



# Designing Data for Business Intelligence and Analytics – Where the Star Schema Fits in a Modern Data Architecture

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Global Data Strategy, Ltd.  
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# Donna Burbank



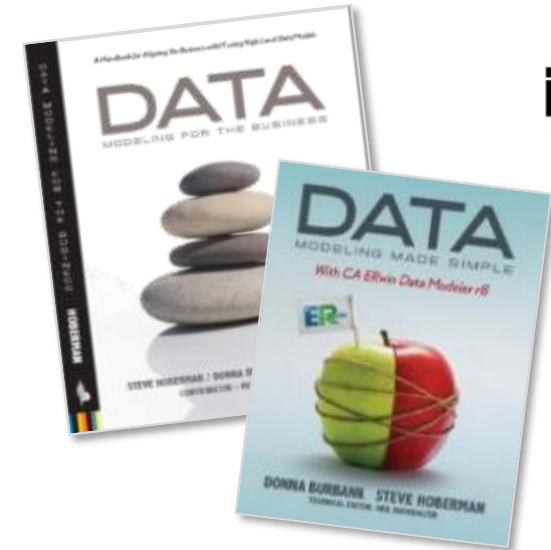
Donna is a recognized industry expert in data management with over 25 years of experience in data strategy, data governance, data modeling, metadata management, and enterprise architecture. Her background is multi-faceted across consulting, product development, product management, brand strategy, marketing, and business leadership.

She is currently the Managing Director at Global Data Strategy, Ltd., an international data management consulting company that specializes in the alignment of business drivers with data-centric technology.

In past roles, she has served in key brand strategy and product management roles at CA Technologies and Embarcadero Technologies for several of the leading data management products in the market.

As an active contributor to the data management community, she is a long time DAMA International member, contributor to the DMBOK 2.0, Past President and Advisor to the DAMA Rocky Mountain chapter, and was awarded the Excellence in Data Management Award from DAMA International.

She has worked with dozens of Fortune 500 companies worldwide in the Americas, Europe, Asia, and Africa and speaks regularly at industry conferences. She has co-authored several books and is a regular contributor to industry publications. She can be reached at [donna.burbank@globaldatastrategy.com](mailto:donna.burbank@globaldatastrategy.com) Donna is based in Boulder, Colorado, US.



# DATAVERSITY Data Architecture Strategies

## This Year's Lineup

- **January** Emerging Trends in Data Architecture – What's the Next Big Thing?
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- **December** The Business Benefits of Data Modeling – *live from DGIQ in Washington D.C.!*



# What We'll Cover Today

- **Data and analytics are one of the leading drivers for Data Architecture**, according to recent DATAVERSITY surveys.
- With the myriad of technical options available, **what is the best technical architecture to support today's advanced analytics and reporting needs?**
- Does the star schema still have a place?
- This webinar will explore the various architectural approaches that can support today's modern Data Architecture.



**70%** of organizations feel that their organization sees **data as a strategic asset\***.

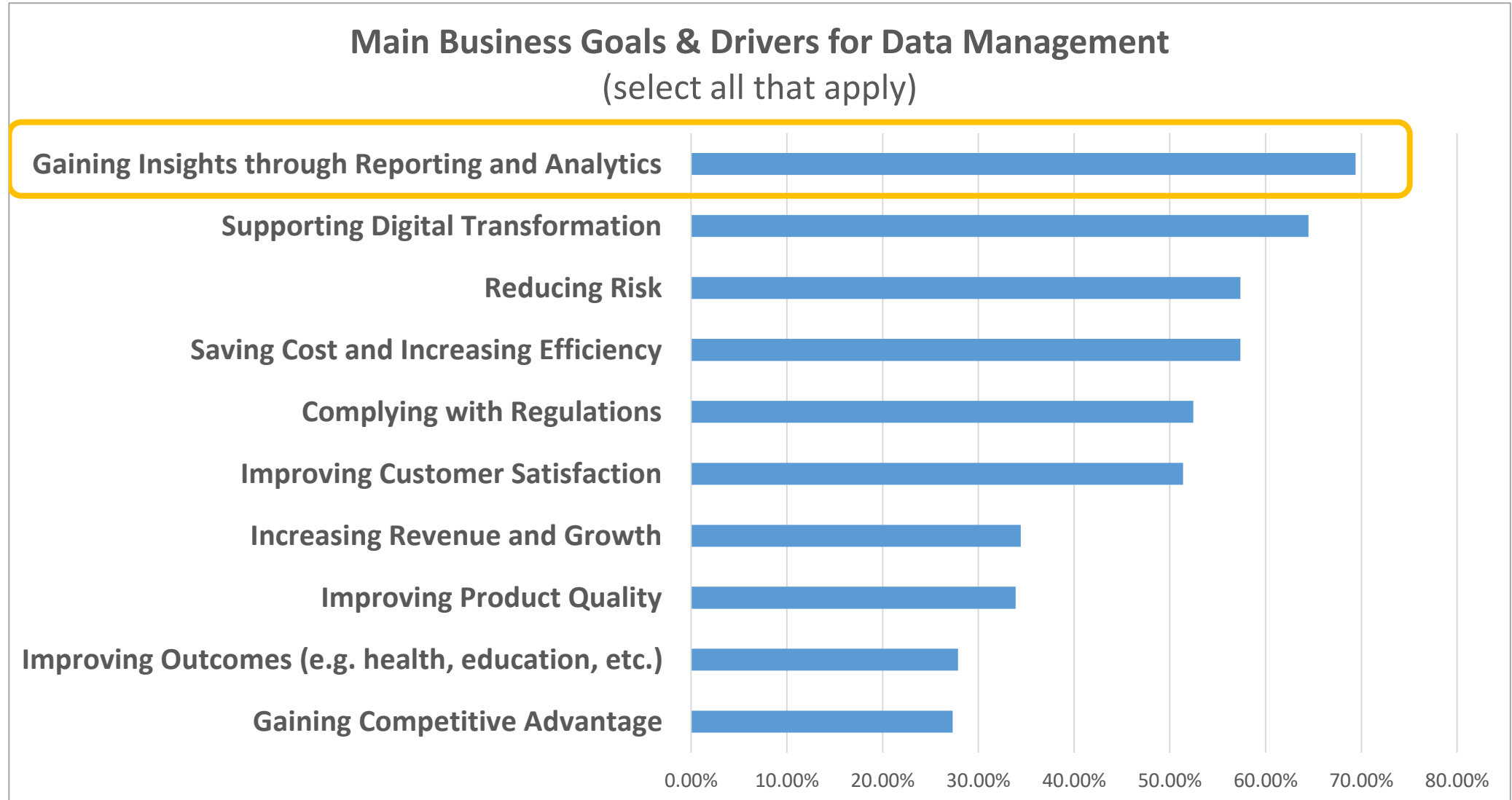
**70%** of indicated that **reporting and analytics** were key drivers for data management.\*\*

