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 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 member, contributor to the DMBOK 2.0 and 3.0, 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.
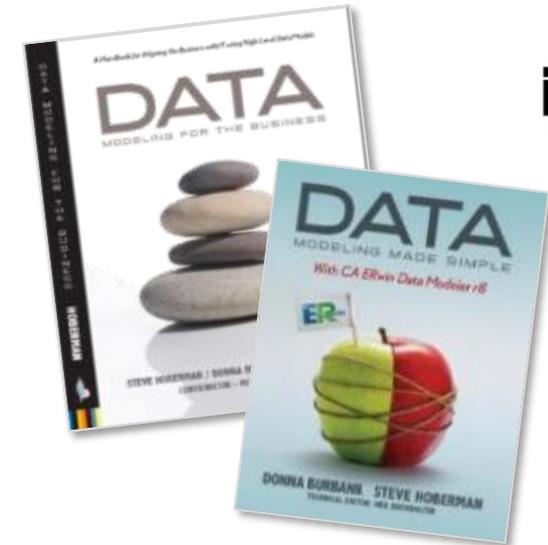
DATAVERSITY Data Architecture Strategies

This Year's Lineup

- **January**   Trends in Data Architecture

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

- **March**   Building the Right Architecture for Analytics & Reporting

- **April**   Data Architect vs. Data Engineer vs. Data Scientist – Making Sense of Roles in Today's Data-Centric Organization

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

- **June**   Where Data Models Fit in Today's Modern Data Architecture

- **July**   Data Architecture vs. Enterprise Architecture

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

- **September**   Modern Data Architecture: Practical Options for Today's Data-Driven Organization

- **October**   Best Practices in Metadata Management

- **December**   The Business Value of Data Modeling

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.

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

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

Purpose

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

Data Modeling Usage Trends

What types of models and diagrams do you use in your Data/Enterprise Architecture?

Type	Percentage
Logical data models	59%
Conceptual data models	53%
Physical data models	53%
Data flow diagrams	51%
Data lineage diagrams	33%
Business process models	28%
System Architecture Diagrams	24%
Don't know	18%
Business Capability Models	13%
CRUD Matrices	10%
Class models	7%
Component diagrams	5%
Sequence diagrams	5%
State diagrams	5%
Javadoc	5%
Other (please specify)	3%

From Trends in Data Management, a 2024 DATAVERSITY® Report, by Donna Burbank and Michelle Knight

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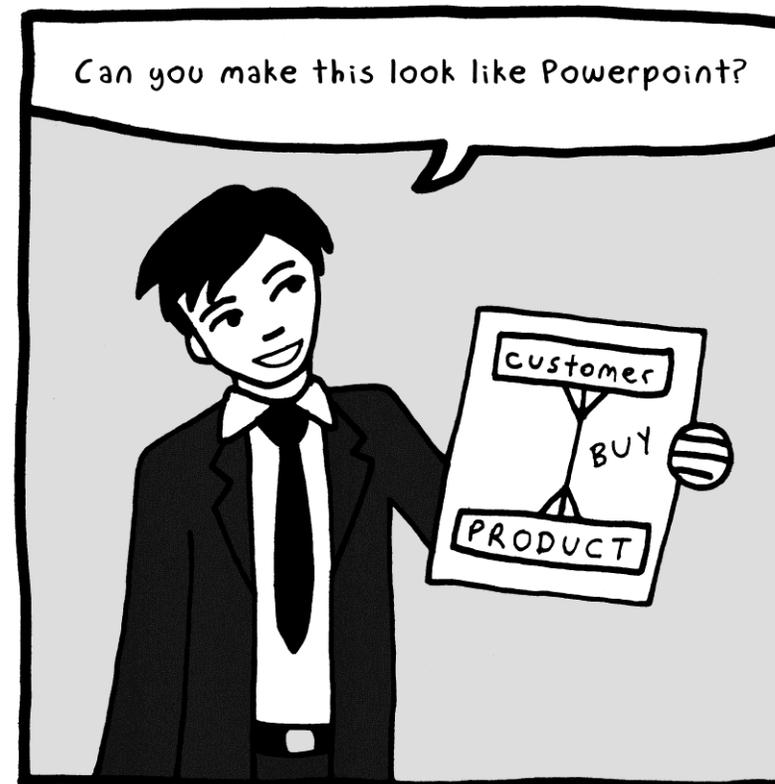
From <u>Data Modeling for the Business</u> by Hoberman, Burbank, Bradley, Technics Publications, 2009
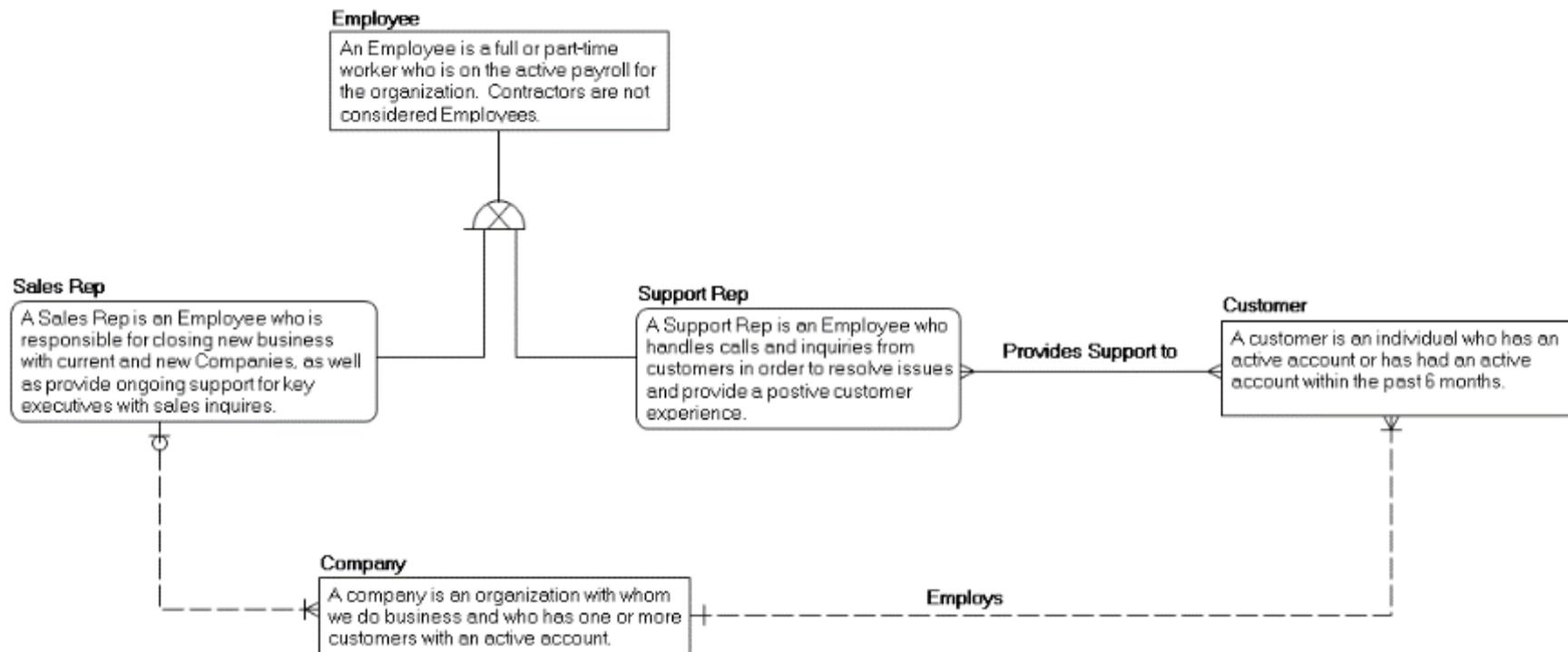
Business Data Model (Conceptual)

