The Business Benefits of Data Modeling

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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 Donna is based in Boulder, Colorado, US.
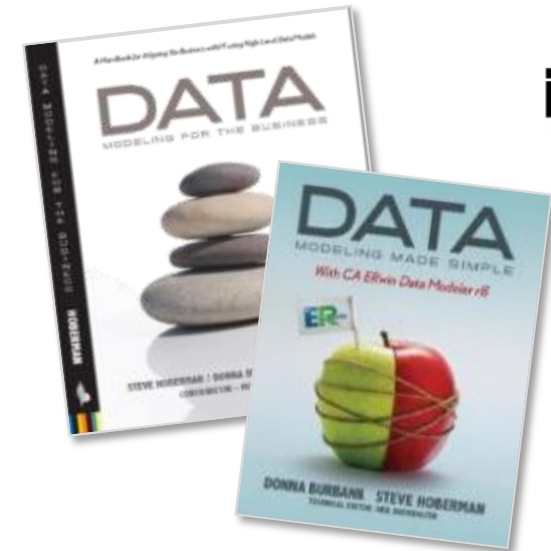
DATAVERSITY Data Architecture Strategies

This Year's Lineup

- **January**   Emerging Trends in Data Architecture – What's the Next Big Thing?

- **February**   Building a Data Strategy - Practical Steps for Aligning with Business Goals

- **March**   Data Mesh or Data Mess? Separating the Reality from the Hype

- **April**   Master Data Management - Aligning Data, Process, and Governance

- **May**   How do Data Governance & Data Architecture Support Each Other?

- **June**   Why You Need Data Management – Getting Executive Buy-In

- **July**   Artificial Intelligence and Machine Learning – Building the Right Architectural Foundation

- **August**   Data Quality Best Practices (with Nigel Turner)

- **September**   Best Practices in Metadata Management

- **October**   Designing Data for Business Intelligence & Analytics – Where the Star Schema Fits in a Modern Data Architecture

- **December**   The Business Benefits of Data Modeling – *live from DGIQ in Washington D.C.!*

What We'll Cover Today

- **Data models are key to gaining a clear view of the data that drives the business** – from customers to products to invoices and more.

- They offer a clear, **visual way for both business and technical stakeholders to communicate** around the crucial business rules and definitions that drive both operational usage of data as well as analytics and reporting.

- This webinar will provide **practical, concrete steps in creating valuable data models** that can show immediate value to the organization, while at the same time building towards a full-enterprise view.

How Prevalent are Data Models?

The use of data models is **ubiquitous in the industry, and <u>the vast majority of organizations</u> are using them.**

Over 96% of DATAVERSITY respondents are using a data model*.

From Emerging Trends in Data Architecture, DATAVERSITY, by Donna Burbank & Charles Roe, October 2017

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?"

From <u>Data Modeling for the Business</u> by Hoberman, Burbank, Bradley, Technics Publications, 2009

Levels of Data Models

Audience

Purpose

Business Stakeholders
Data Architects

Business Stakeholders
Data Architects

Data Architects
Business Analysts

DBAs
Developers

Enterprise
Subject Areas

Conceptual
Business Concepts

Logical
Data Entities

Physical
Physical Tables

Organization & Scoping of main
business domain areas

Communication & Definition of
Business Concepts & Rules

Clarification & Detail
of Business Rules &
Data Structures

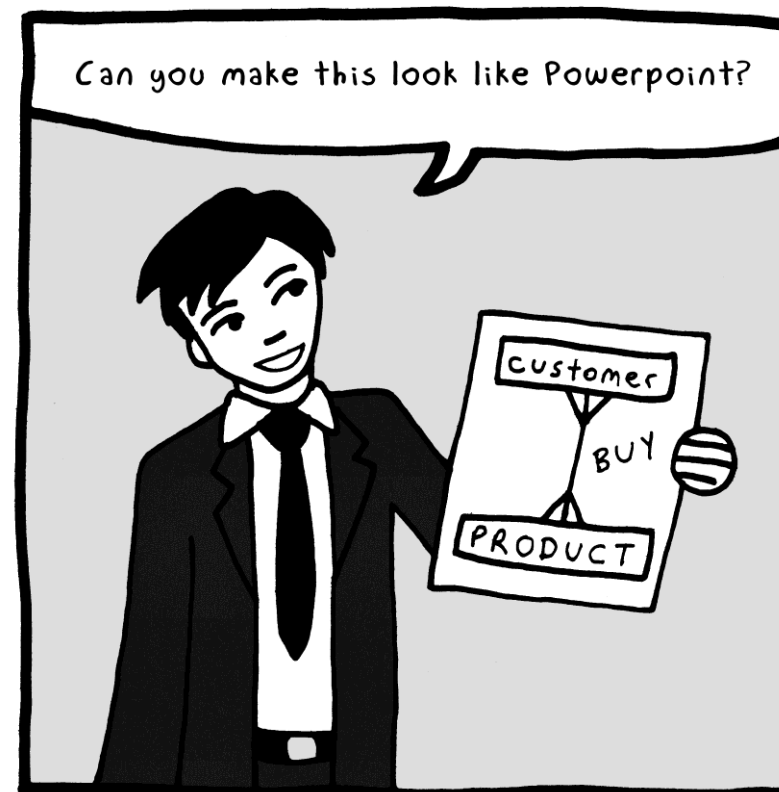**Technical**
Implementation on
a Physical Database

Use the Language of Your Audience

Gaining Buy-In

- When communicating with business stakeholders, it's important to display data models in a way that's intuitive to them

  - PowerPoint-style Conceptual Data Models

  - Use Business Terminology

  - Avoid Excess Detail

From <u>Data Modeling for the Business</u> by Hoberman, Burbank, Bradley, Technics Publications, 2009

Business Data Model (Conceptual)