**>50%** identified **improved collaboration** through **using a defined data architecture.** \*\*



\* based on research from a 2019 DATAVERSITY survey on “Trends in Data Management” by Donna Burbank and Michelle Knight  
\*\* based on research from a 2021 DATAVERSITY survey on “Trends in Data Management” by Donna Burbank and Michelle Knight

# Main Business Goals & Drivers for Data Management



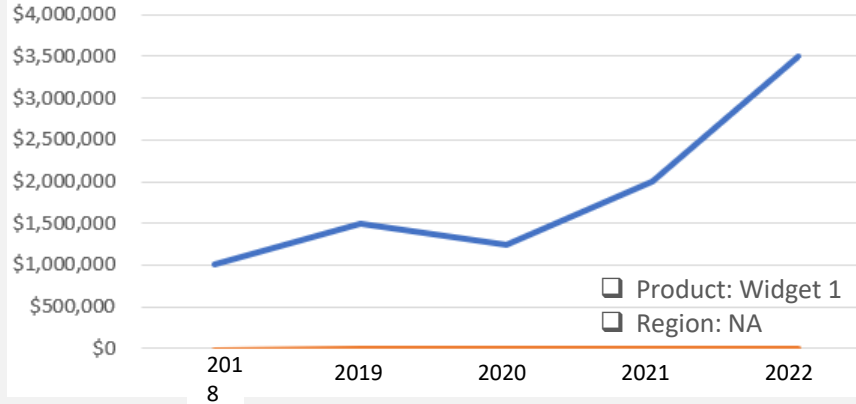
# Supporting Reporting & Analytics

## ACME Inc. Sales Dashboard

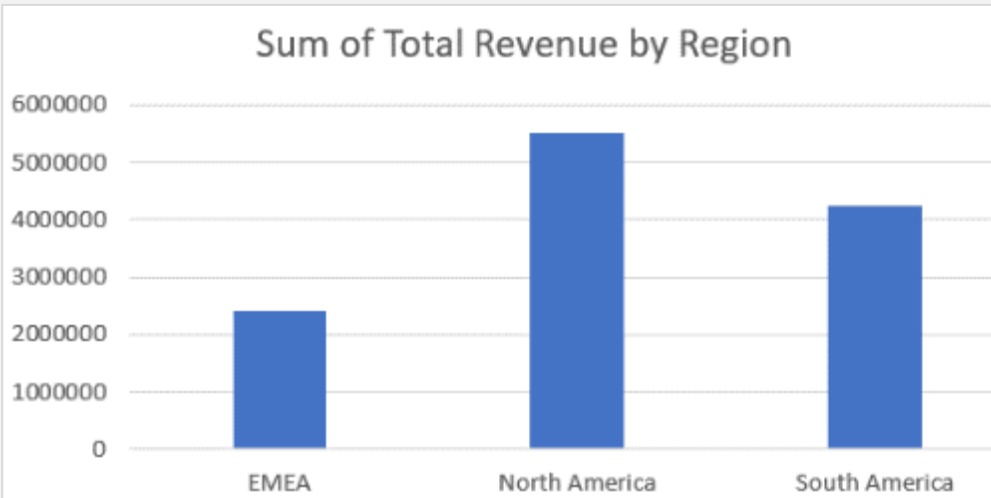
Total Revenue by Product



Total Revenue by Year



Sum of Total Revenue by Region



What about  
the data?

Successful reporting & analytics includes:

- **Data-driven culture**
  - Do we use dashboards in our sales meetings?
  - Or go by “gut feel”?
  - How can we integrate analytics into our sales cycle (e.g. predictive next best offer)
- **Data Governance**
  - How do we define “Total Revenue”?
  - What countries are included in South America?
- **Data Quality**
  - Are these revenue numbers accurate?
  - What’s the source of the product data?
- **Data Architecture**
  - How are we storing the data to accurately & efficiently to slice and dice for these reports?

# What is the Correct Architecture to Power Reporting & Analytics?

... There is a Cacophony of Options ...

