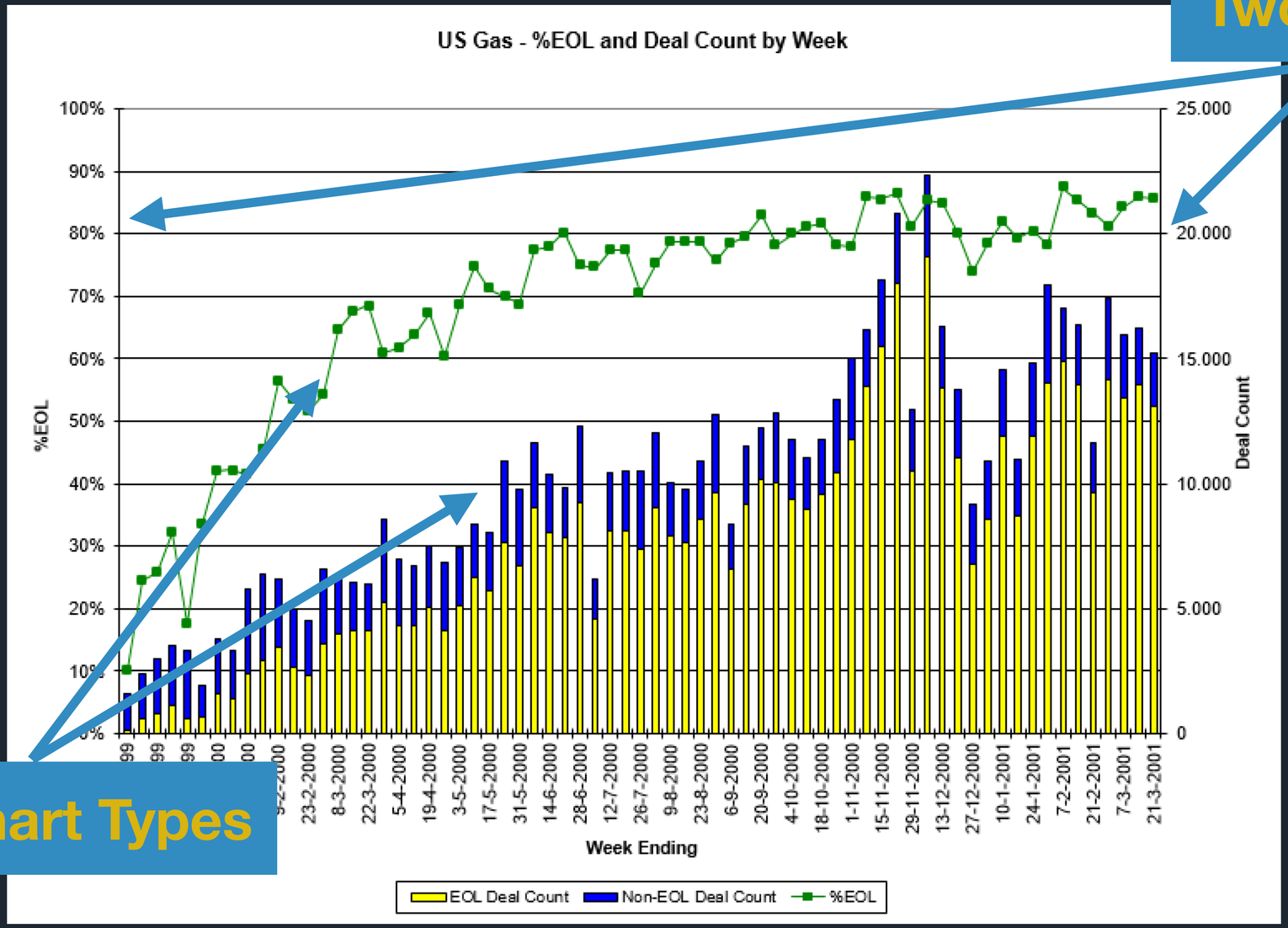
Save the Pie for Desert

https://www.perceptualedge.com/articles/visual_business_intelligence/save_the_pies_for_dessert.pdf