- Communication & definition of core data concepts & their definitions

- A business data model provides core **definitions** of key data objects.
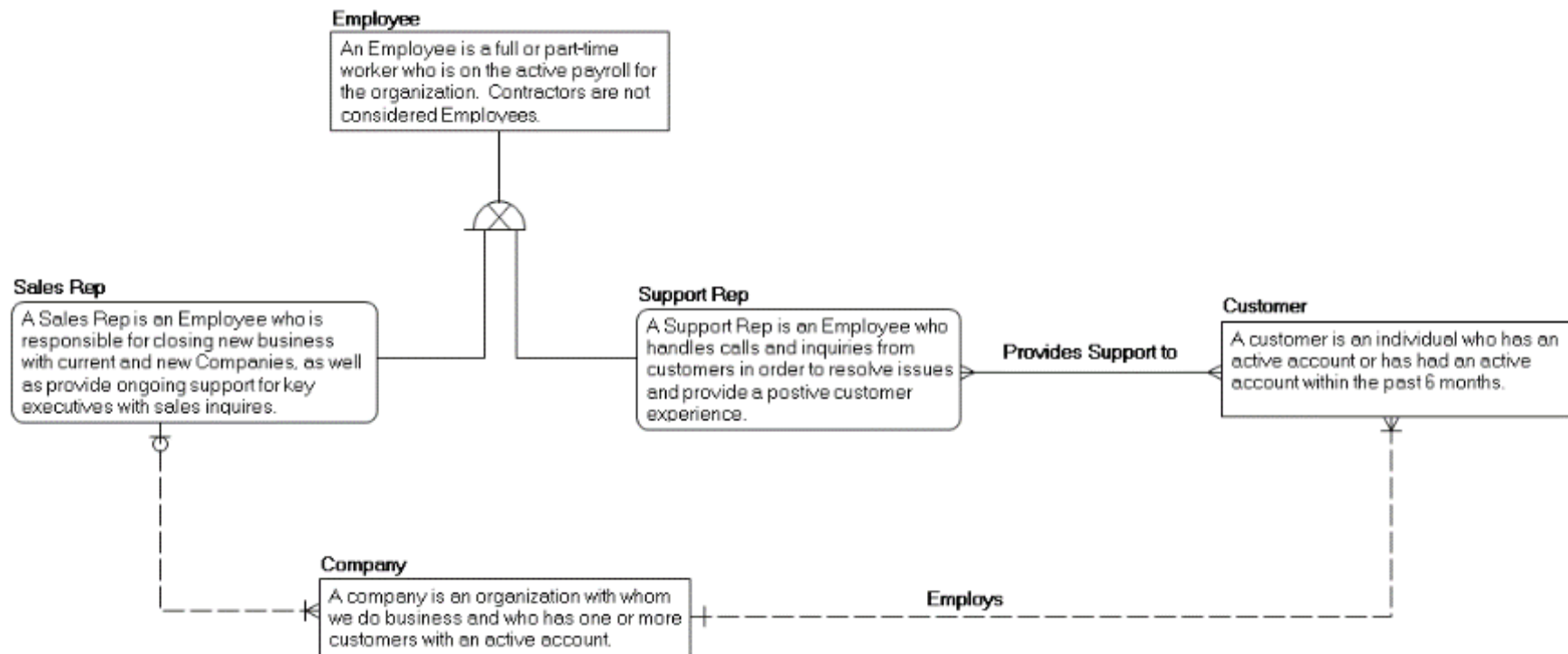
- It also shows key **relationships** between data objects.

- Even a simple diagram as the one on the right can tell a powerful **"story"**

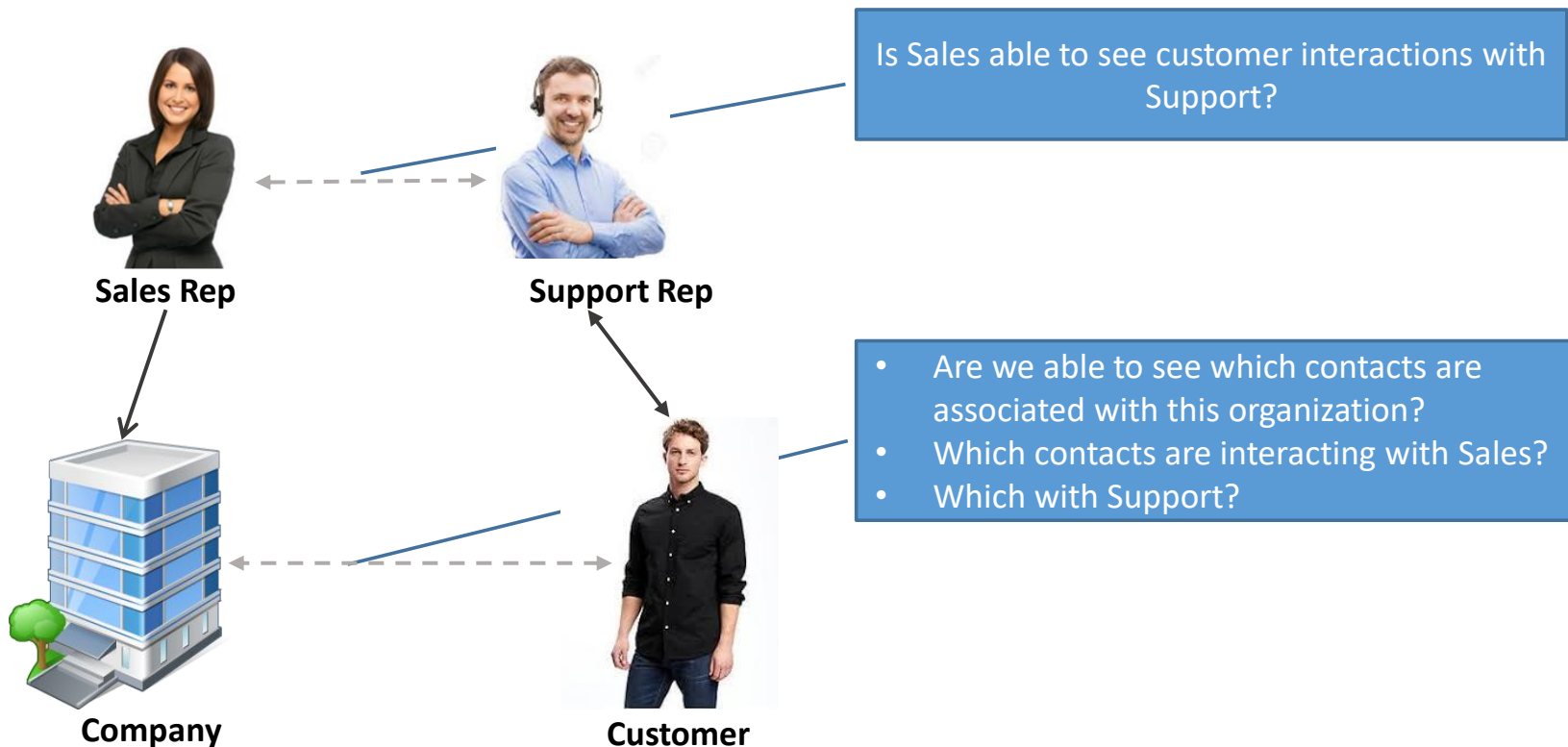 .... And uncover key **business issues and opportunities**.

- How do we define a "customer" vs. a "client"

- Is our employee relationship different for each?

Employee
An Employee is a full or part-time worker who is on the active payroll for the organization. Contractors are not considered Employees.

Sales Rep
A Sales Rep is an Employee who is responsible for closing new business with current and new Companies, as well as provide ongoing support for key executives with sales inquires.

Support Rep
A Support Rep is an Employee who handles calls and inquiries from customers in order to resolve issues and provide a positive customer experience.

Provides Support to

Customer
A customer is an individual who has an active account or has had an active account within the past 6 months.

Company
A company is an organization with whom we do business and who has one or more customers with an active account.

Employs

Business Data Model (Conceptual)

- Including a graphical version of a data model is often a helpful way to tell the "story"

Sales Rep

Support Rep

Is Sales able to see customer interactions with Support?

Company

Customer

- Are we able to see which contacts are associated with this organization?
- Which contacts are interacting with Sales?
- Which with Support?

A Picture is worth a thousand words.

Tell a Story

What impact does the data model have on the business?

- Humans have evolved over time as storytellers
  - We can't even sleep without dreaming in stories.

- No one cares about your data model…
  - … but they do care about the RESULTS of your data model
  - … **relate the model to a real world impact or scenario**..i.e. "story"

Humans are Storytellers.

From <u>Data Modeling for the Business</u> by Hoberman, Burbank, Bradley, Technics Publications, 2009

Real-World Quotations from Business Users

This is really elegant. You just summed up our organization in a single page.
- Early Childhood Educator

I'd never seen data from the Customers' perspective before. This will totally help me in my application development. Thank you!
- VP of Software Development

We have two more departments asking if you can build one of those data model diagrams for them.
- Clinical Health Organization

I love this data model. The last architect told me I couldn't possibly understand this stuff, but when presented this way, it makes total sense—it's so logical!
- Evaluation & Analytics Lead

How did you learn so much about our company in one week? Are you sure you never worked here before?
- Utility Company

This explains why our campaigns aren't working.
- Chief Marketing Officer

Hand me the pen...