- 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 postive 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 are Storytellers.

- 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"

And then each Customer can buy many Products, and they lived happily ever after.

From Data Modeling for the Business 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.
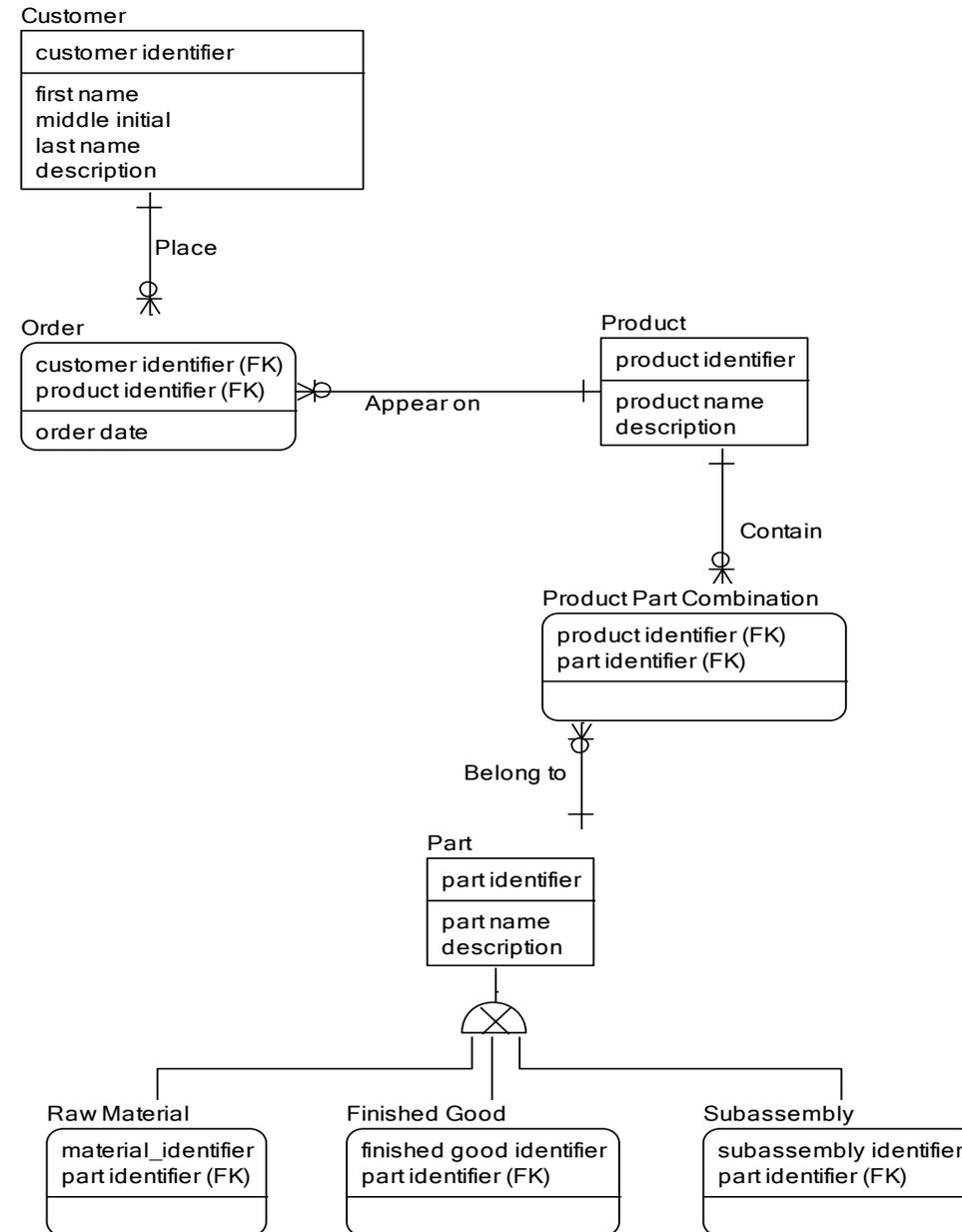 - A department can contain more than one employee.