**Data  
Warehouse**

**Data Lake  
House**

**MDM Hub**

**Data Fabric**

**Data Lake**

**Data Hub**

**Data Mesh**

**Data  
Virtualization**

**Knowledge  
Graph**

**Data Marketplace**

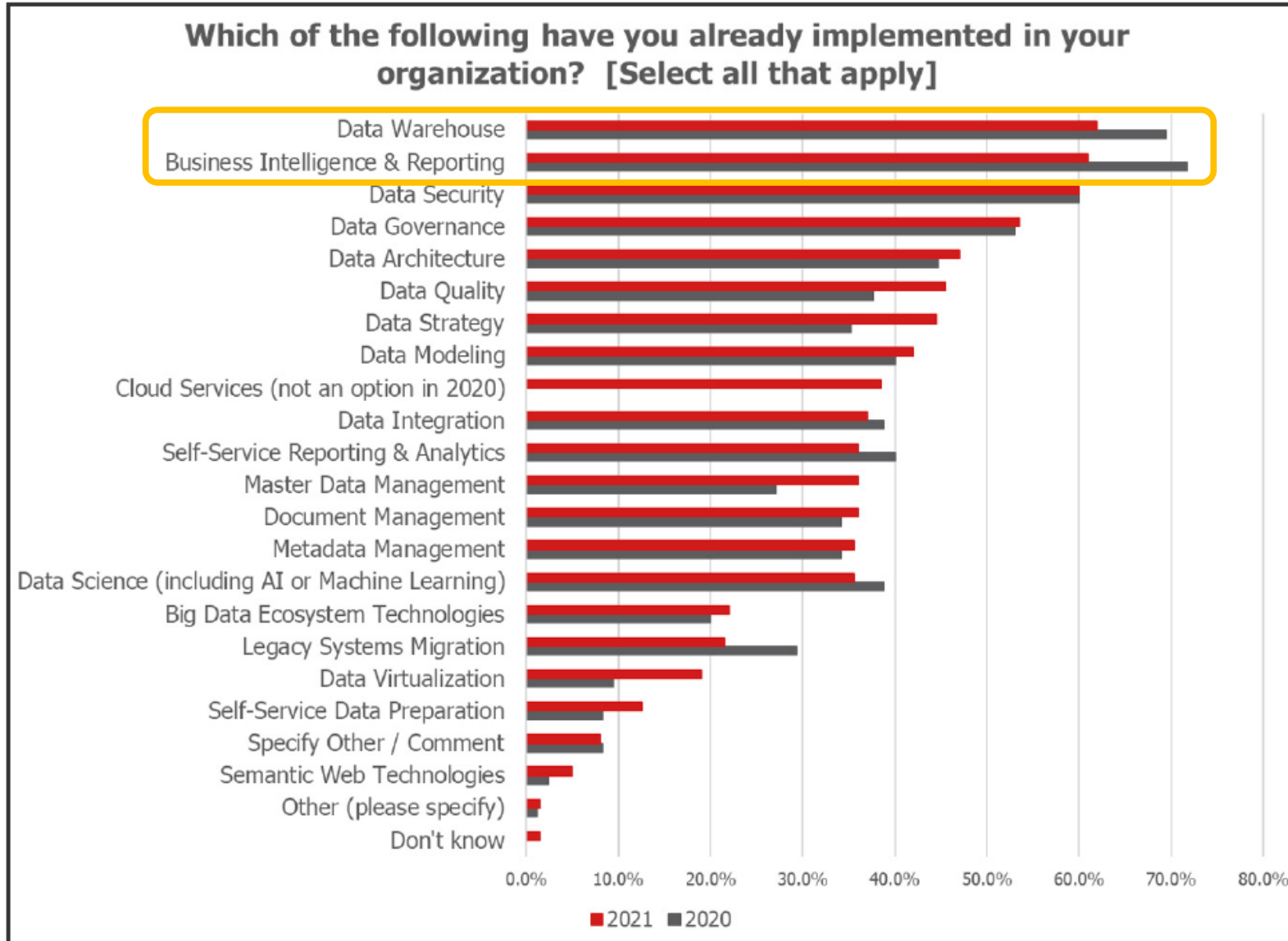
**Data Catalog**

**Metadata  
Catalog**

Relational, Nonrelational, Star Schema, SQL, NoSQL, Graph, Document Store, Real-time Streaming, Time series...

