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HEALTHCARE CONSULTING

DATA ANALYTICS: THE PAST, CURRENT TOOLS AND APPLICATIONS IN HEALTHCARE FINANCE

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INTRODUCTION

- Texas A&M (Undergrad) and Appalachian State (MBA)
- Past president of Maryland HFMA
- Programmer since late 1970s.
- Multiple decades in healthcare finance, mostly in hospitals.
- SQL user since mid-2000s.
- Designed multiple Tableau dashboards for prior employer.
- More recent Python user.

AGENDA

- History – How far we have come!
- First Experiences – Healthcare Data Analytics
- Current Tools
- How to use those tools (cases)

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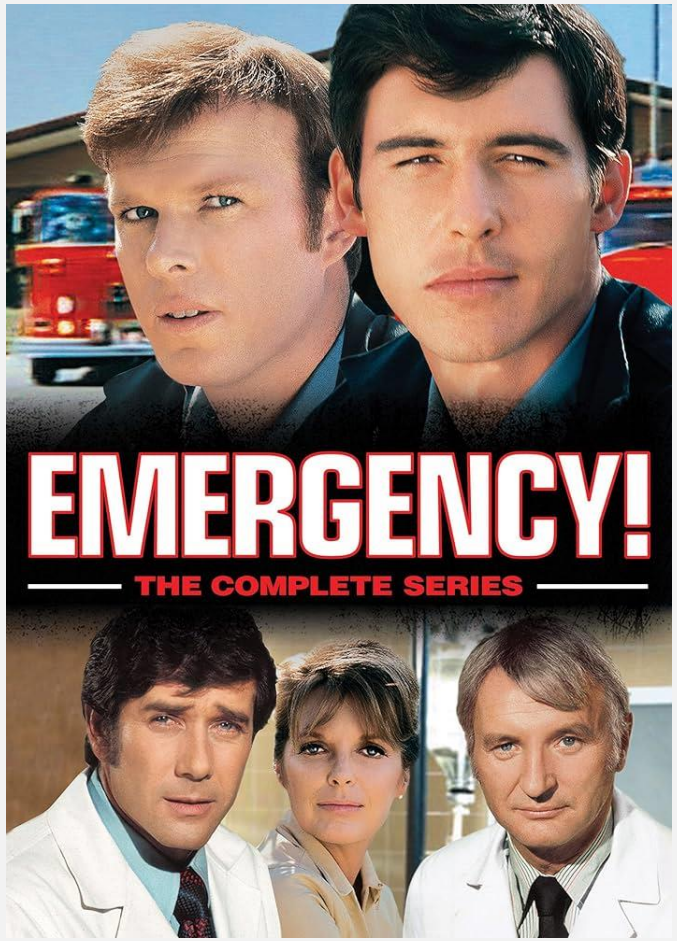
HISTORY: HOW FAR WE'VE COME