Employee

Customer

Account
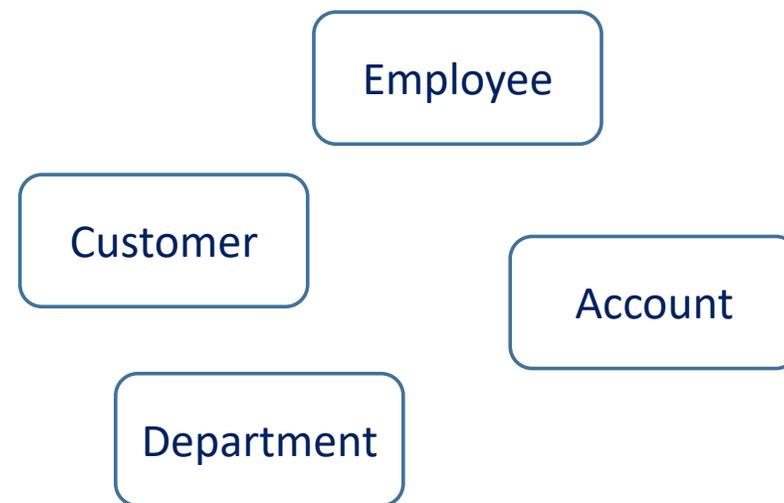
Department

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!

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
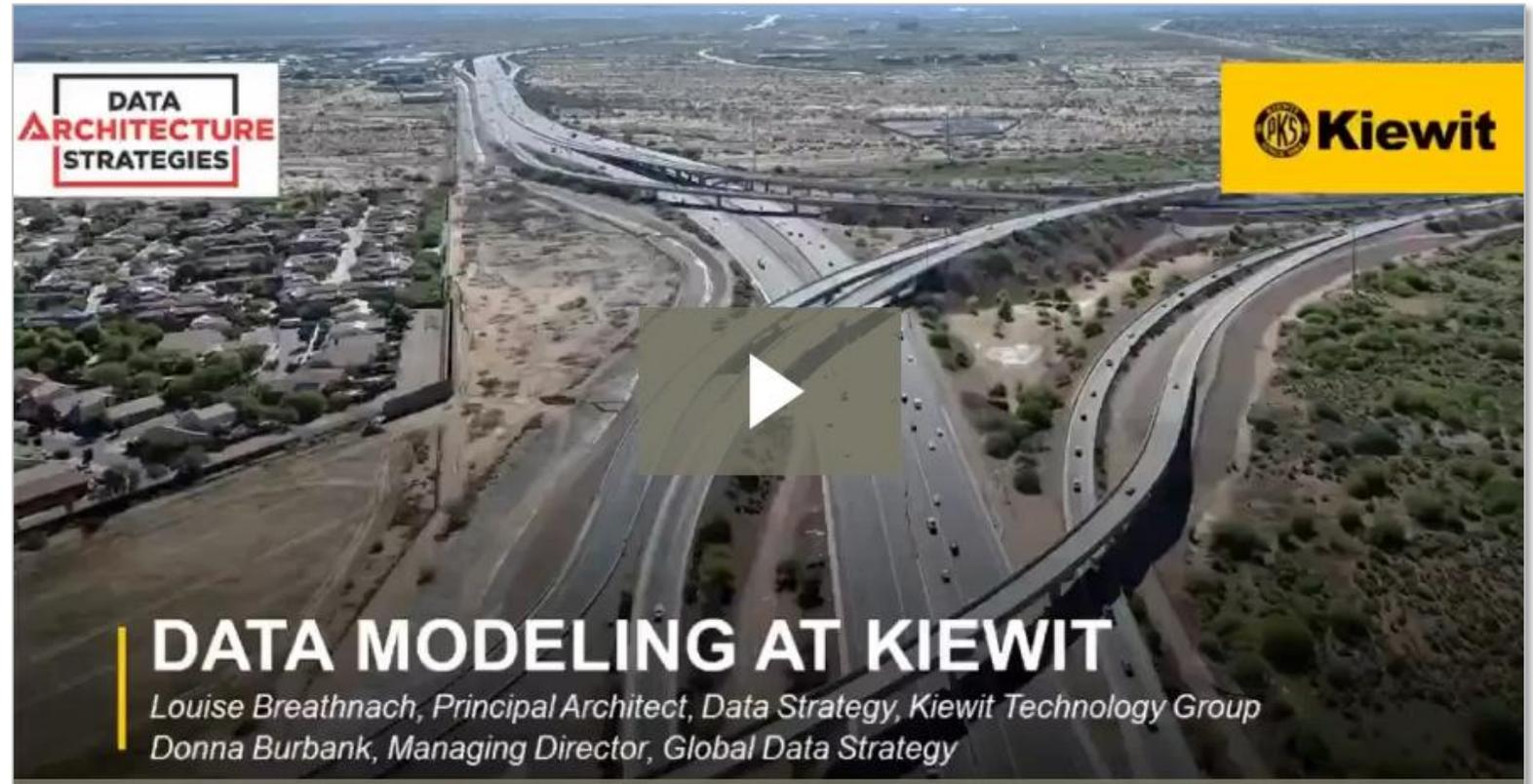 - Increasing collaboration between teams