Chart Types Used



Mixed Chart Type

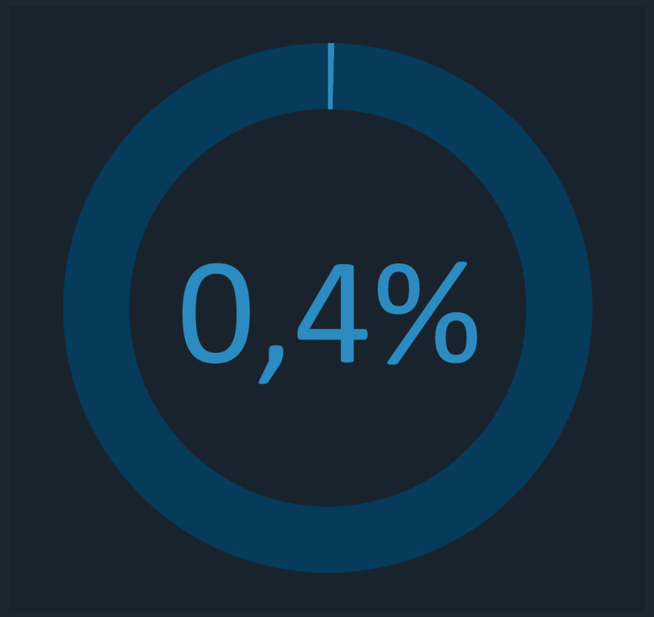


Charts: Problems

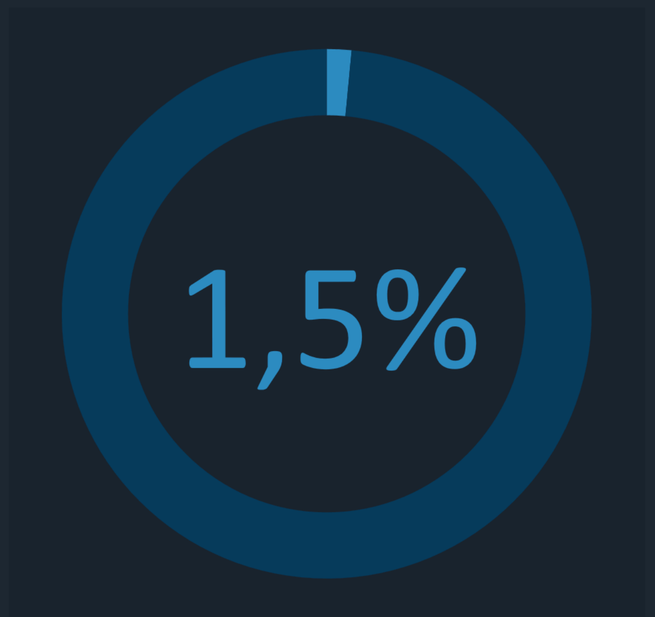
- Wrong Axes
- Wrong Visualization
- Data ranges

