Gaining Competitive Advantage Using AI with EACOE Enterprise Architecture

11th Annual 930gov Convention

Presented by
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Gaining Competitive Advantage Using AI With EACOE Enterprise Architecture

How will AI and Enterprise Architecture all fit together? That is the intent of this presentation, to bring some method and reduce a bit of madness. Yes, an Architected approach to AI will bring organizations distinct advantages versus the "un-architected" approaches we are all seeing. We suggest a good deal of the angst and turmoil we are seeing from and due to AI are in great part due to no Enterprise Architecture driving artificial intelligence.

We will begin with what AI is and a bit of a historical perspective. Our analysis indicates this phrase/concept first appeared in 1955 (yes, that date is correct). Another term that was used during that time was "thinking machine." We will then look at the various "flavors" of AI, as there is no one definition that we see that addresses the variations we have identified. And then, we will piece this all together with a path going forward to bring you and your organization a competitive advantage using AI.

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Definitions

What is Enterprise Architecture

Enterprise Architecture is explicitly representing an organization's desired state and as-is state, through a set of independent, non-redundant artifacts, defining how these artifacts relate with each other, and developing a set of prioritized, aligned capabilities/initiatives/focus areas needed to meet the organization's goals, communicating this understanding to stakeholders, and advancing the organization from its as-is state to its desired state.

(Google - 932,000,000 entries for Enterprise Architecture)

Definitions

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(As Defined by an Intelligence Community General)

Enterprise Architecture is the roadmap and initiatives needed to enable our Mission Strategy.

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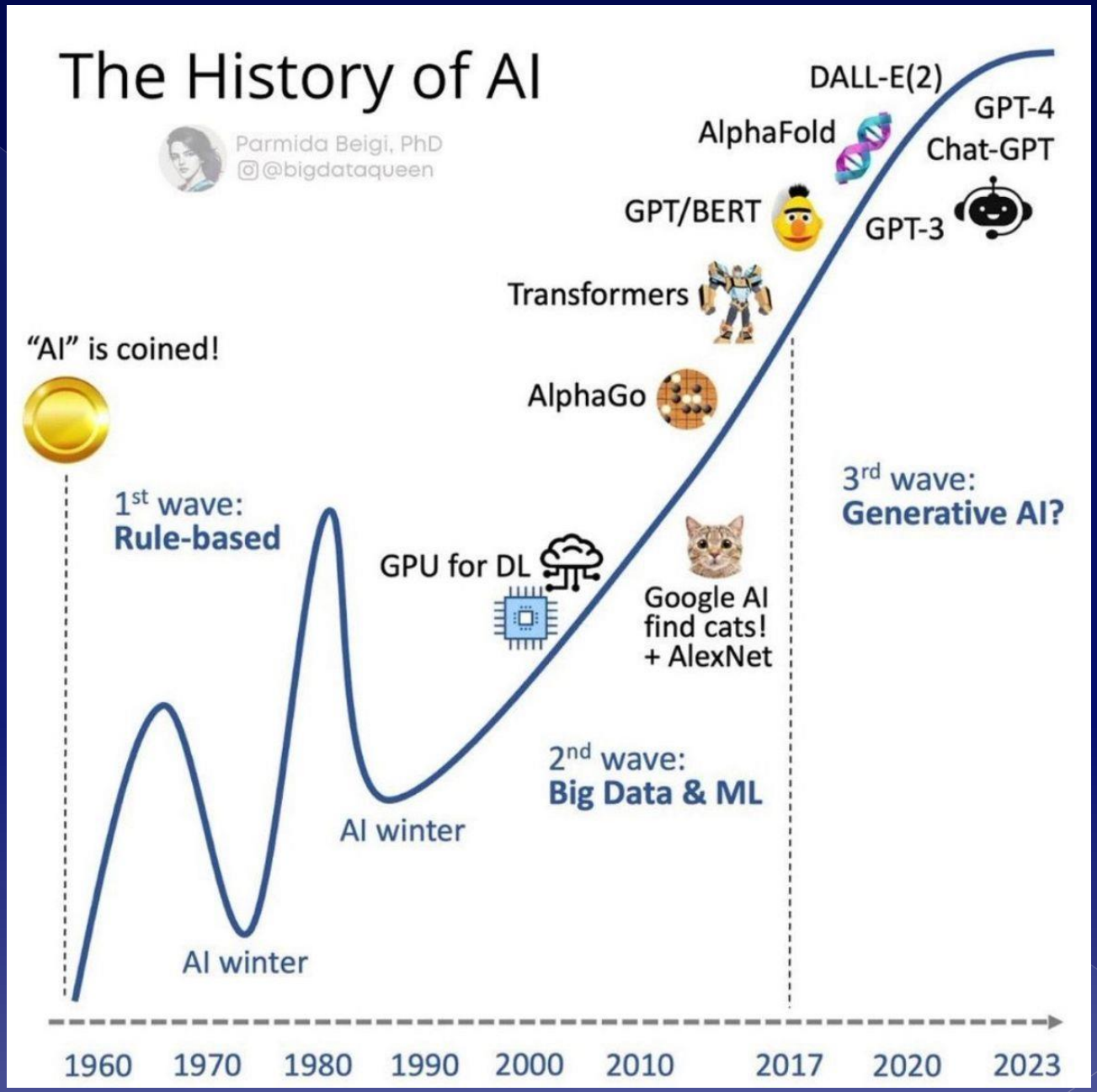