> "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
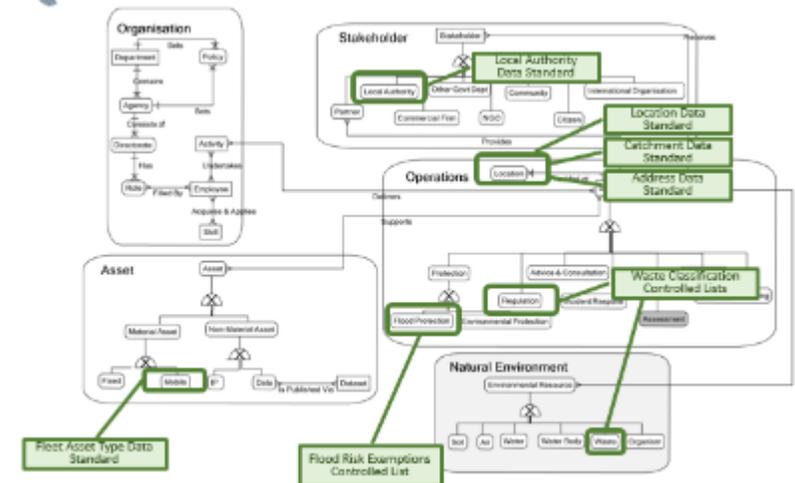
Business Modeling at Kiewit*

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

DATA MODELING AT KIEWIT

Louise Breathnach, Principal Architect, Data Strategy, Kiewit Technology Group
Donna Burbank, Managing Director, Global Data Strategy

* See March 2021 DATAVERSITY webinar

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.
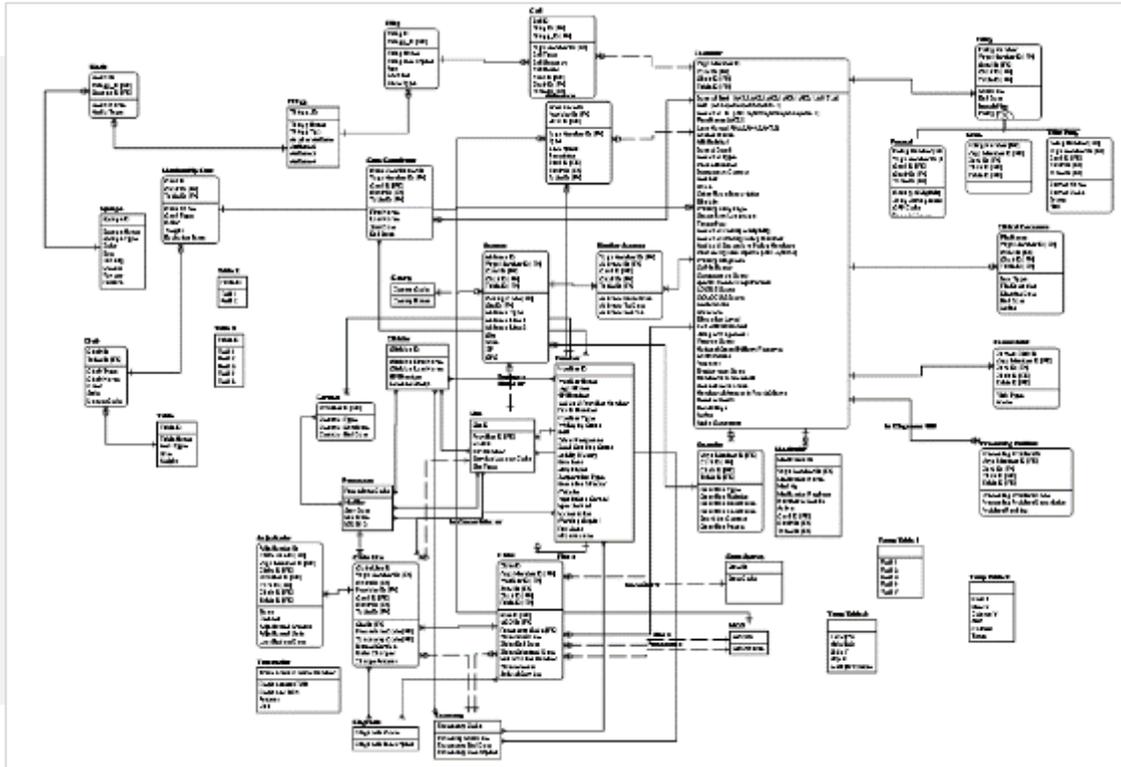