The Value of Whiteboarding

It's often helpful to "whiteboard" data models with sticky notes

- Short whiteboard sessions with key stakeholders can flesh out key metadata definitions & scope in a short period of time.

- And it can be fun and interactive.
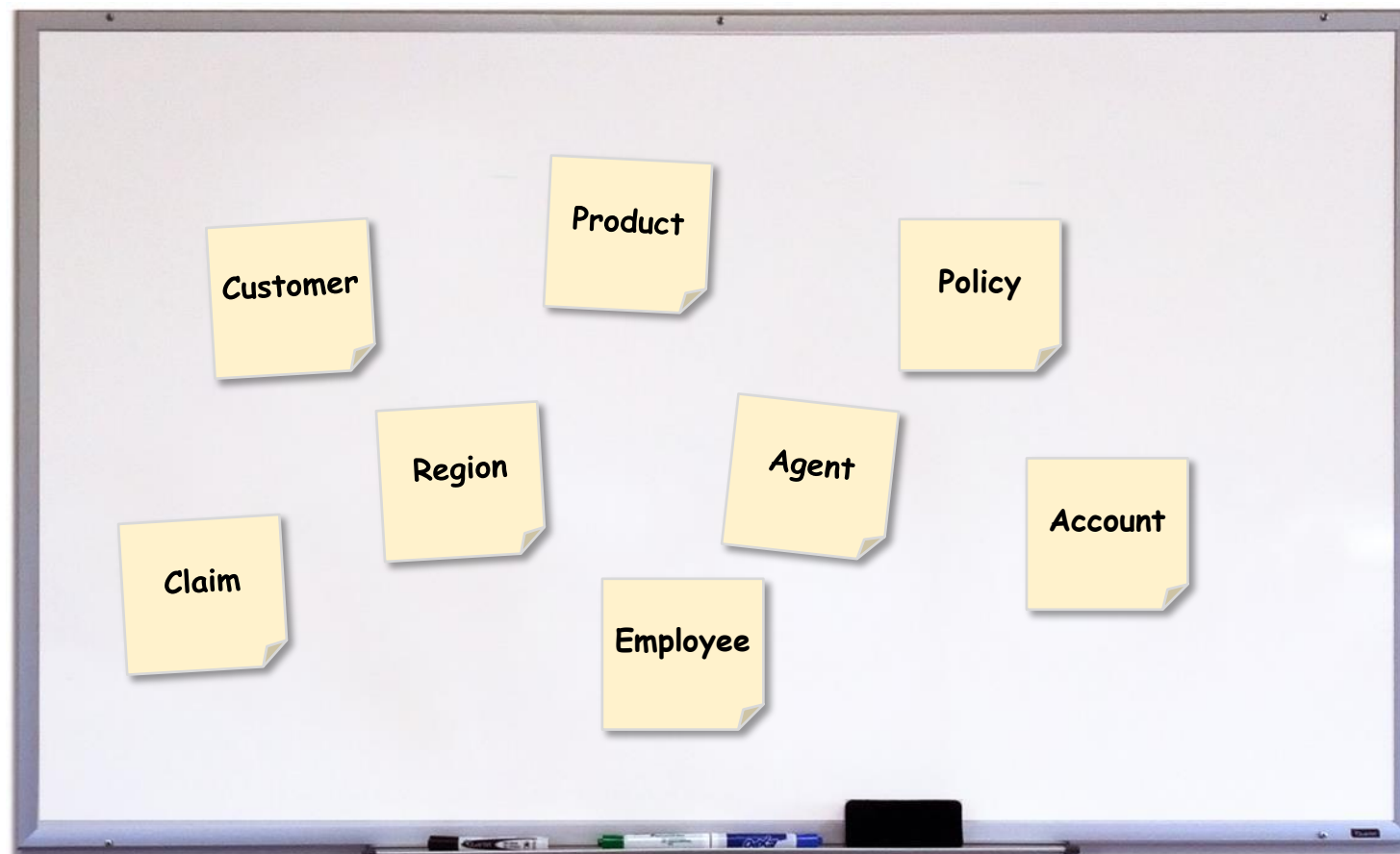
Data Models Describe the Organization

- Relationships define the **data-centric Business Rules of an organization**

- You should be able to **"read" a data model like a sentence.**

- The **Entities / Concepts** are the **"nouns"** – the **boxes** on a data model

- It's often helpful to start by taking some text describing the organization (or transcripts from stakeholder interviews) and draw boxes around the nouns to find the core entities

  - An employee can work for more than one department.
  - A customer can have more than one account.
  - A department can contain more than one employee.

Employee

Customer

Account
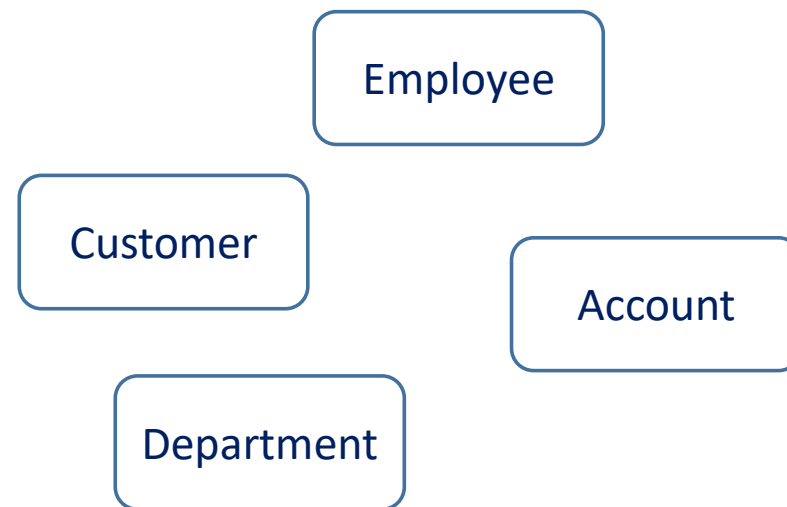
Department

Data Models Describe the Organization

- Relationships are the "**verbs**" in a sentence.

- It's easy to spot the relationships by underlining the verbs in a sentence:
  - —A department can contain more than one employee.
  - —A customer purchases a product