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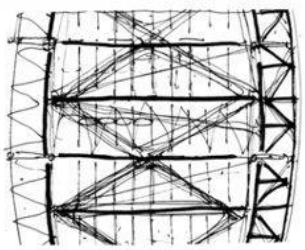
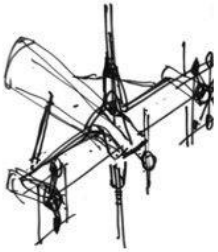
For individuals who are aspiring to become Enterprise / Technical / Domain Architects: Don't be confused between Design, Architecture, Engineering, Implementation and Production Deployment

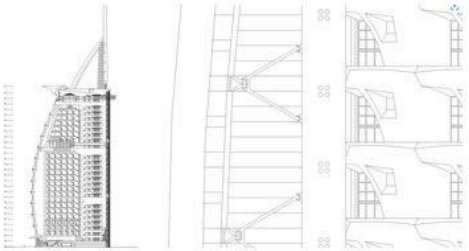
An example from the Burj-Al-Arab in Dubai:

Design
(Step 1)

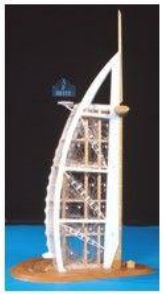




Architecture
(Step 2)



Engineering
(Step 3)



Implementation
(Step 4)

Production Deployment
(Step 5)

Source: BURJ AL ARAB, DUBAI - OLD — WKK (wkkarchitects.com)

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The Four Divisions of an Application

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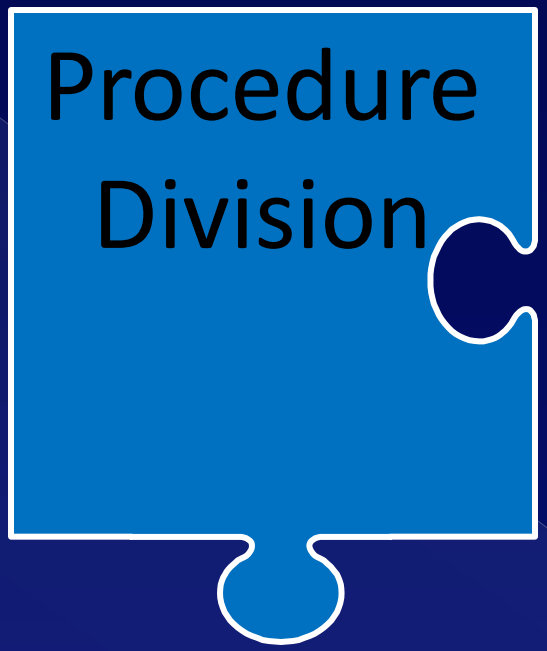
The Four Divisions of an Application



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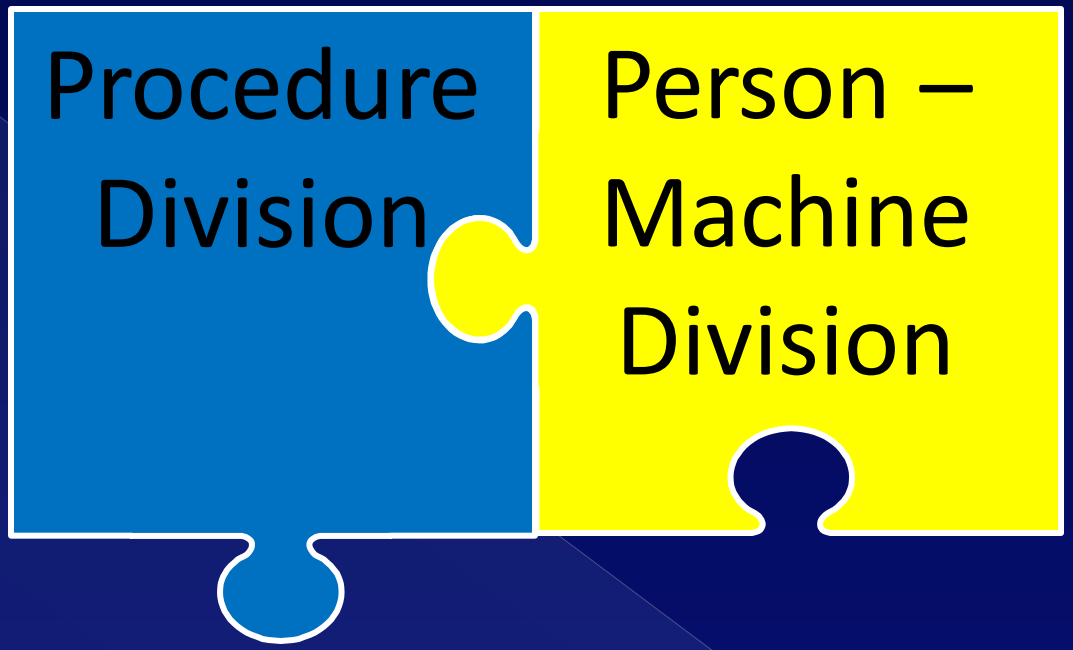
The Four Divisions of an Application