Design
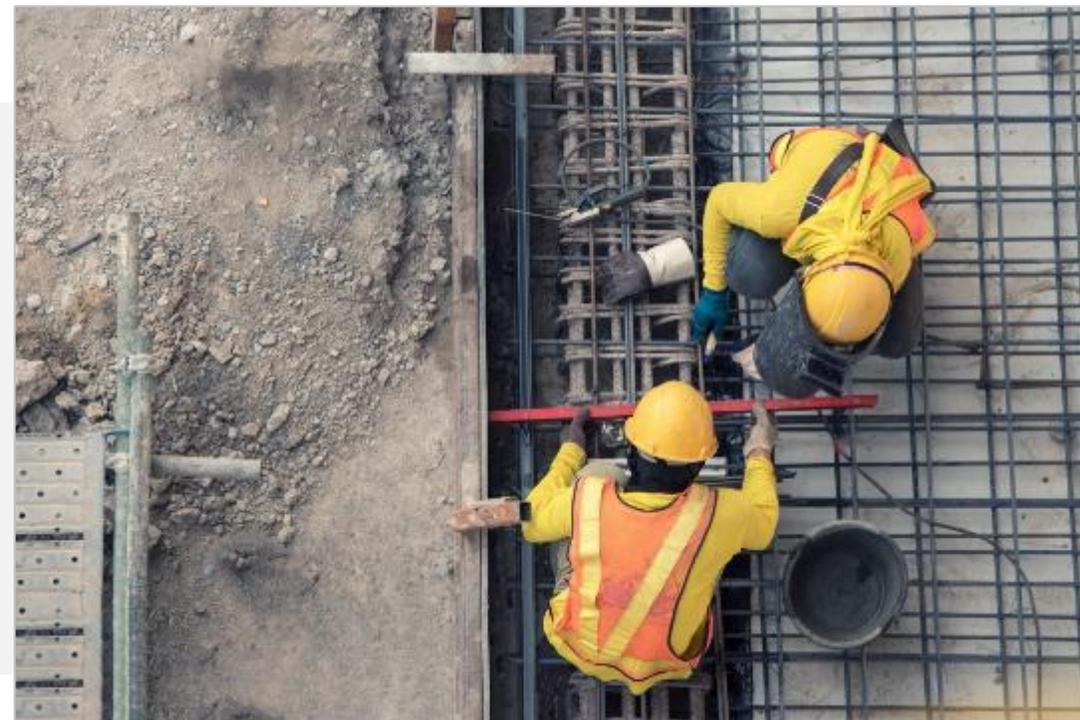
Build

Architecture vs. Construction

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

Design

```
product_id        INTEGER NOT NULL,
    product_name      VARCHAR(50) NULL,
    product_price     NUMBER NULL);

ALTER TABLE PRODUCT
    ADD  ( PRIMARY KEY (product_id) ) ;

CREATE TABLE DEPARTMENT (
    department_id     INTEGER NOT NULL,
    department_name   VARCHAR(50) NULL);

ALTER TABLE DEPARTMENT
    ADD  ( PRIMARY KEY (department_id) ) ;


CREATE TABLE EMPLOYEE (employee_id
INTEGER NOT NULL,
    department_id     INTEGER NOT NULL,
    employee_fname    VARCHAR(50) NULL,
    employee_lname    VARCHAR(50) NULL,
    employee_ssn      CHAR(9) NULL);
ALTER TABLE EMPLOYEE
    ADD  ( PRIMARY KEY (employee_id) ) ;

CREATE TABLE CUSTOMER (
    customer_id       INTEGER NOT NULL,
    customer_name     VARCHAR(50) NULL,
    customer_address  VARCHAR(150) NULL,
    customer_city     VARCHAR(50) NULL,
    customer_state    CHAR(2) NULL,
    customer_zip      CHAR(9) NULL);

ALTER TABLE CUSTOMER
    ADD  ( PRIMARY KEY (customer_id) ) ;

CREATE TABLE ZORDER (
    zorder_id         INTEGER NOT NULL,
    employee_id       INTEGER NOT NULL,
    customer_id       INTEGER NOT NULL,
    zorder_date       DATE NULL);

ALTER TABLE ZORDER
    ADD  ( PRIMARY KEY (zorder_id) ) ;
```
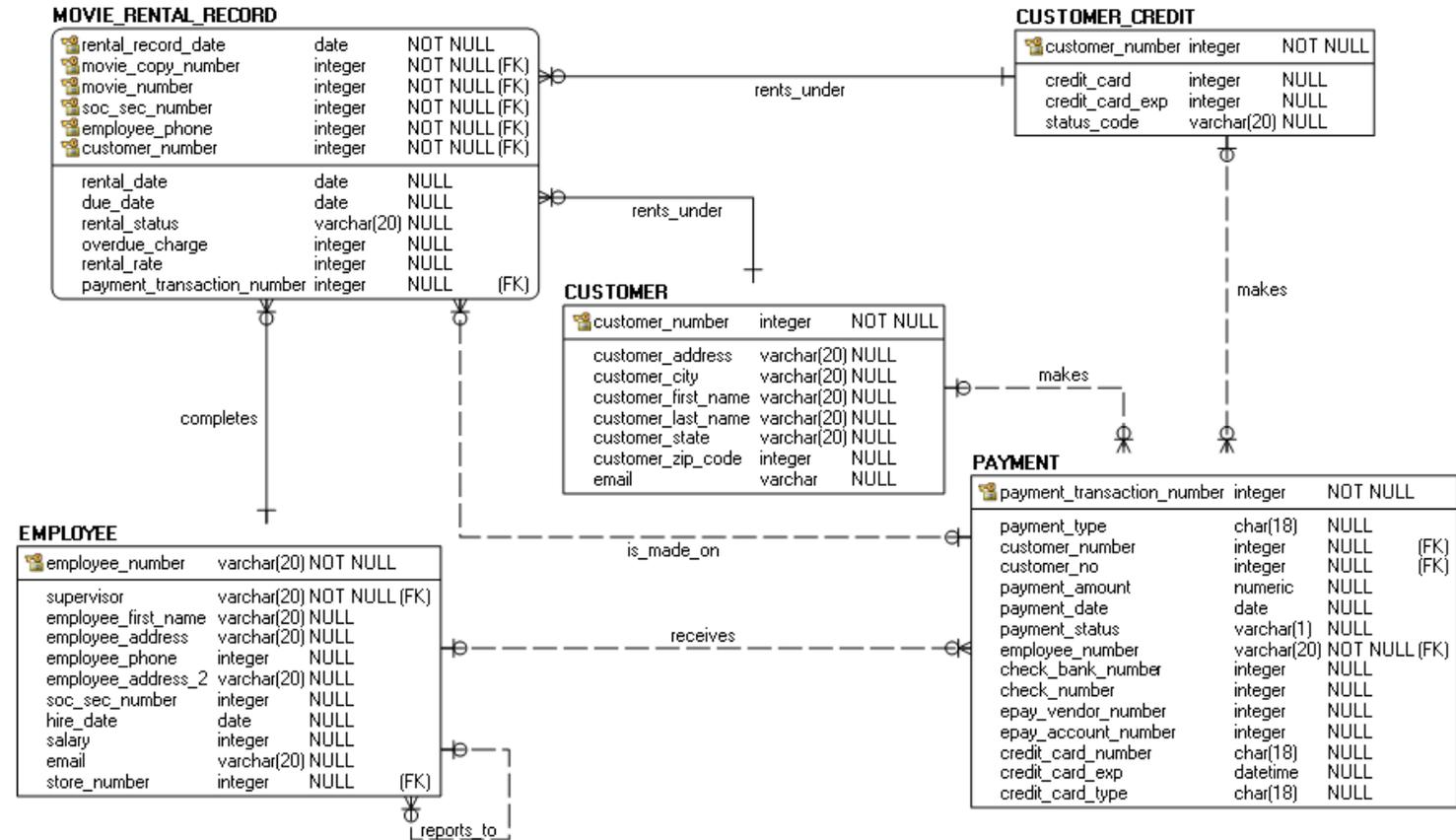
Build