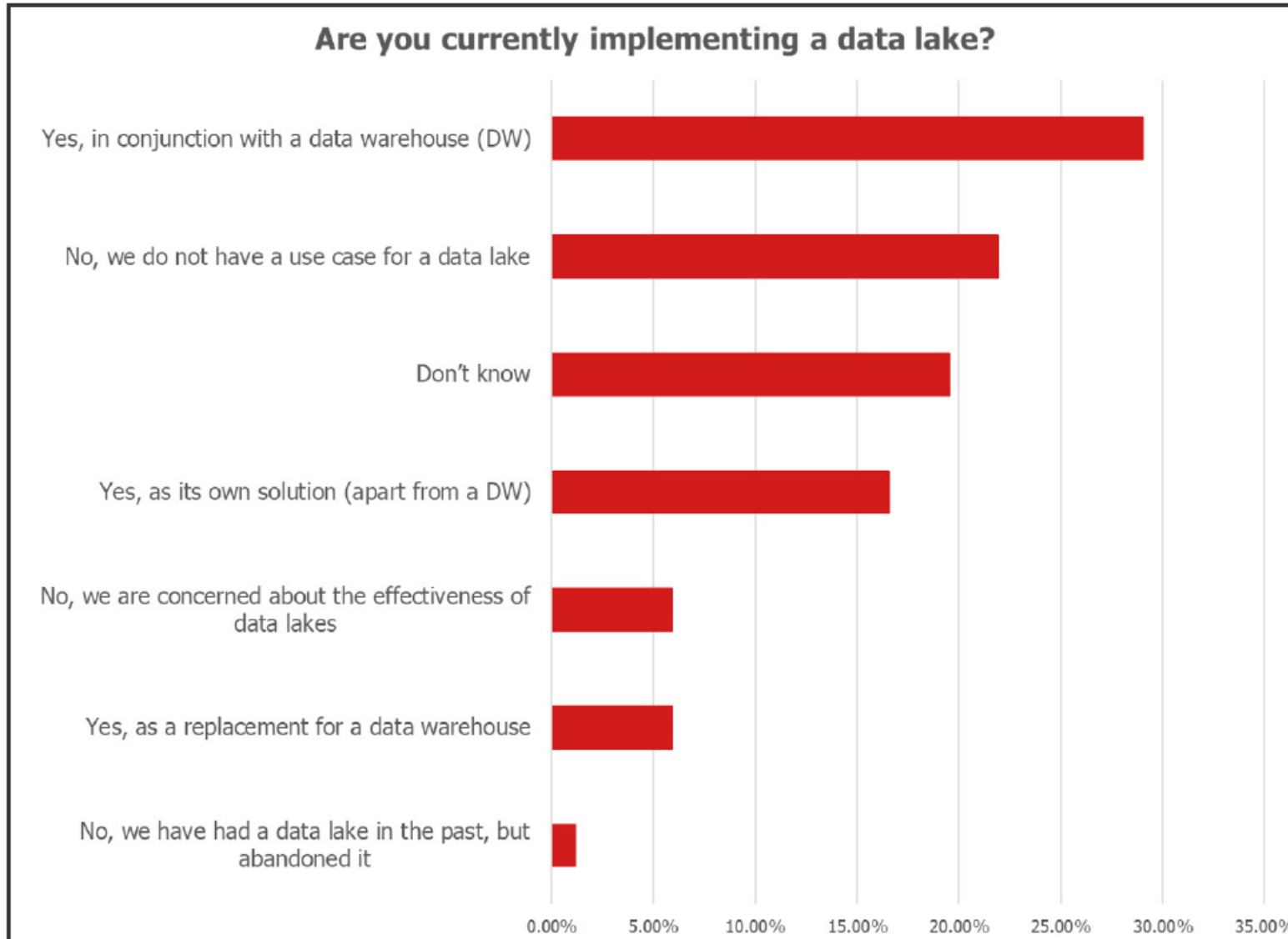


# Current Organizational Priorities



\* based on research from a 2021 DATAVERSITY survey on "Trends in Data Management" by Donna Burbank and Michelle Knight

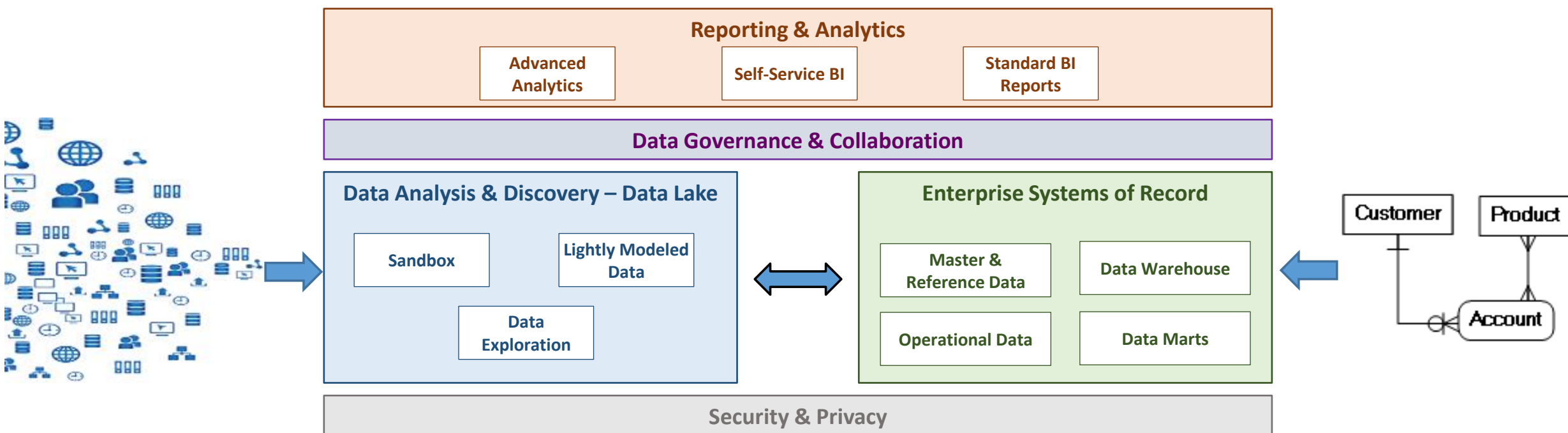
# Using a Data Lake in Conjunction with a Data Warehouse