Pivot Tables

Spreadsheets With Pivot Tables

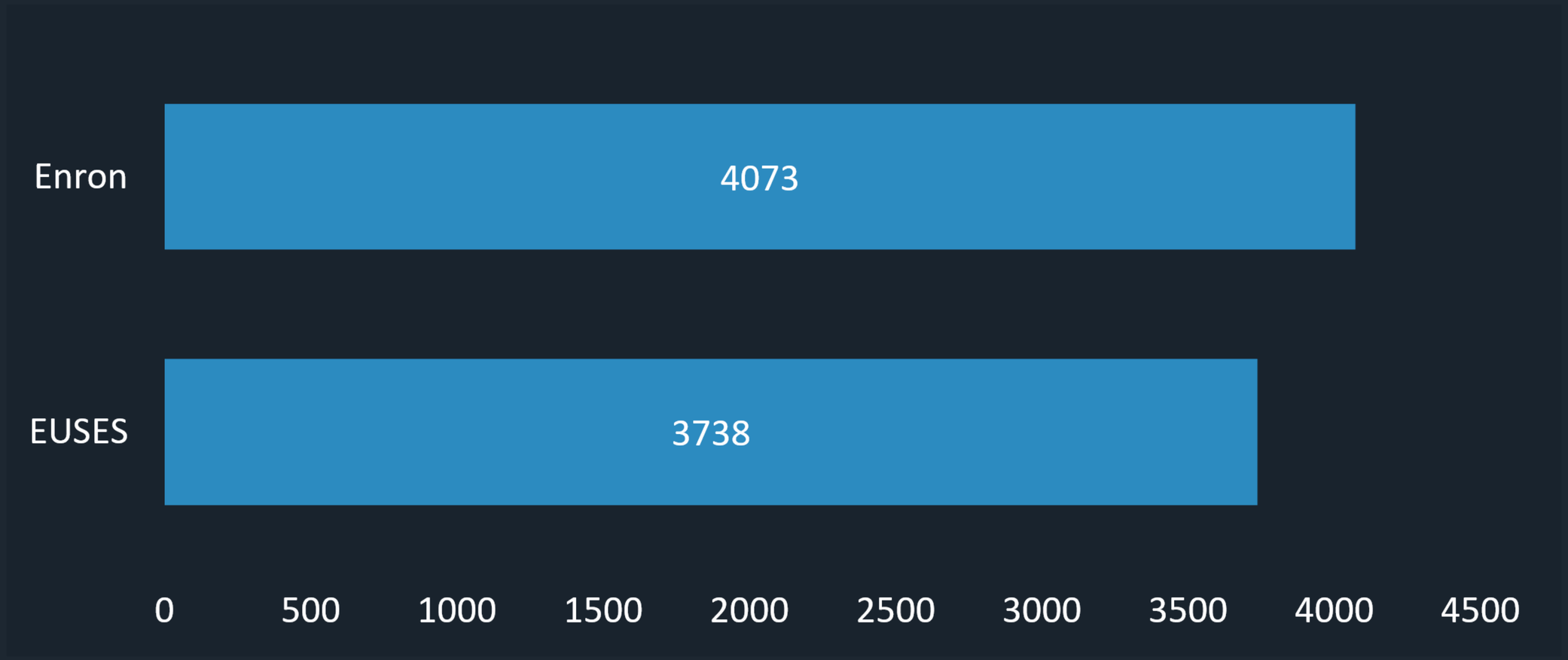


EUSES