SEARCHING MEDICAL RECORDS – 1970S



YOUR OWN PC

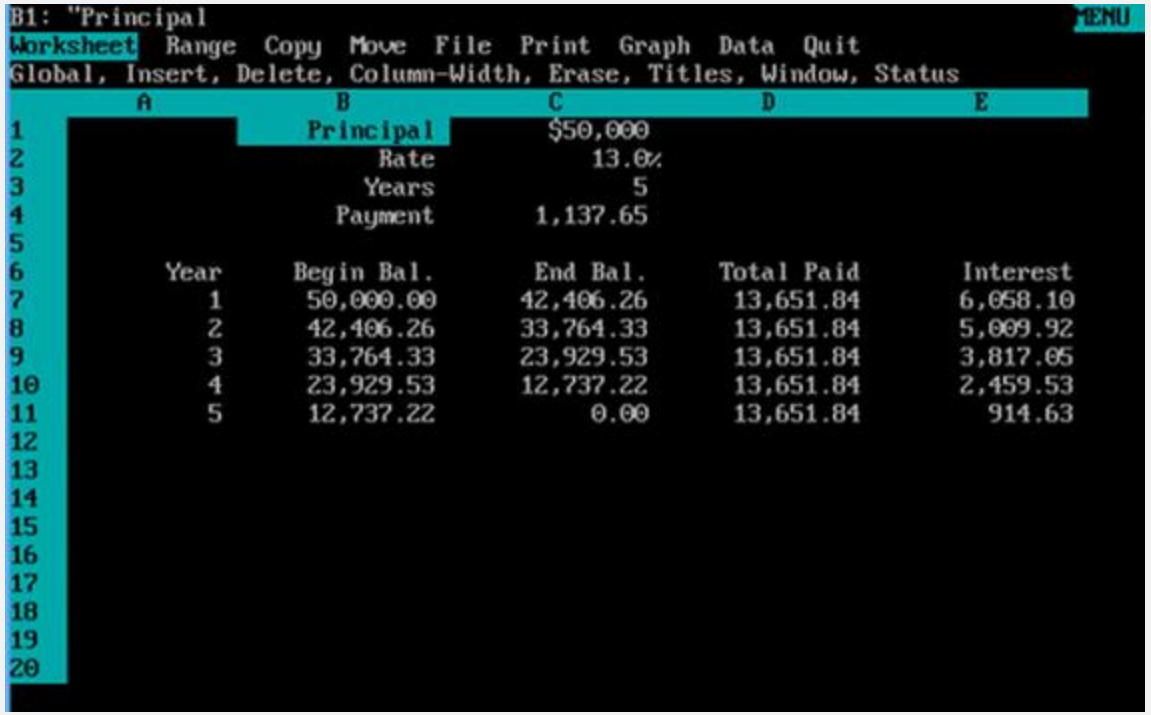
- Radio Shack TRS-80 Model I
- 16K (yes, 16,000) bytes of memory
- What mouse?
- Monochrome screen
- CLOAD and CSAVE