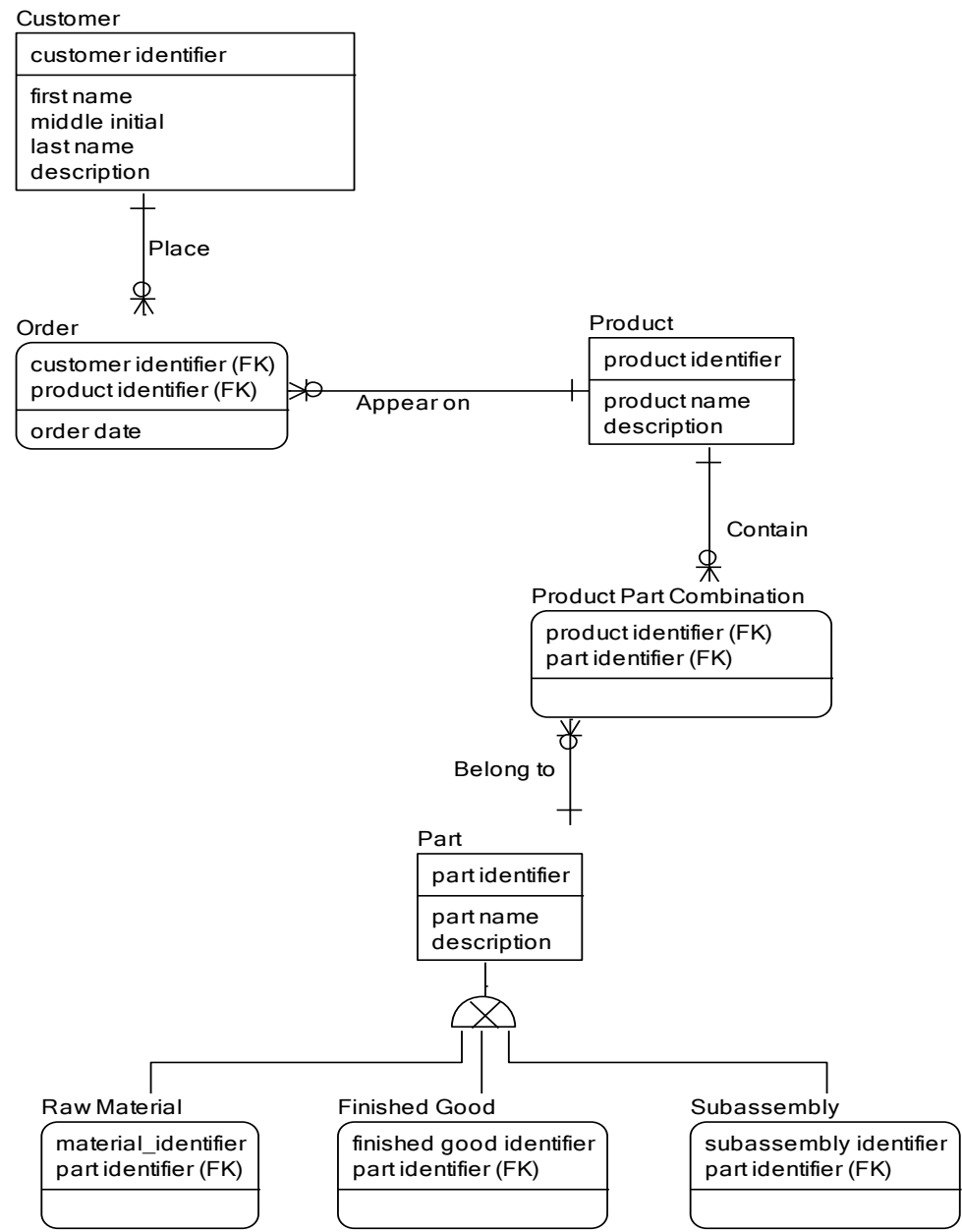- With this combination of boxes for nouns and lines for verbs, you have a data model!

DIY Collaborative Data Modeling

Verb phrase

Entity Name
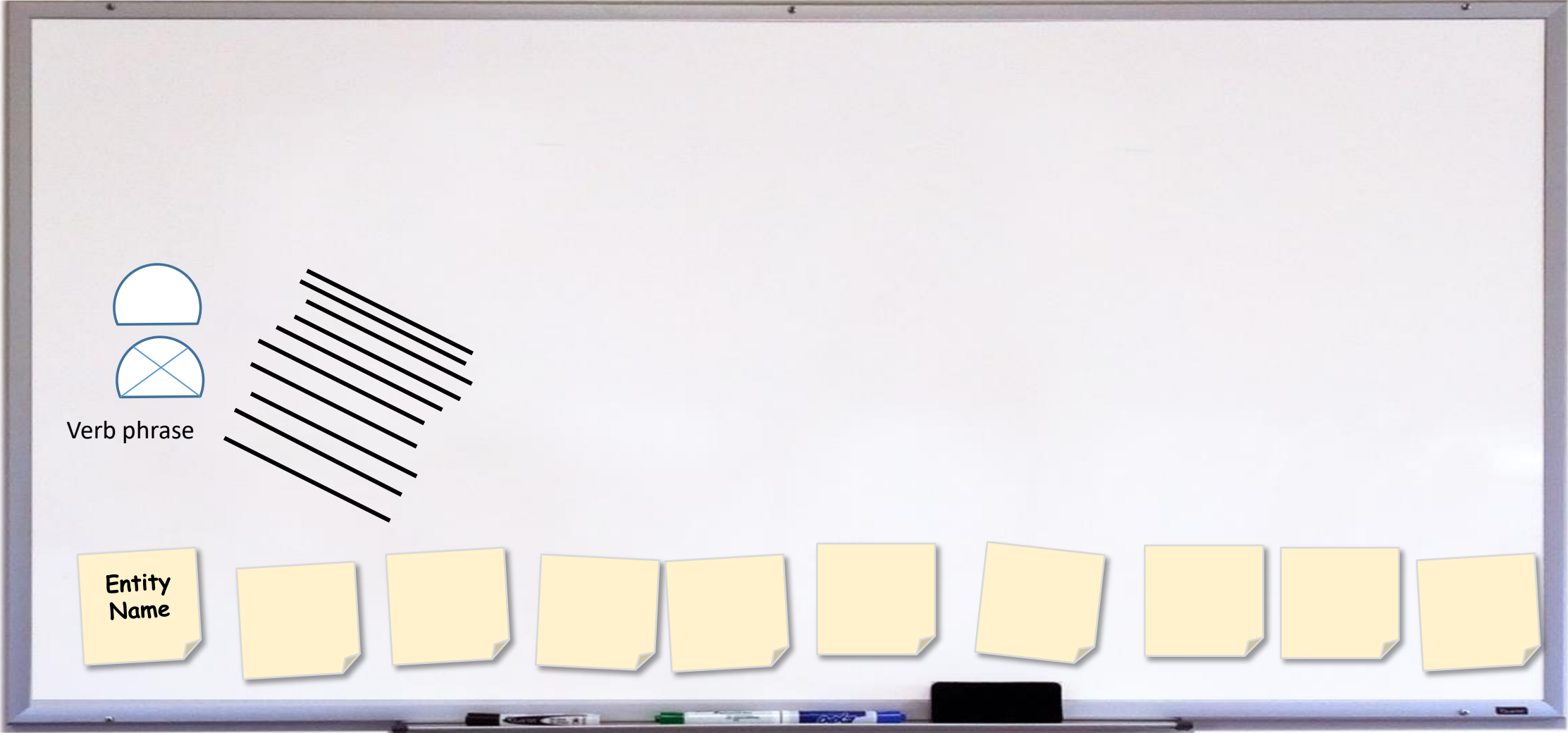
Logical Data Model

- A logical data model

  - Defines detailed business rules

  - Includes attributes, data types, nullability, etc.

  - Defines data structures, but not physical tables (e.g. hierarchies)

    .... And uncovers key business issues and opportunities.

  - Can a customer have more than one address?

  - Is Fax number still a required field?

  - What is a fax number???....

Customer

customer identifier
first name middle initial last name description

Place

Order

customer identifier (FK) product identifier (FK)
order date

Appear on

Product

product identifier
product name description

Contain

Product Part Combination

product identifier (FK) part identifier (FK)

Belong to

Part

part identifier
part name description

Raw Material

material_identifier part identifier (FK)

Finished Good

finished good identifier part identifier (FK)

Subassembly

subassembly identifier part identifier (FK)

Environment Agency of England**

Governing Open Data Publication through Data Models

- The Environment Agency worked with Global Data Strategy to develop **Data Models** & **Data Standards** in order to support Open Data publication of key environmental measures.
  - Land boundaries
  - Air & Water Quality
  - Fish & Wildlife populations
  - Etc.