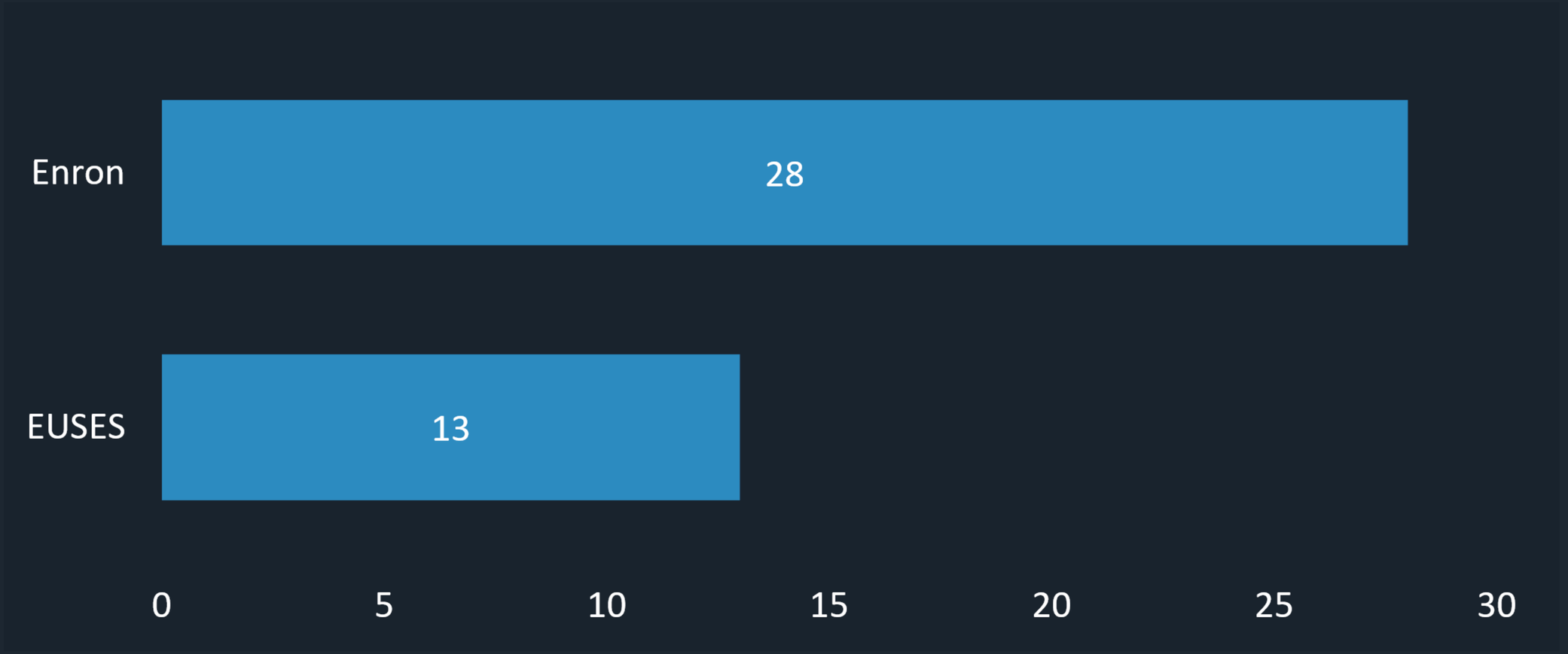


Enron

Pivot Tables: # of Records

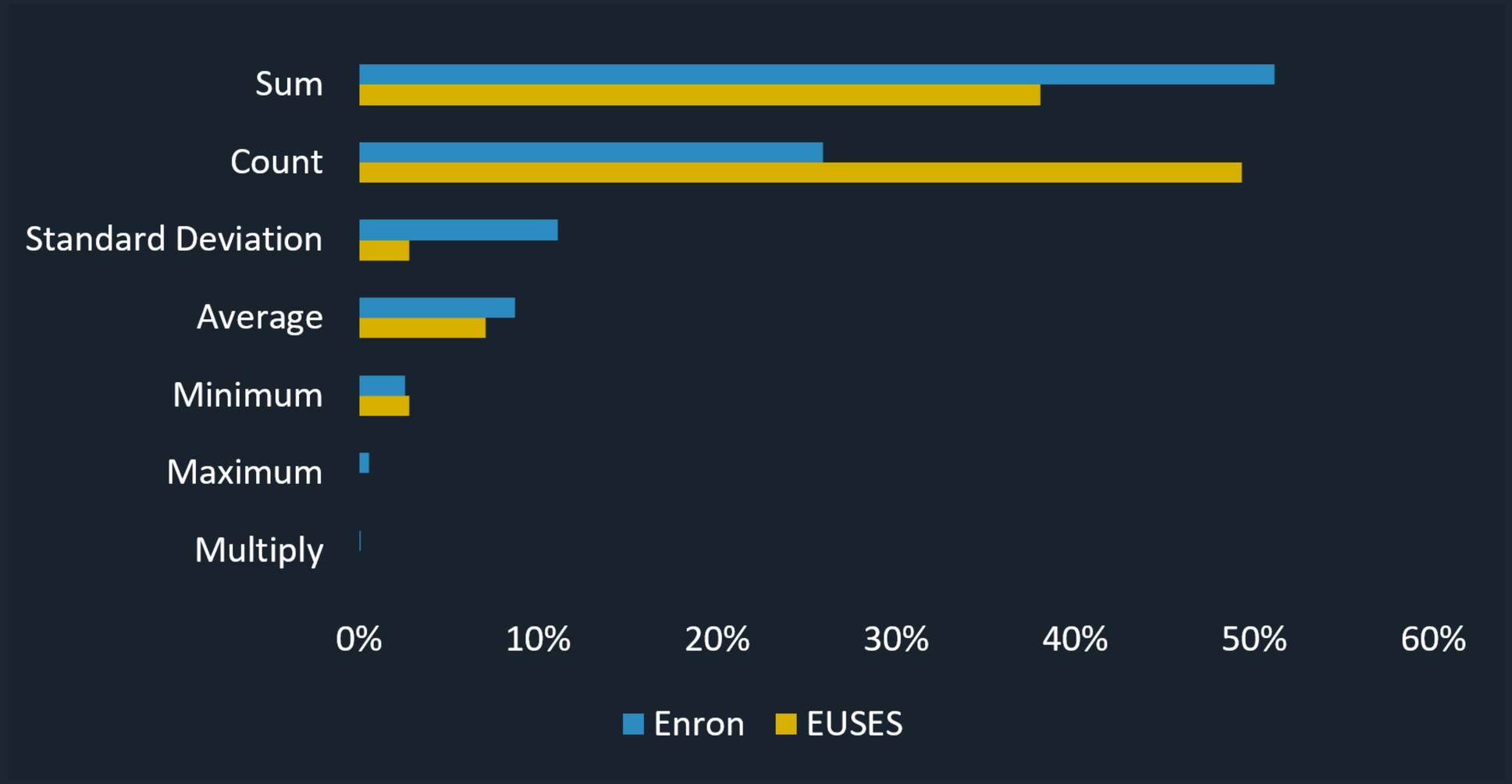