- What's a spreadsheet?

DATA ENTRY/ANALYSIS IN THE EARLY 90S

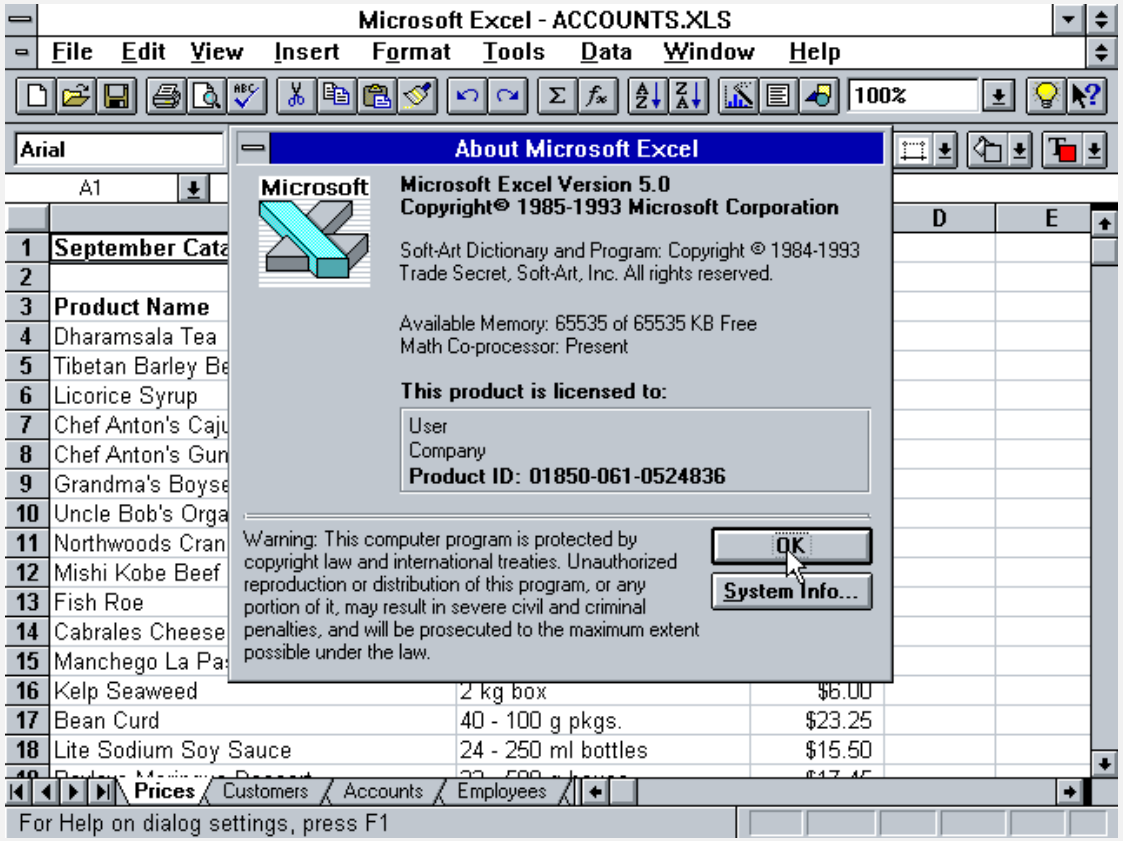
- USAir – yes, another airline that no longer exists
- Payroll data – faxed
- Airplane maintenance cards and carpal tunnel