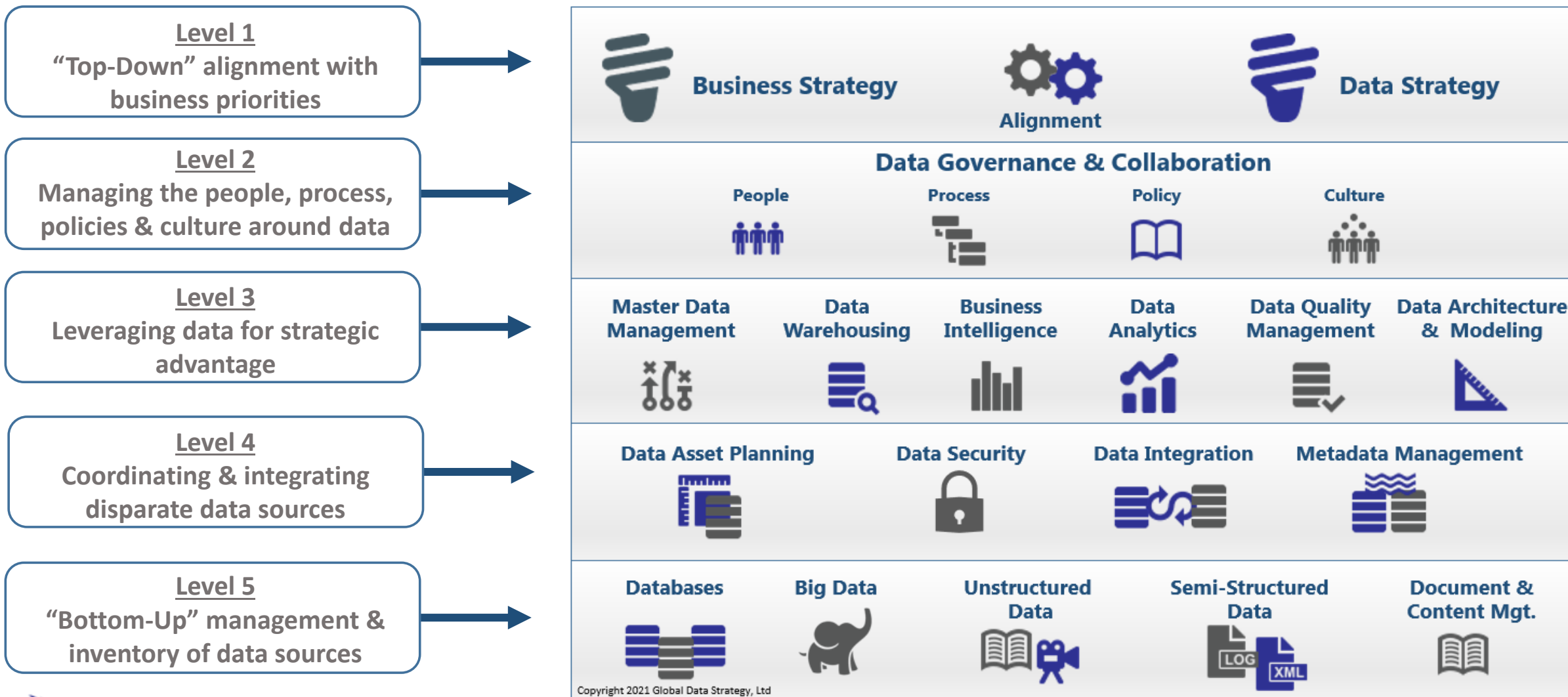
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# Integrating Multiple Paradigms

- The Data Lake has a different architecture & purpose than traditional data sources such as data warehouses.
- But the two environments can co-exist to share relevant information.



# A Holistic Approach is Needed



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# The Design Aspect of Data Architecture for BI & Analytics



# A little data modeling up-front

## ... prevents headaches down the road

- It's often tempting to skip data modeling documentation because it's "faster"
- But...long-term, it's ultimately longer as errors and inconsistencies need to be fixed as a result.

**"If you don't have time to do it right, do you have time to do it again?"**



# Levels of Data Models

## Audience

## Purpose

**Business Stakeholders**  
**Data Architects**

**Organization & Scoping** of main  
business domain areas

**Enterprise**  
Subject Areas

**Business Stakeholders**  
**Data Architects**

**Communication & Definition** of  
Business Concepts & Rules

**Conceptual**  
Business Concepts

**Data Architects**  
**Business Analysts**

**Clarification & Detail**  
of Business Rules &  
Data Structures

**Logical**  
Data Entities

**DBAs**  
**Developers**

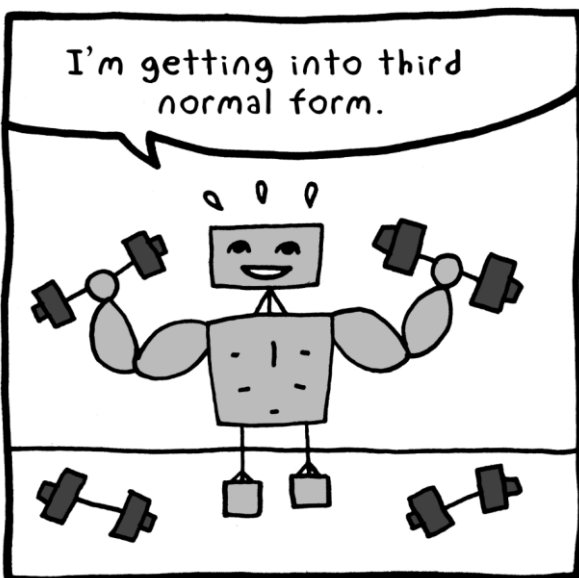
**Technical**  
**Implementation** on  
a Physical Database