Pivot Tables: # of Fields



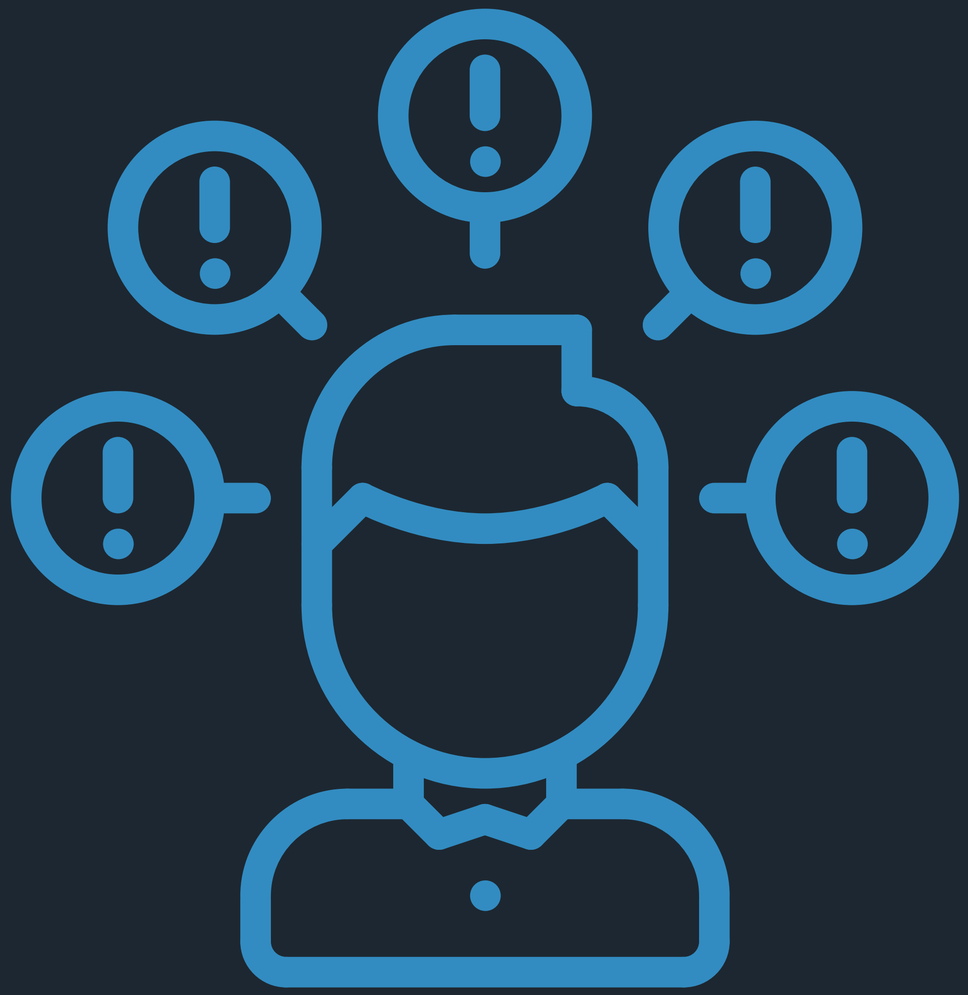
Calculated fields and items are not used