ELECTRONIC SPREADSHEETS

Remember Lotus 1-2-3?



How about early Microsoft Excel?



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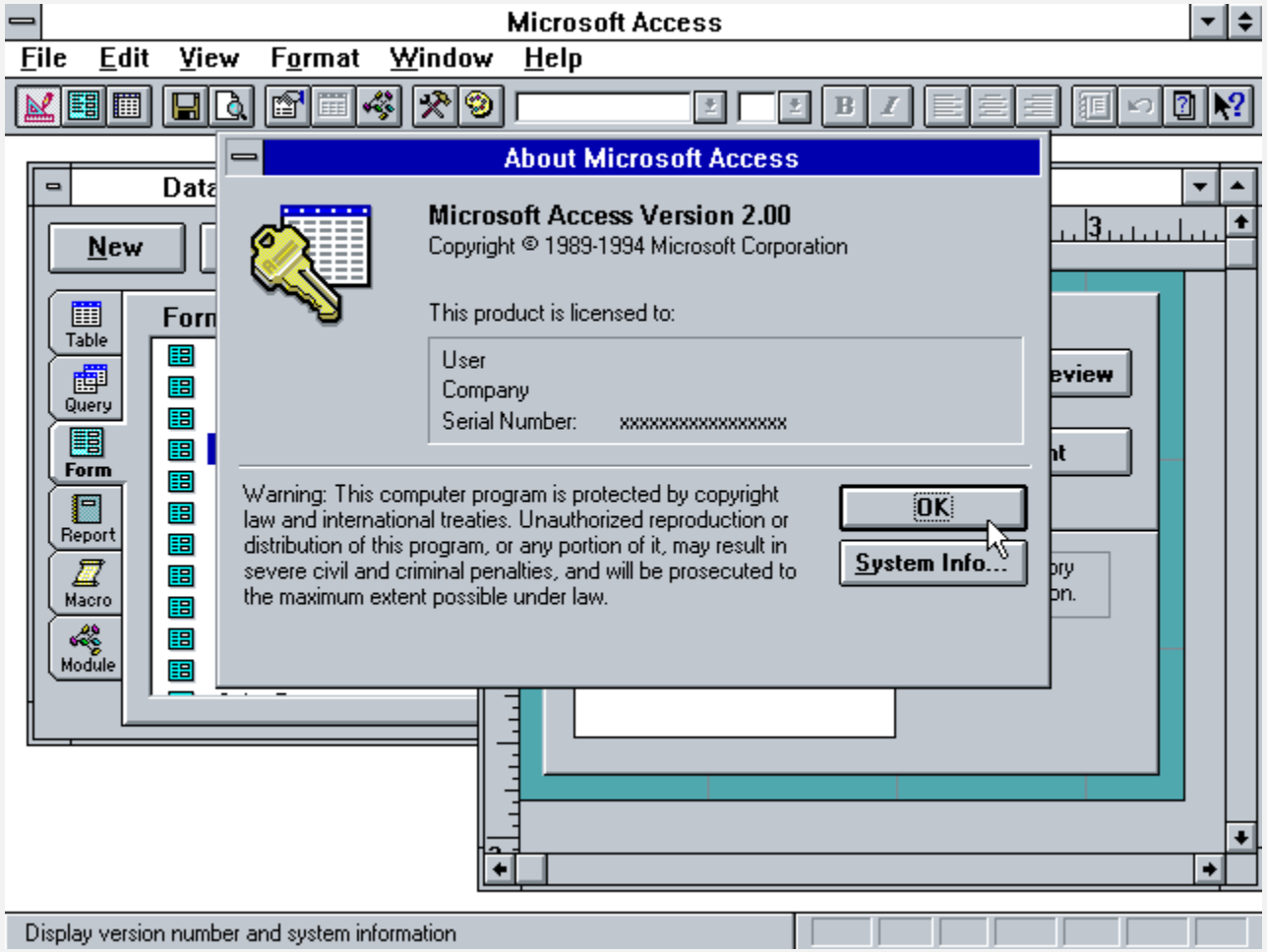
HEALTHCARE ANALYTICS – BACK “WHEN”