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…
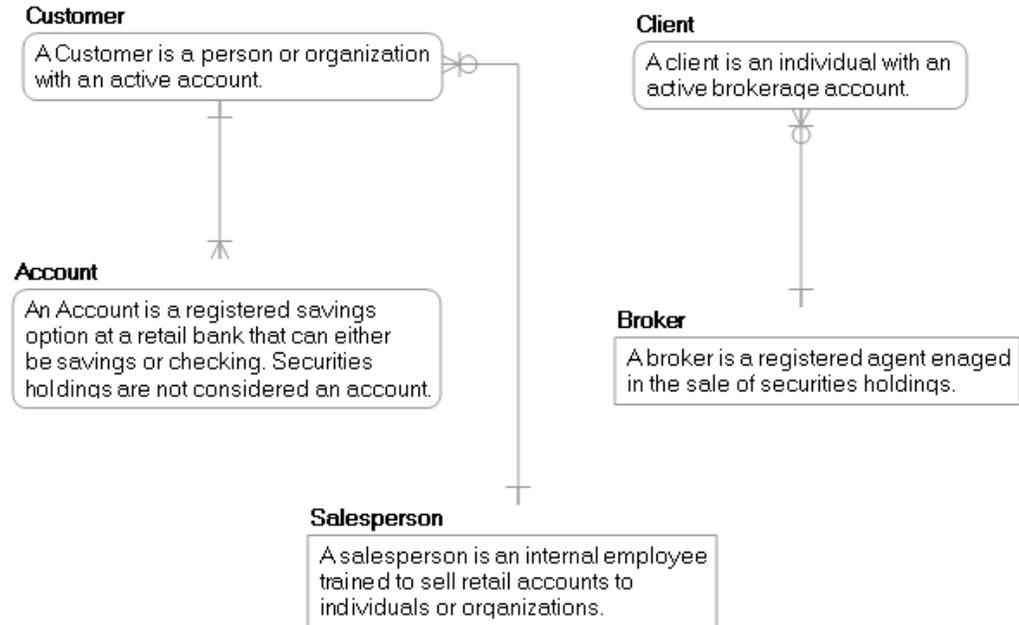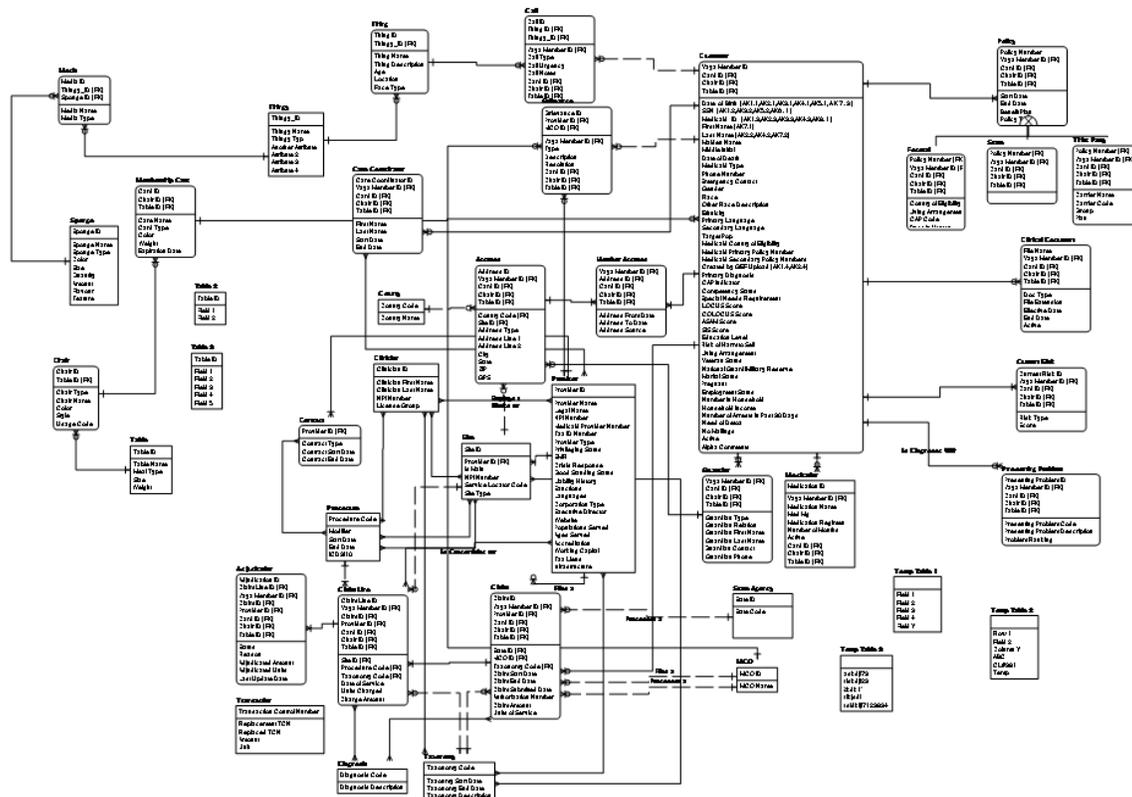- First off, what is the data type for account code? …"