- **Common Data Models & Standards helped create a common lingua franca across the organization**:
  - Saving time & money
  - Supporting Regulation
  - Enhancing public reputation
  - Improving data quality & consistency
  - Increasing collaboration between teams

> "Establishing a standard is a really important step in bringing our information together so we can be better joined up, better integrated and **work together more efficiently**. In short, if you've got even the slightest interest in how we plan and deliver outcomes on the ground, you should be taking an interest in this!"
> - National River Basin Operations Manager, Environment Agency

** See March 2019 DATAVERSITY webinar here
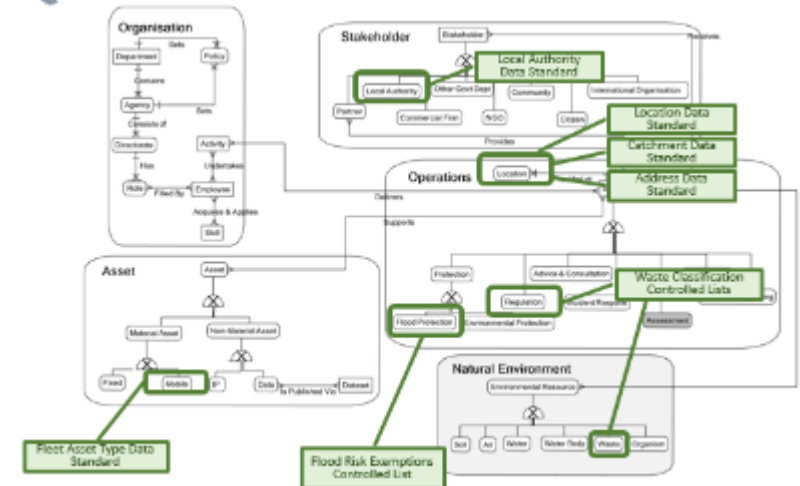
Business Modeling at Kiewit**

It's all about Architecture

- Understanding the data that supports the business – architecture & construction

- Supporting data governance efforts – aligning business & IT

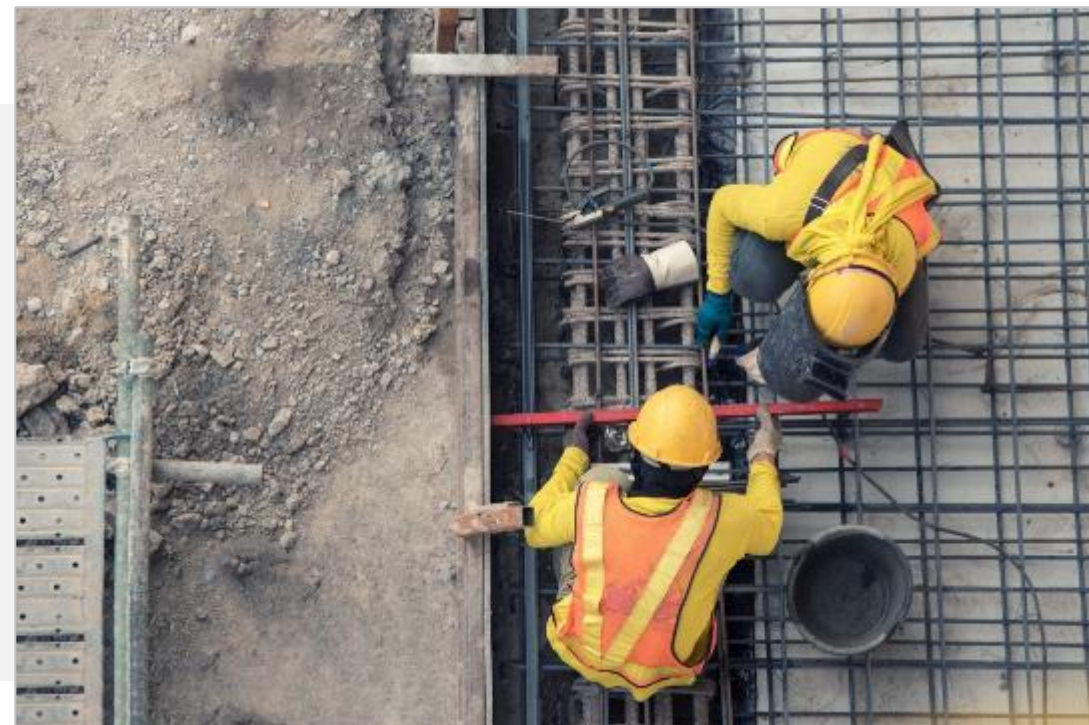- Integrating data silos across the organization – single view of data assets

** See March 2021 DATAVERSITY webinar here

Architecture vs. Construction

- It's a common analogy to use building architecture as an analogy to data architecture.

- When constructing a building, there is a clear distinction between designing a house and building a house.

Design

Build

Architecture vs. Construction

- When constructing a database, there is a clear distinction between designing and building.


Design

Build

Physical Data Model

- A physical data model
  - Defines data structures to store data on a physical platform (e.g. RDMBS, Document data store, etc.)
  - Optimizes for performance, query, etc.

… And ensures that data is stored in a fit for purpose manner. e.g. How can I:

  - Store data to reduce redundancy and increase data quality?
  - Optimize data storage to "slice and dice" for self-service analytics?
  - Optimize data storage for speed of query?
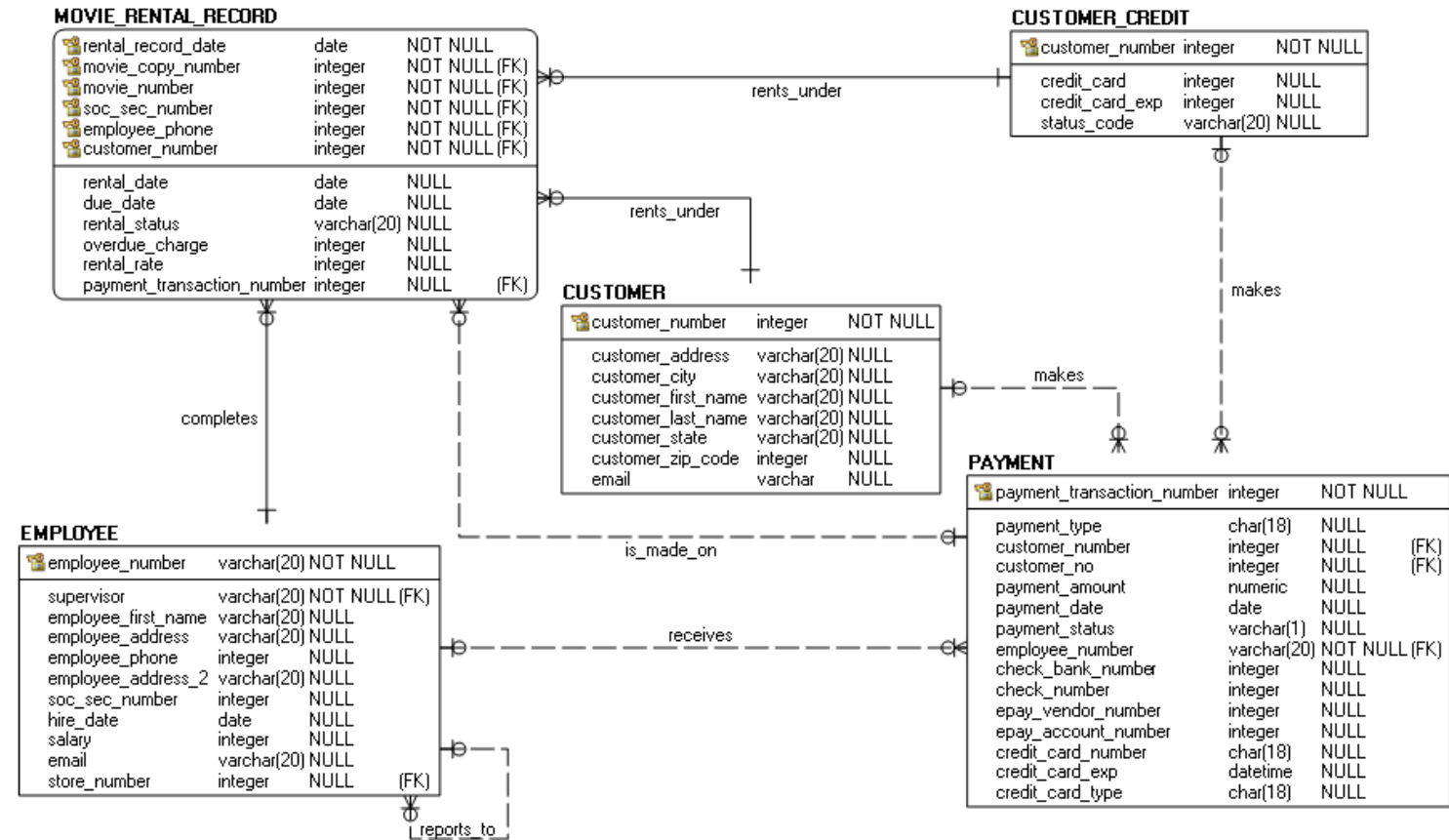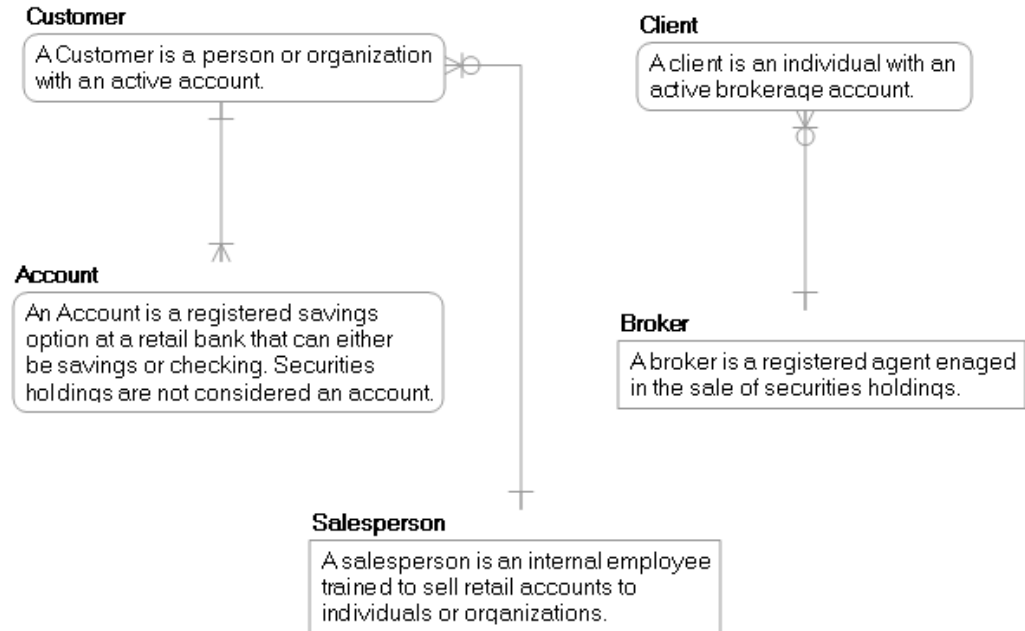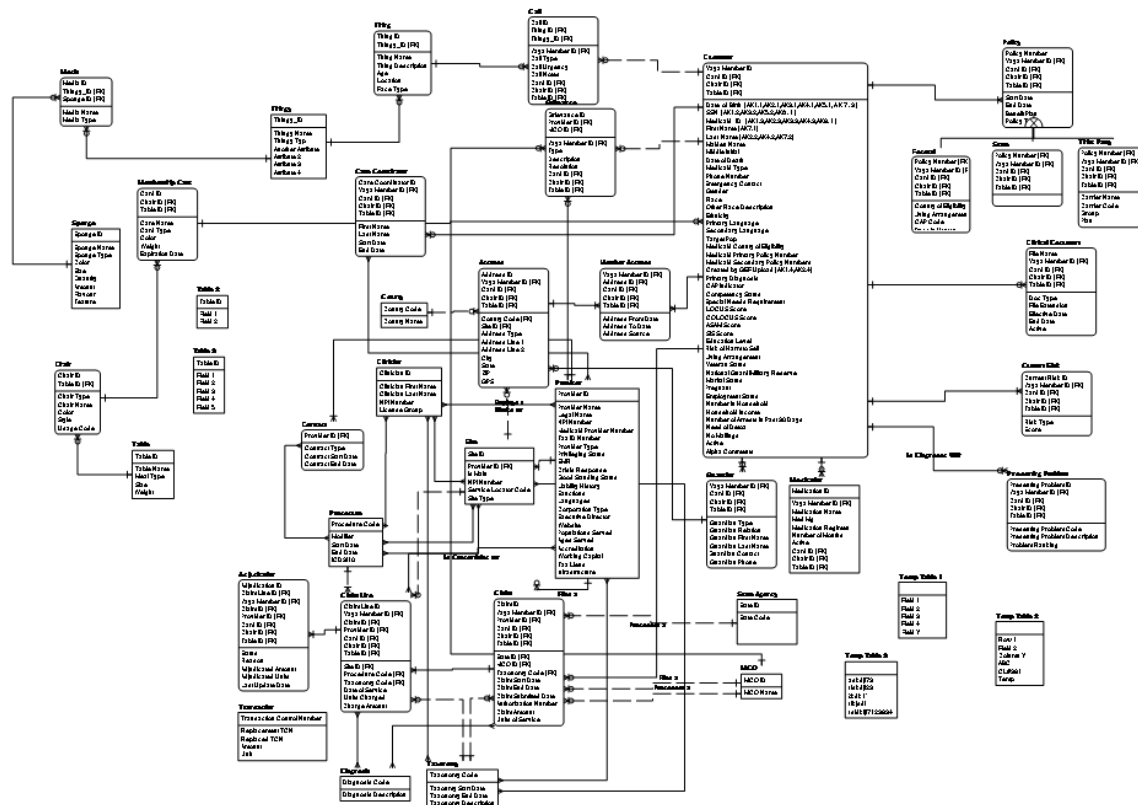
Avoid "Death by Data Modeling"