EARLY USER DATABASES

- There were a few others, but Microsoft Access is still around



HEATHCARE ANALYTICS IN THE 90S/00S

- Access databases – variance tool – monthly reports – capital budgets – anything we could think of …
- Productivity software – faxed statistics and agency hours
- Budgets – print out on a Friday afternoon – and run …
- Home grown operating budget tool
- Developer version of Microsoft Office

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CURRENT TOOLS

SQL – THE BASICS

- Structured Query Language
- Around since 1970s
- The basics:
  - SELECT <What Fields>
  - FROM <What Source>
  - WHERE <Filter Criteria>

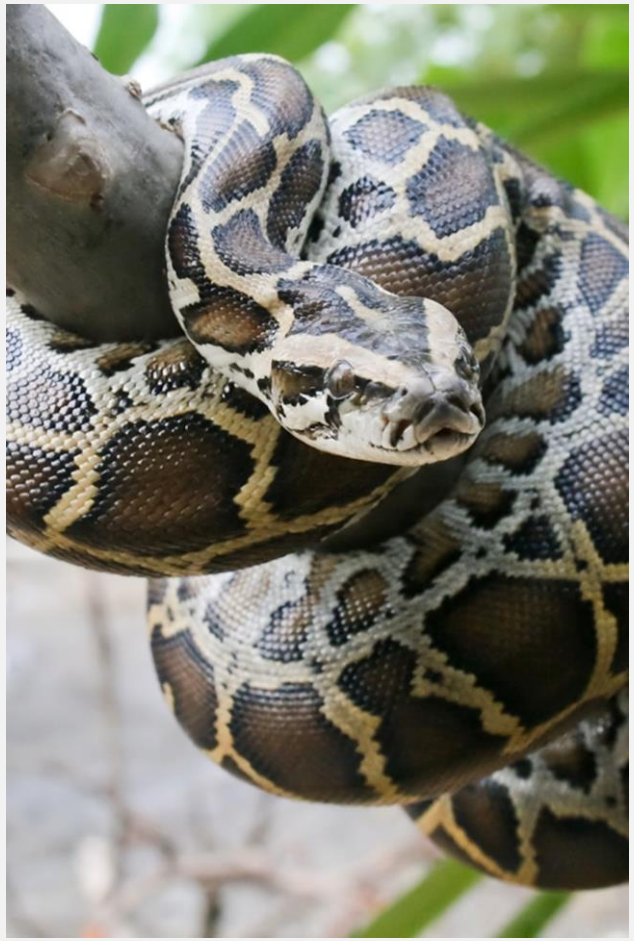
SQL – THE NOT SO BASICS

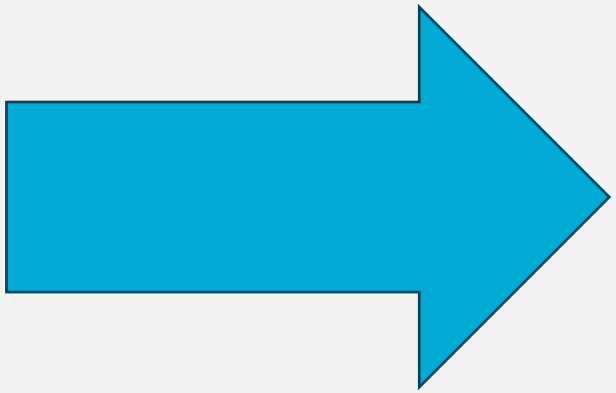
```sql
DECLARE @BACKUPDATE AS DATE = '1/20/2025'

BEGIN
    WITH BAK_Budget_CTE
    AS (
        SELECT DEPT,
            ACCT,
            INITIATIVEID,
            BudTtl
        FROM [Axiom].[BUD2025History]
        WHERE CAST(LastUpdate AS DATE) = @BACKUPDATE
        ),
    Compare_CTE
    AS (
        SELECT COALESCE(CUR.DEPT, BAK.DEPT) AS Department,
            COALESCE(CUR.ACCT, BAK.ACCT) AS Account,
            COALESCE(CUR.BudTtl, 0) AS CurrentTotal,
            COALESCE(BAK.BudTtl, 0) AS BackupTotal,
            COALESCE(CUR.BudTtl, 0) - COALESCE(BAK.BudTtl, 0) AS Variance
        FROM [Axiom].[BUD2025] AS CUR
        FULL OUTER JOIN [BAK_Budget_CTE] AS BAK ON CUR.ACCT = BAK.ACCT
            AND CUR.DEPT = BAK.DEPT
            AND CUR.INITIATIVEID = BAK.INITIATIVEID
        )
    SELECT S.Department,
        COALESCE(D.Dept_Description, 'Unknown') AS DeptDesc,
        S.Account,
        S.CurrentTotal,
        S.BackupTotal,
        S.Variance
    FROM Compare_CTE AS S
    LEFT JOIN [Axiom].[DEPT_Full] AS D ON S.Department = D.DEPT
    WHERE
    S.Variance != 0
    ORDER BY  S.Department, S.Account
END

```

PYTHON IS NAMED AFTER:





PYTHON – THE BASICS

- First version released in 1991
- Think of Python as an interpreter – with lots of libraries from which to choose that give it specific features
- You need to (generally) check out libraries to do what you want
- Multi-purpose language
- Relatively easy to learn
- Pull from varied sources in the same analysis
- VERY powerful data analytics libraries that perform analytics along with graphical analysis

PYTHON – TWO DATA LIBRARIES

Pandas

Polars

PYTHON – QUICK EXAMPLE

```python
# Pull in the pandas library with the alias pd
import pandas as pd

# Look for five characters - the first being a capital letter or a number,
# the next three are numbers,
# and the last can be a capital letter or a number
regex = r"([A-Z0-9][0-9]{3}[A-Z0-9])"

# Read in the data from the an Excel file and load it into a DataFrame
df = pd.read_excel("input_file_name.xlsx")

# Add the search results to new columns in the DataFrame
df["CPT_HCPCS_Breakout1"] = df["First String Name"].str.findall(regex)
df["CPT_HCPCS_Breakout2"] = df["Second String Name"].str.findall(regex)

# Print or export the results (in this case, both)
print(df)
df.to_excel("output_file_name.xlsx")
```