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.

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.

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

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
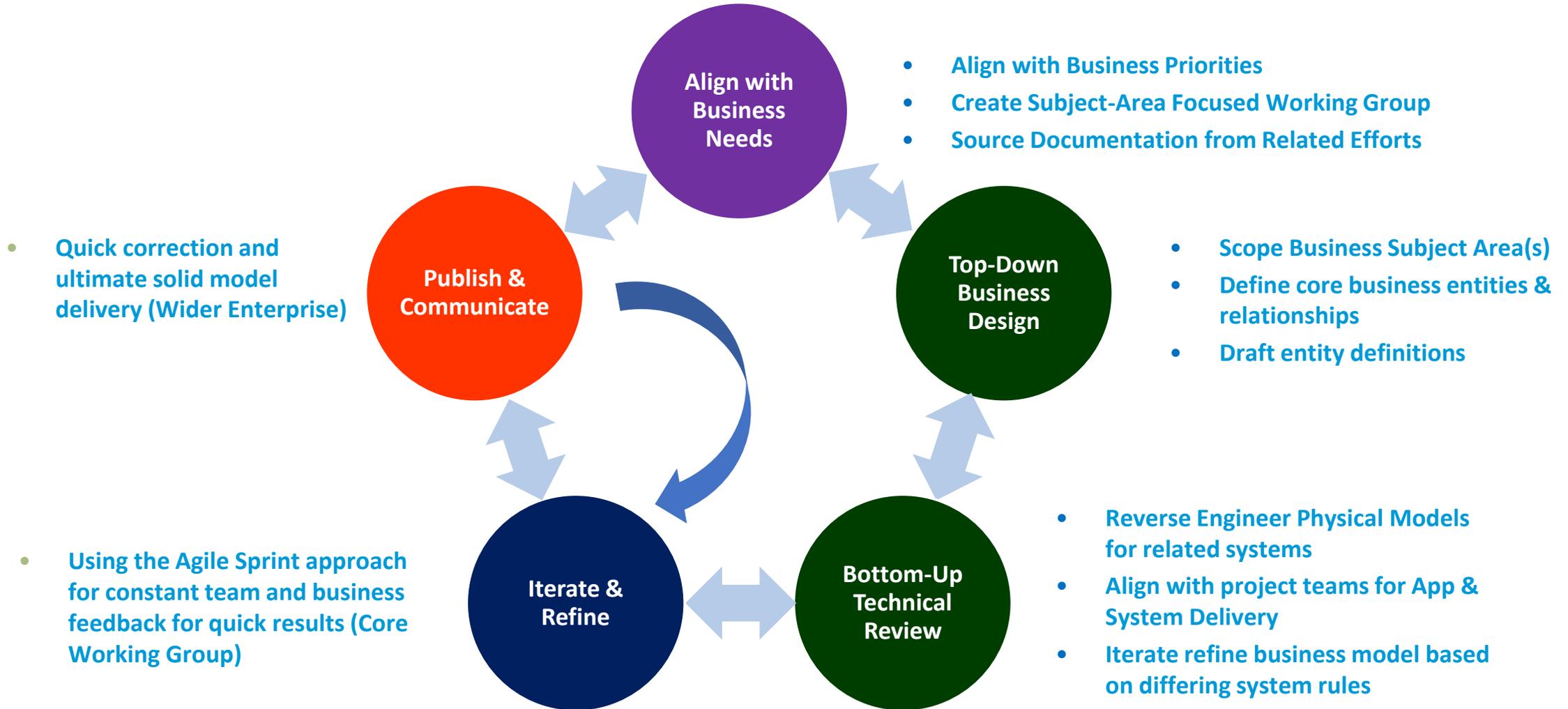
Data Models
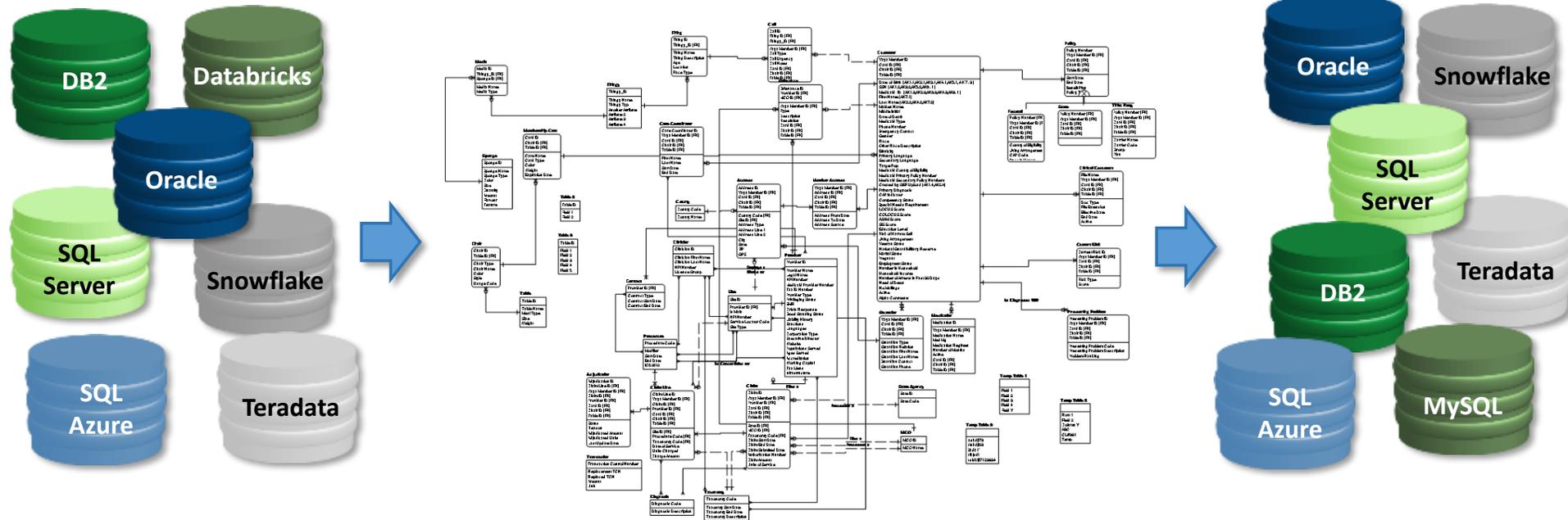
Forward Engineering