**Physical**  
Physical Tables

# Different Physical Models for Different Use Cases

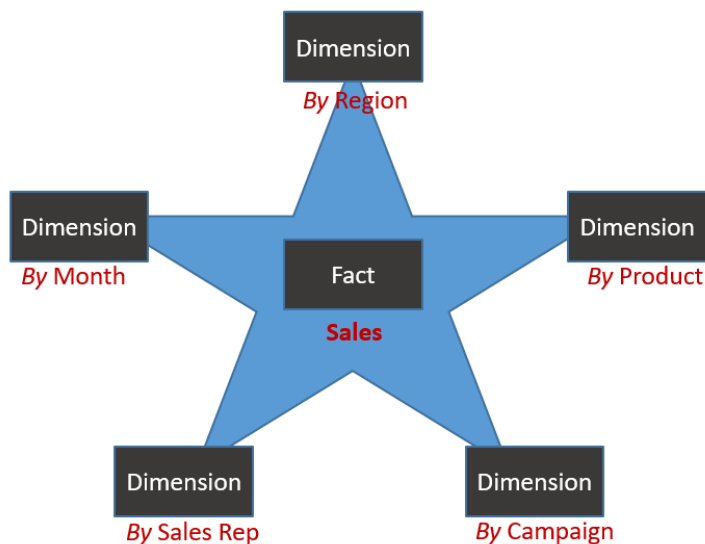
## Relational – Normal Form

- Reduce redundancy for operational data
- Increase data quality
- Ensure consistency (ACID transactions)



## Dimensional– Star Schema

- Ease of reporting for summarized and historical data
- Ability to easily “slice and dice” for self-service reporting
- Performance and flexibility



## NoSQL

- Speed of retrieval, low latency
- High data volumes
- Flexibility for change

```

Key: Brewery_Pike_Brewing
{
  "Name": "Pike Brewing",
  ...
  "Brewery_Address": {
    ...
    City: Seattle
    Country: USA
  }
}

```

```

Key: Brewery_Pike_Brewing
{
  "Name": "Pike Brewing",
  "Brewery_Address_ID": "Brewery_Address_Pike_Brewing",
  ...
}

Key: Brewery_Address_Pike_Brewing
"Brewery_Address": {
  ...
  City: Seattle
  Country: USA
}

```

An arrow points from the top document to the bottom document, indicating a transformation or relationship.

## ...And More!


- There are numerous ways to model and store data.
  - Hierarchical/XML
  - Graph
  - COBOL Copybook!
  - S3 “buckets”
  - Data Vault
  - Etc...

No modeling technique is inherently “better” than another. Data use cases & purpose drives what “good” looks like.



# Is the Star Schema Dead?





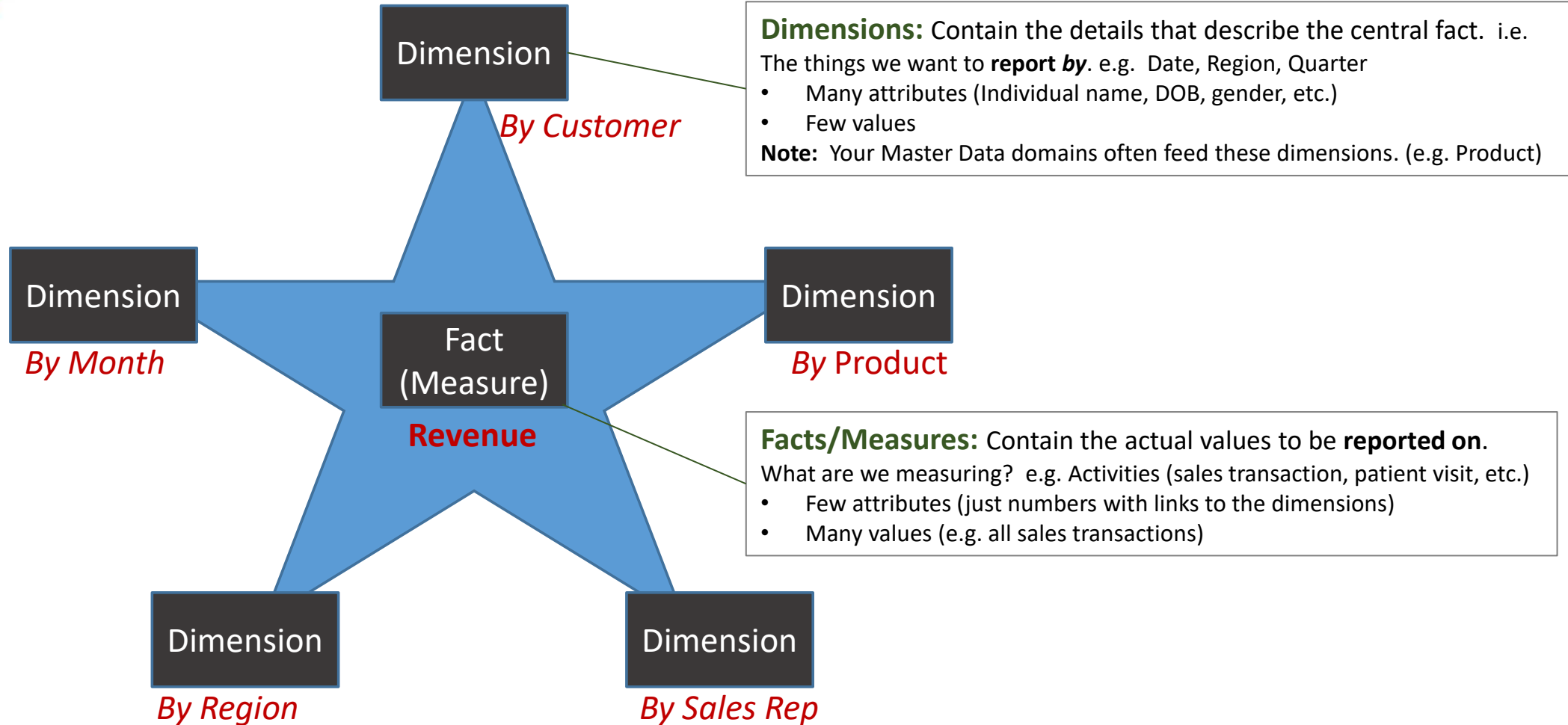
**I want to see historical data trending over time to “slice & dice” by year, by region, by product from a single source of trusted data from all systems.**

**... but I don't want one of those old-fashioned data warehouses!**

# The Star Schema



The Star Schema is still a user-friendly and performant way to “slice and dice” data for reporting.