- "We're just going to sit in this room for a few days until we scope out the entire enterprise data model plastered across these three walls.
- Just about 1000 entities or so…
- First off, what is the data type for account code? …"
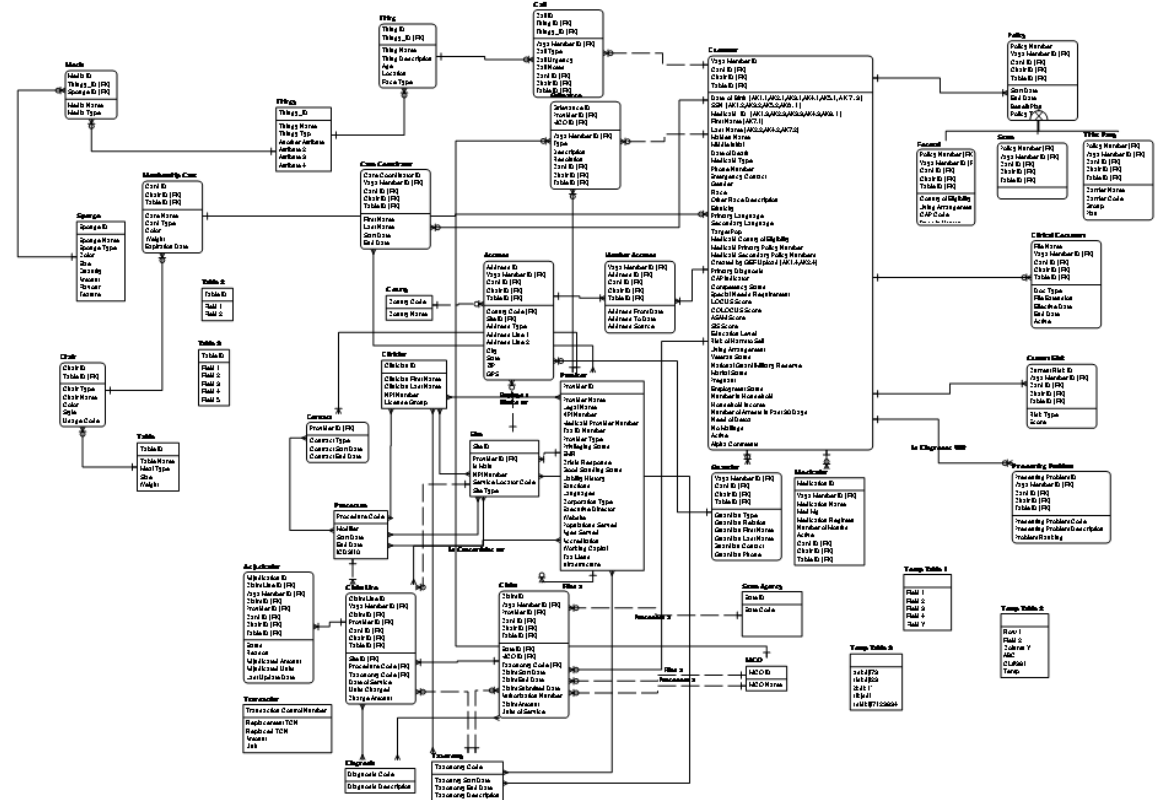
Break the Large Modeling Efforts into Manageable Chunks

Instead of creating large models all at once

Break them into smaller "chunks" / sprints

Customer
A Customer is a person or organization with an active account.

Account
An Account is a registered savings option at a retail bank that can either be savings or checking. Securities holdings are not considered an account.

Salesperson
A salesperson is an internal employee trained to sell retail accounts to individuals or organizations.

Client
A client is an individual with an active brokerage account.

Broker
A broker is a registered agent enaged in the sale of securities holdings.

Data Modeling Creates an "Active Inventory" of Data Assets

- **Know what data you have:** Create a visual inventory of database systems

- **Know what your data means:** Communicate key business requirements between business and IT stakeholders

- **Support data consistency:** Build consistent database structures & support data governance initiatives
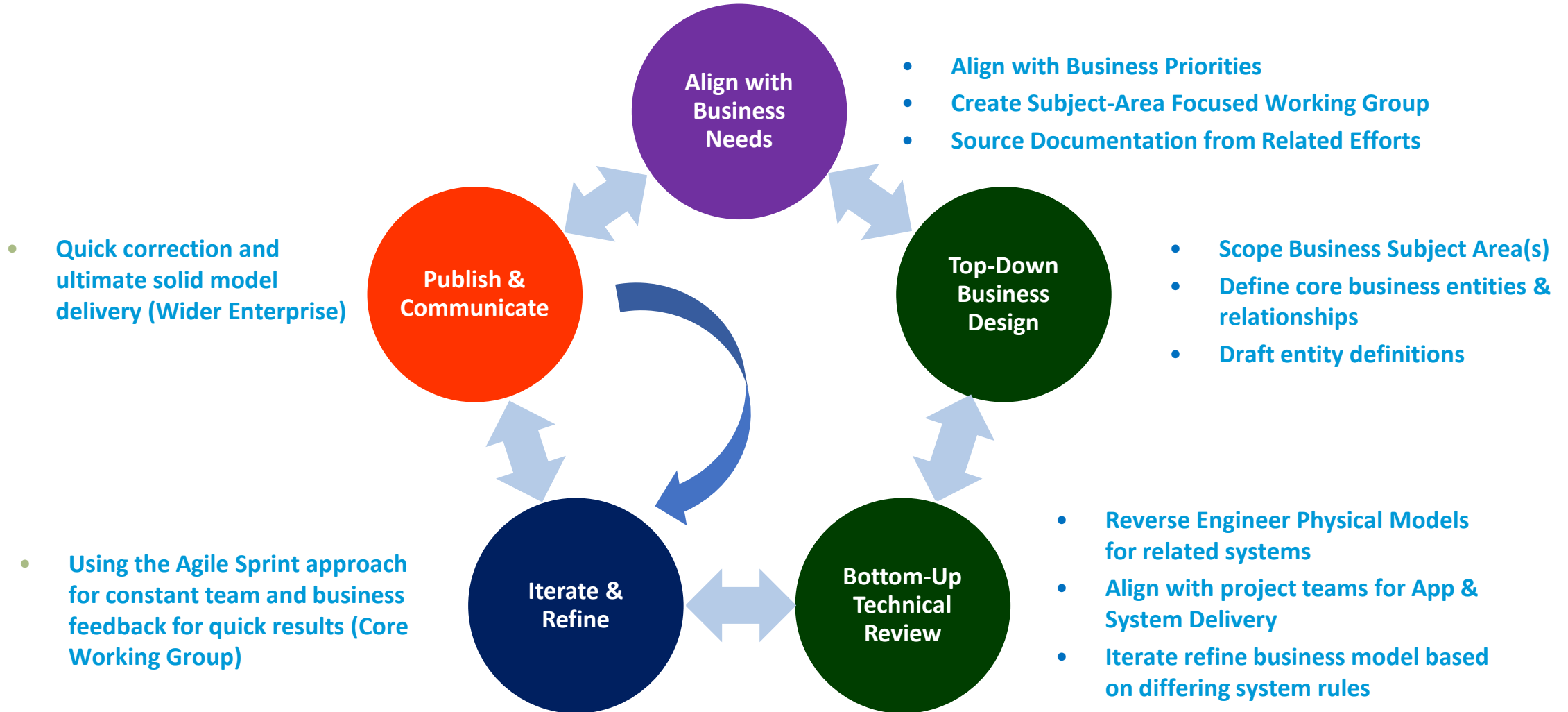
Data Models
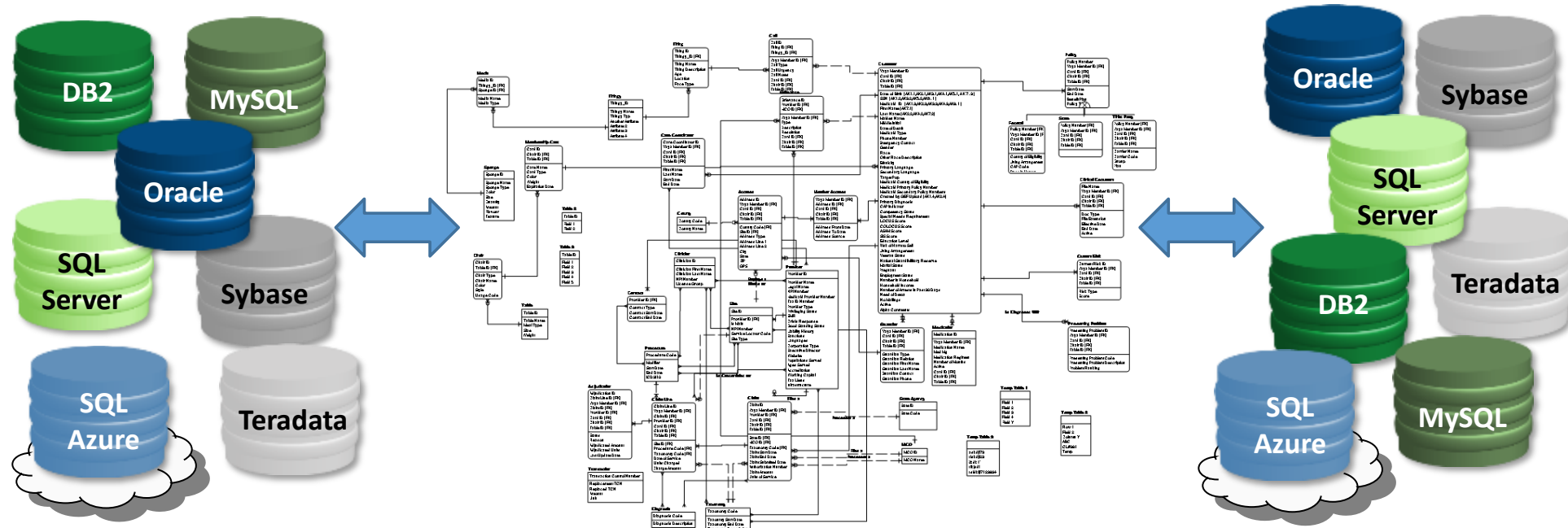
Forward Engineering