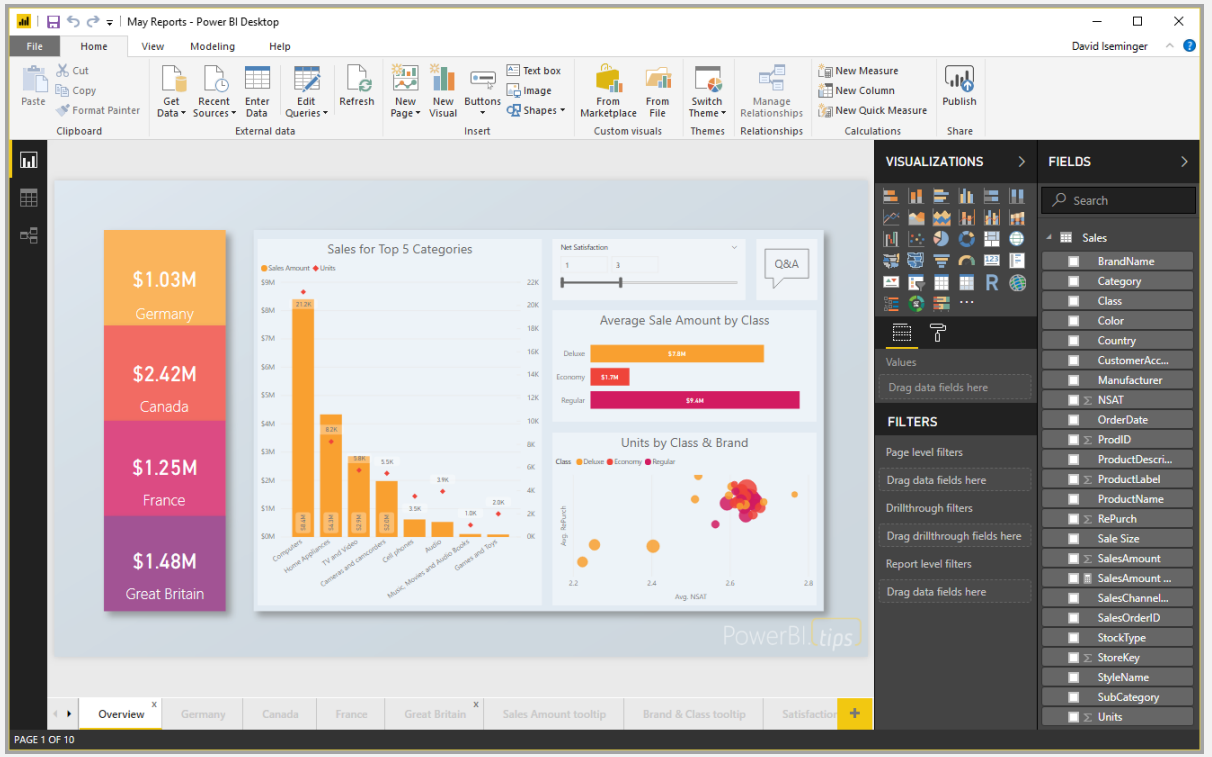
DASHBOARDS – THE BASICS

- Connect to MANY types of data sources
- Easy to get started, advanced functions available
- Visual design can make easier to spot outliers
- Interactivity – one part of dashboard reacts to changes in another
- Drilldown – keep clicking until you get to core data.