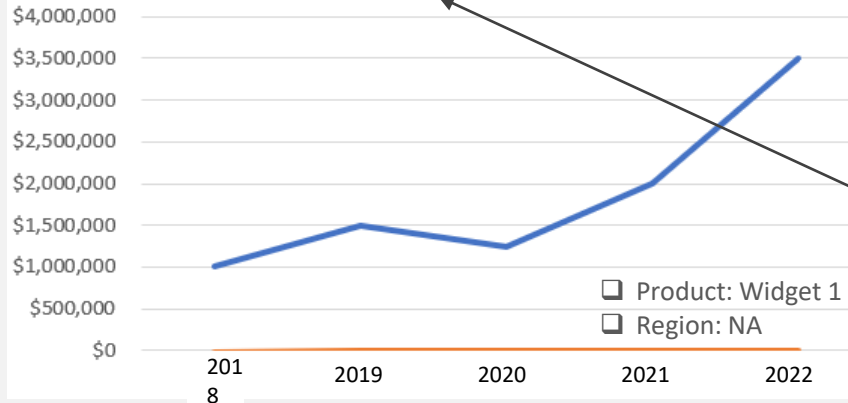
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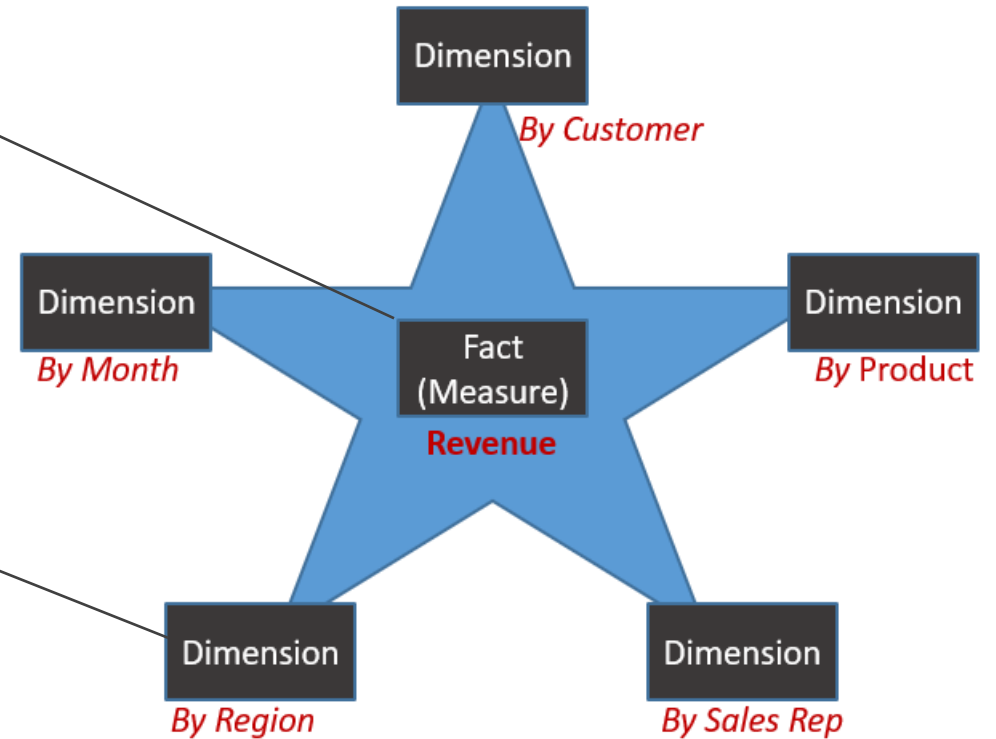
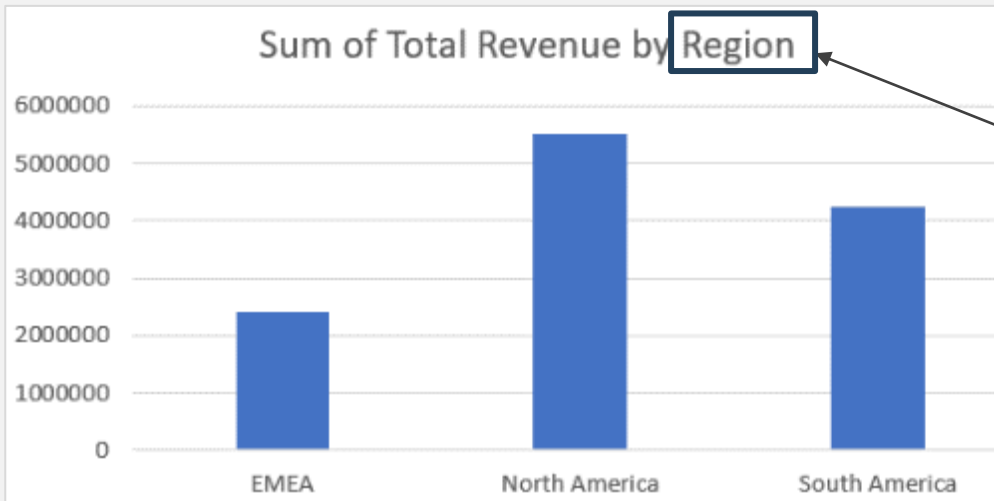
Total Revenue by Product



Total Revenue by Year



Sum of Total Revenue by Region



# The Bus Matrix

A Bus Matrix is a simple way to keep track of what you want to report “on” (Facts) and what you want to report “by” (Dimensions)

Report “on” - Dimensions

	Region	Sales Rep	Product	Customer
<b>Total Sales Revenue</b>	X	X	X	X
<b>Wholesale Revenue</b>	X		X	
<b>Number of Returned Items</b>			X	X
<b>Etc.</b>				

Report “by” - Facts

# Design Patterns

There are a number of design patterns available to fit a variety of use cases  
(again – there is no “one size fits all” )

## Inmon vs. Kimball

The battle still rages...