Reverse Engineering

An Agile Approach to Data Modeling

Rapid Development, Rapid Feedback

Align with Business Needs
- Align with Business Priorities
- Create Subject-Area Focused Working Group
- Source Documentation from Related Efforts

Top-Down Business Design
- Scope Business Subject Area(s)
- Define core business entities & relationships
- Draft entity definitions

Publish & Communicate
- Quick correction and ultimate solid model delivery (Wider Enterprise)

Iterate & Refine
- Using the Agile Sprint approach for constant team and business feedback for quick results (Core Working Group)

Bottom-Up Technical Review
- Reverse Engineer Physical Models for related systems
- Align with project teams for App & System Delivery
- Iterate refine business model based on differing system rules

Focus on Communication & Iteration

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DATA ARCHITECTURE STRATEGIES

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

...And More!

- There are numerous ways to model and store data.
  - Hierarchical/XML
  - Time series
  - COBOL Copybook!
  - S3 "buckets"
  - Data Vault
  - Etc...
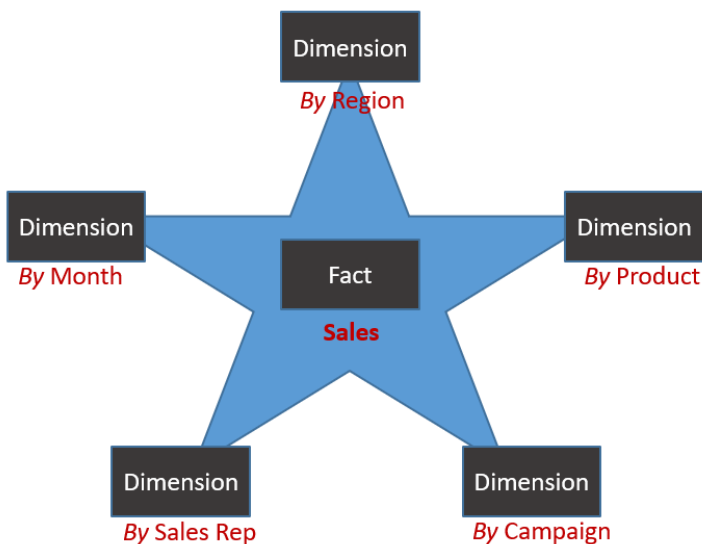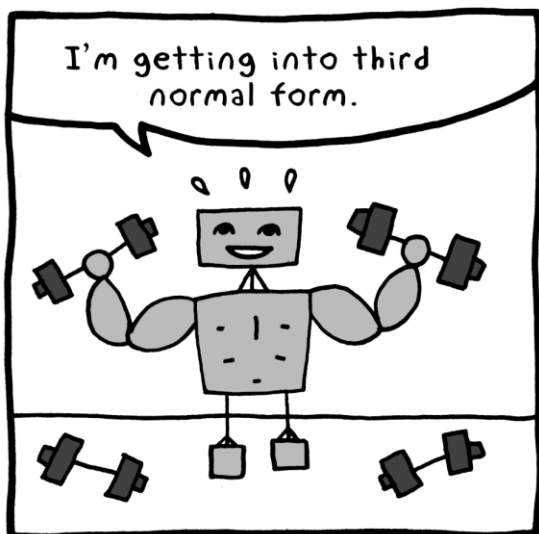
> No modeling technique is inherently "better" than another. Data use cases & purpose drives what "good" looks like.

Real-World Use Cases for Data Models

Examples from practice

These are all from real-world examples we've implemented. Data Models are everywhere.

Environmental Data Sampling	**Early Childhood Development**	**eCommerce & Digital Transformation**	**University Student Support**
How do we align our scientific terminology?	*How to we create better outcomes for children?*	*What is data is key to our digital transformation?*	*Understanding the Student Journey with Data*
Water Utility Data Modernization	**Construction Contracting Efficiencies**	**Agile Software Development**	**Membership Org Customer Centricity**
How do we reflect our business rules into our new, digital environment?	*How can a data model highlight inefficiencies in our business?*	*What data is involved in this user story?*	*How do we define our customer/member?*

Etc…

Real World Business Benefits

Some Specific Issue Solved with Data Modeling

Why did our website go down – losing two days of online sales?

Product Item Code: CHAR(10)

Why do we have so many duplicate suppliers?

A Supplier can have more than one address….

Who decided to sent renewal reminders to people who don't own our software?

A customer is an individual who has purchased one or more products.

How do we scope our data strategy & roadmap for the coming year?

This high-level data model shows the scope of our enterprise data.

Extra super-hero points

Summary

- **Speak the language of the business** in a conceptual and logical data model

- Be more "data advisor" and less "data architect" for business-centric modeling. Your model should **tell the story of the business**.

- A good business data model **supports solid physical implementations**.

- **Data Modeling helps increase efficiency** and avoid unnecessary rework

- **All industries can benefit** from business-centric data modeling.

- **Data models solve real-world business problems (or stop them happening to begin with...)**

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?