DASHBOARDS - EXAMPLES

Tableau

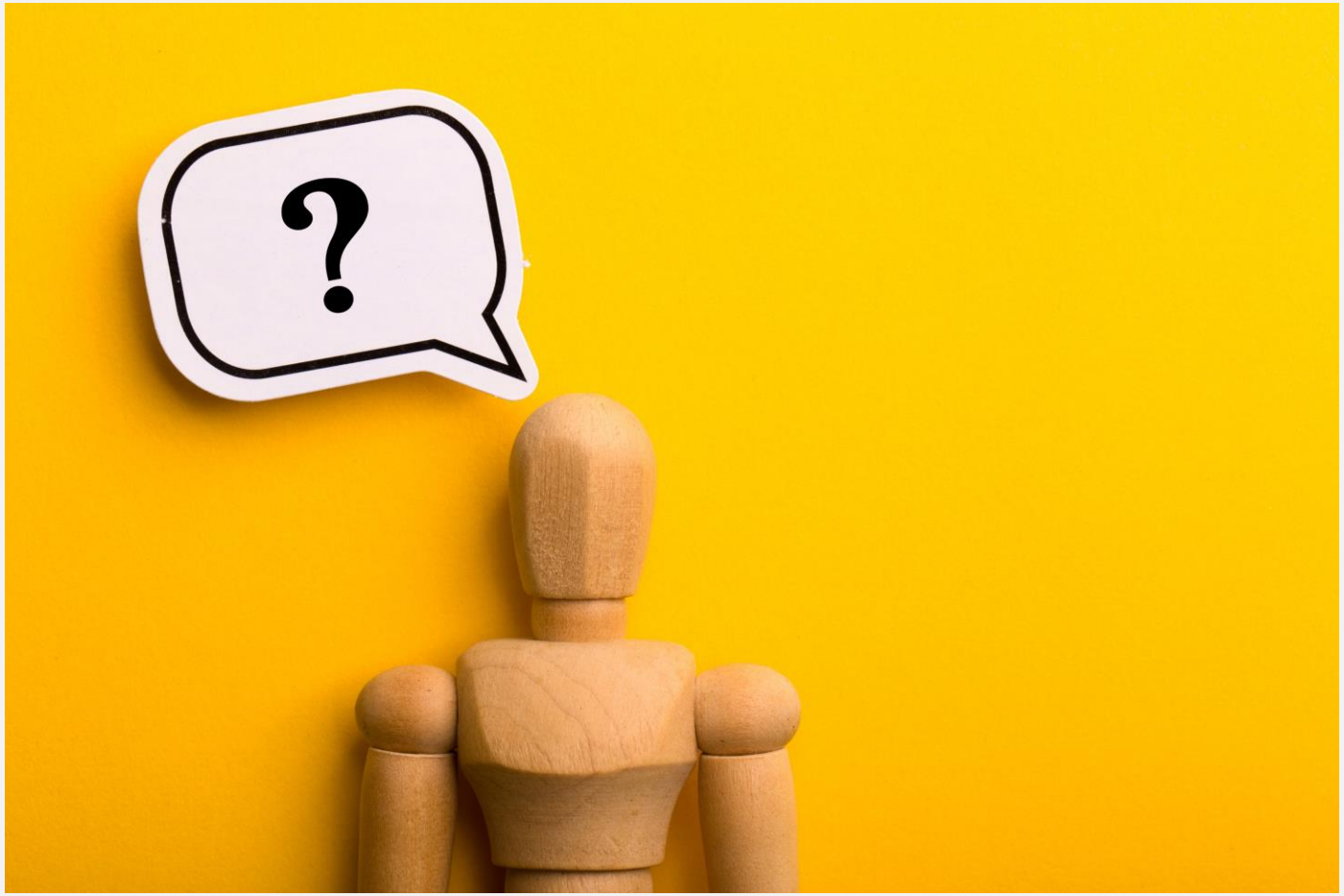
Microsoft Power BI



DASHBOARDS – TABLEAU VS POWER BI

- Tableau $$$; Power BI included in most enterprise packages
- Tableau first out of gate; Power BI catchup
- Very advanced functions in Tableau
- End of day, both can publish great dashboards
- Both require IS team and server space for published dashboards

YOUR SOFTWARE



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USE CASES

USES FOR CURRENT TOOLS

- ER door times / admission times
- Discharge times
- Census data
- Payroll data
- Tracking changes in budget

USES FOR CURRENT TOOLS

- Monthly close process
- Chargemaster audits
- Time of service collections
- Denials
- What else – let’s hear from you!

THANK YOU FOR PARTICIPATING!

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