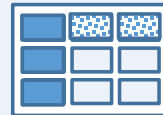
## Data Vault

Hubs, Links and Satellites



## Columnar

Columns vs. Rows



## Flatten Everything

Popular with Data Science



## Graph

Good for discovering connections

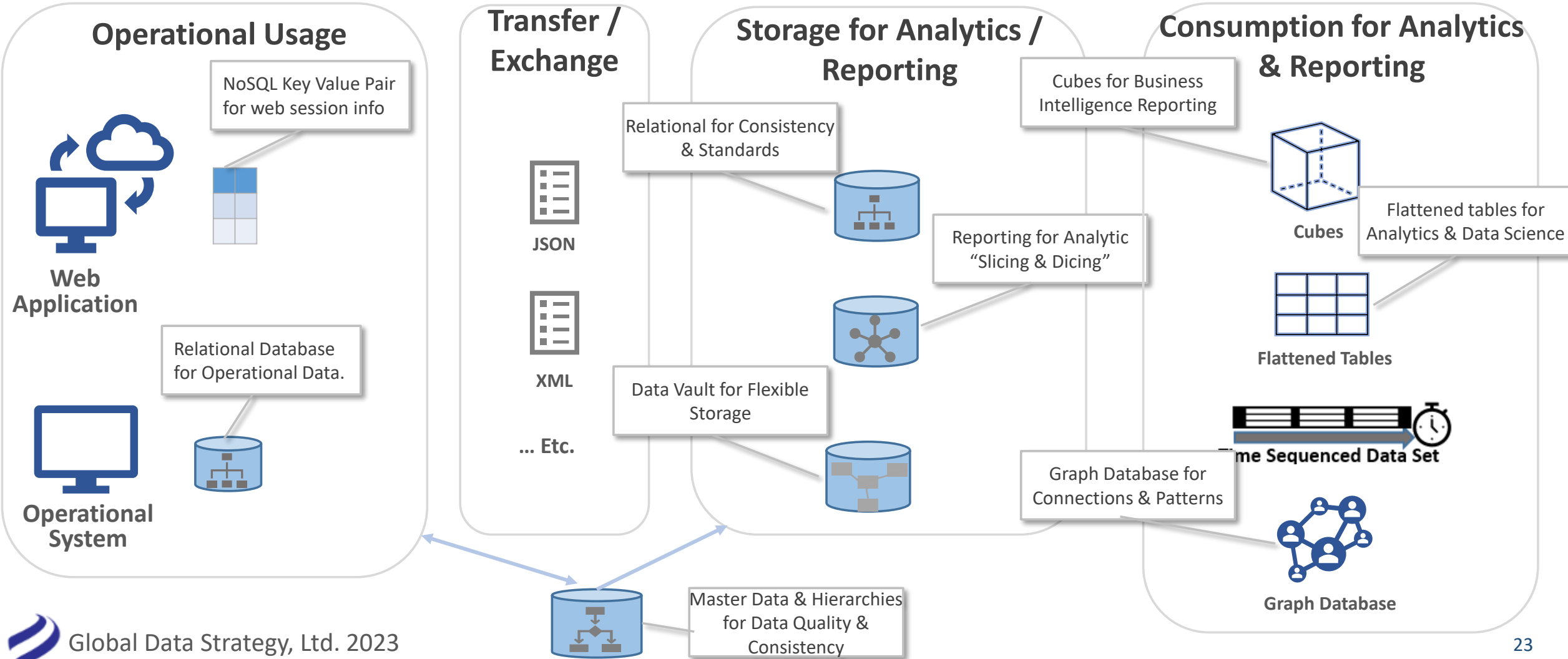


**And More...**  
Choices abound...



# In a Typical Organization, there are many Use Cases for Data Models

The following is just a subset of options that exist....



# Summary

- **Analytics and Reporting are key priorities** for today's data-driven business.
- **A strong data architecture is needed** to support successful analytics
- There are **many choices** in the marketplace, and at the same time, **core fundamentals still apply.**
- **Choose your architecture wisely**, and have fun and success with the numerous options available in today's market.





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# Who We Are: Business-Focused Data Strategy

## Maximize the Organizational Value of Your Data Investment



In today's business environment, showing **rapid time to value** for any technical investment is critical.

But technology and data can be complex. At Global Data Strategy, **we help demystify technical complexity** to help you:

- Demonstrate the ROI and **business value of data** to your management
- Build a data strategy **at your pace to match your unique culture** and organizational style.
- Create an **actionable roadmap for “quick wins”**, which building towards a long-term scalable architecture.

Global Data Strategy's shares experience from some of the largest international organizations scaled to the pace of your unique team.

Global Data Strategy has worked with organizations globally in the following industries:

Finance · Retail · Social Services · Health Care · Education · Manufacturing  
· Government · Public Utilities · Construction · Media & Entertainment ·  
Insurance .... and more



Thoughts? Ideas?  
**Questions?**