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**

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**

Iterate & Refine

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

Publish & Communicate

- **Quick correction and ultimate solid model delivery (Wider Enterprise)**

Focus on Communication & Iteration

Real-World Use Cases for Data Models

Examples from practice

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

Financial Services	**Manufacturing & Retail**	**eCommerce & Digital Transformation**	**University Student Support**
Who is our Customer and how do we target Products to support them?	*How does our physical Product compete with digital startups?*	*What is data is key to our digital transformation?*	*How do we better understand 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 Issues 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.

Summary

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

- 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 from happening to begin with...)**
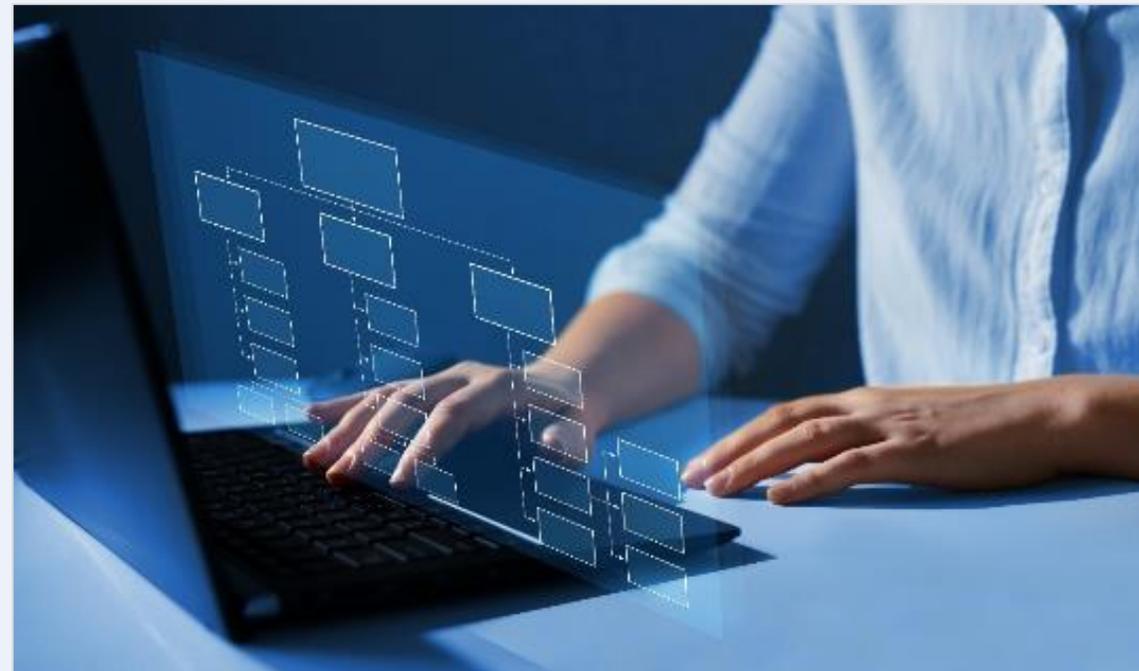
Who We Are: Business-Focused Data Strategy
Maximize the Organizational Value of Your Data Investment

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**

- 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 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

Global Data Strategy, Ltd. 2025

www.globaldatastrategy.com

Farewell!

This is my last webinar with Dataversity

I'll still be creating content, so please follow me on Linkedin at:

https://www.linkedin.com/in/donnaburbank/

... and Global Data Strategy at:

https://linkedin.com/company/global-data-strategy-ltd

https://globaldatastrategy.com

Stay tuned for exciting new things coming in 2026!

Thoughts? Ideas?
Questions?