Aggregation Functions Used

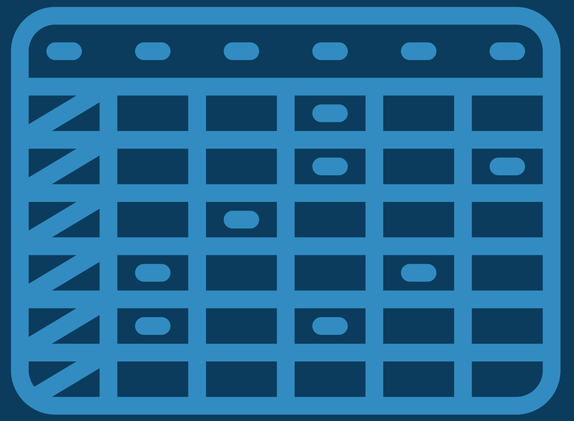


Pivot Tables: Problems

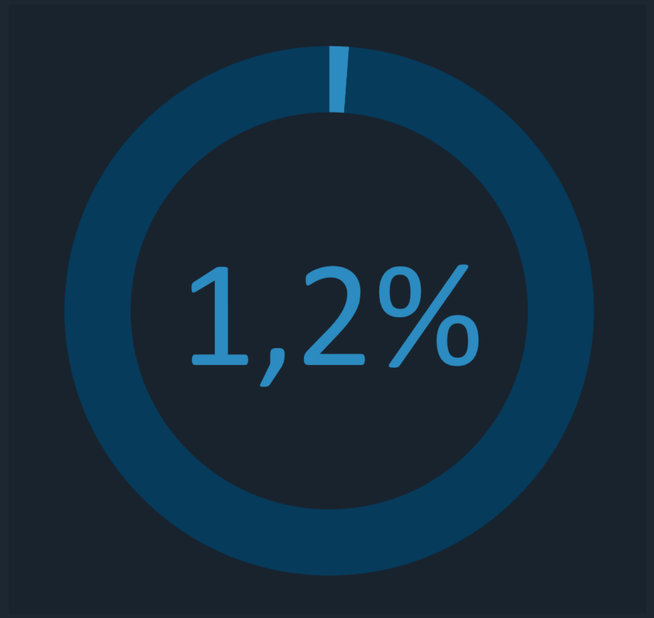
- No Automatic Refresh



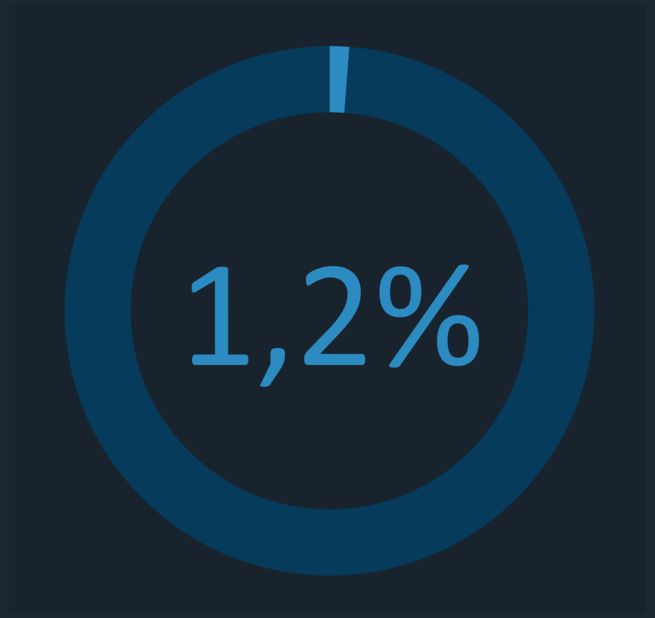
Array Formulas



Spreadsheets With Array Formulas

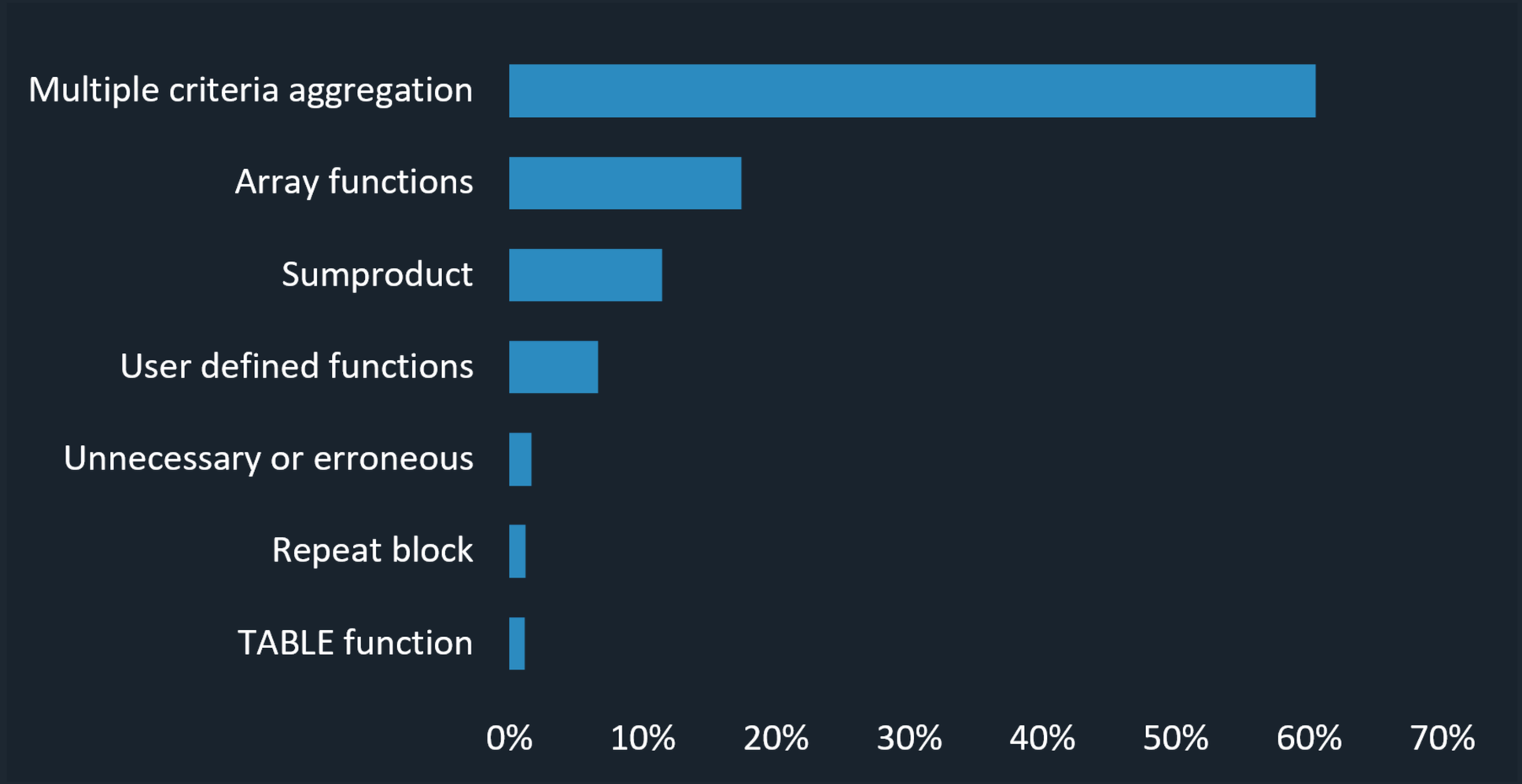


EUSES



Enron

Use Cases for Array Formulas



Array Formulas: Problems

- Difficult to Understand
- Difficult to Edit

Spreadsheet Error Fault

Information Inaccurate?

Decision Wrong? Problem?

Spreadsheet Research

fx

What about?

Charts

Pivot Tables

Array Formulas

?

Spreadsheets With Charts

8% EUSES

11% Enron

Spreadsheets With Pivot Tables

0,4% EUSES

1,5% Enron

Spreadsheets With Array Formulas

1,2% EUSES

1,2% Enron