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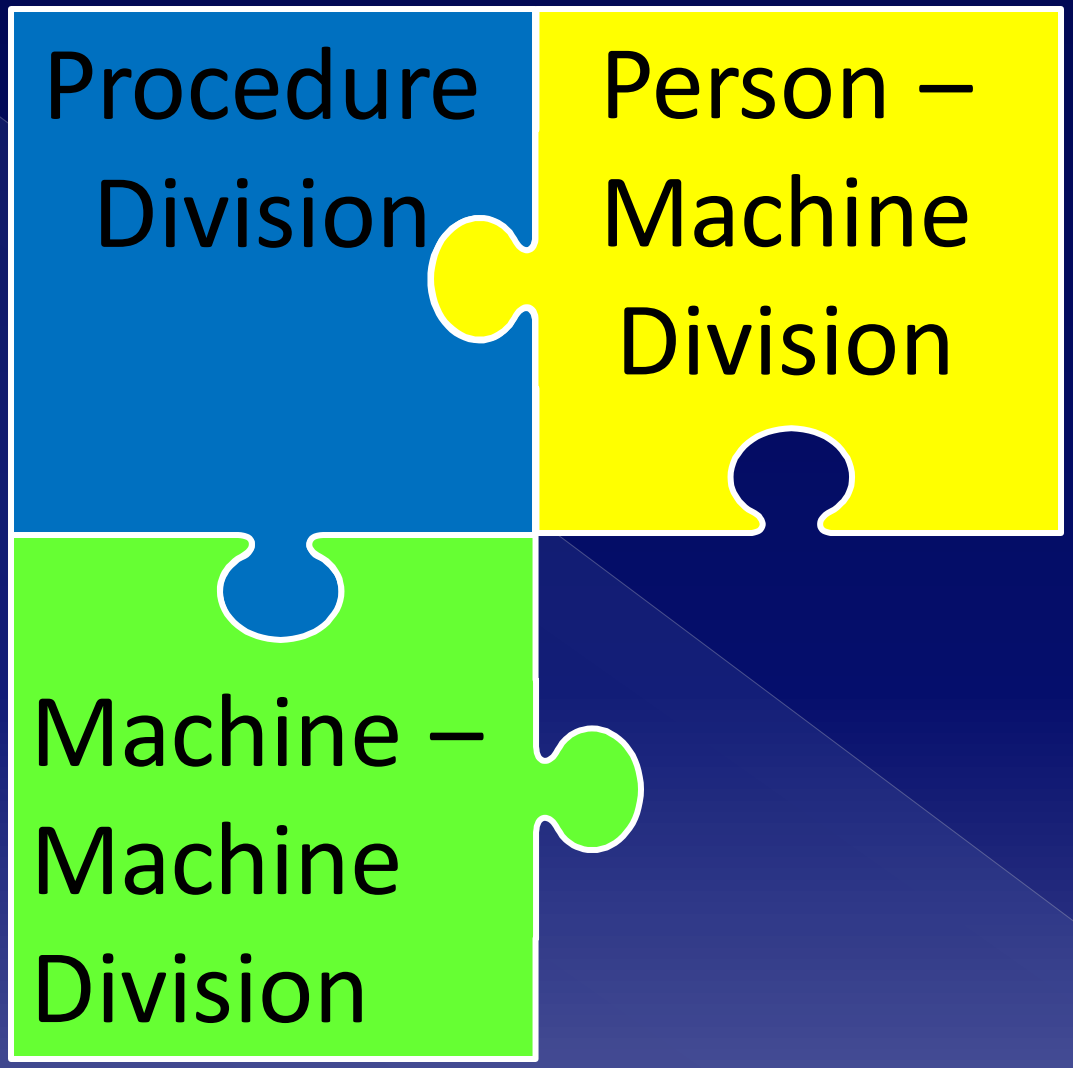
The Four Divisions of an Application



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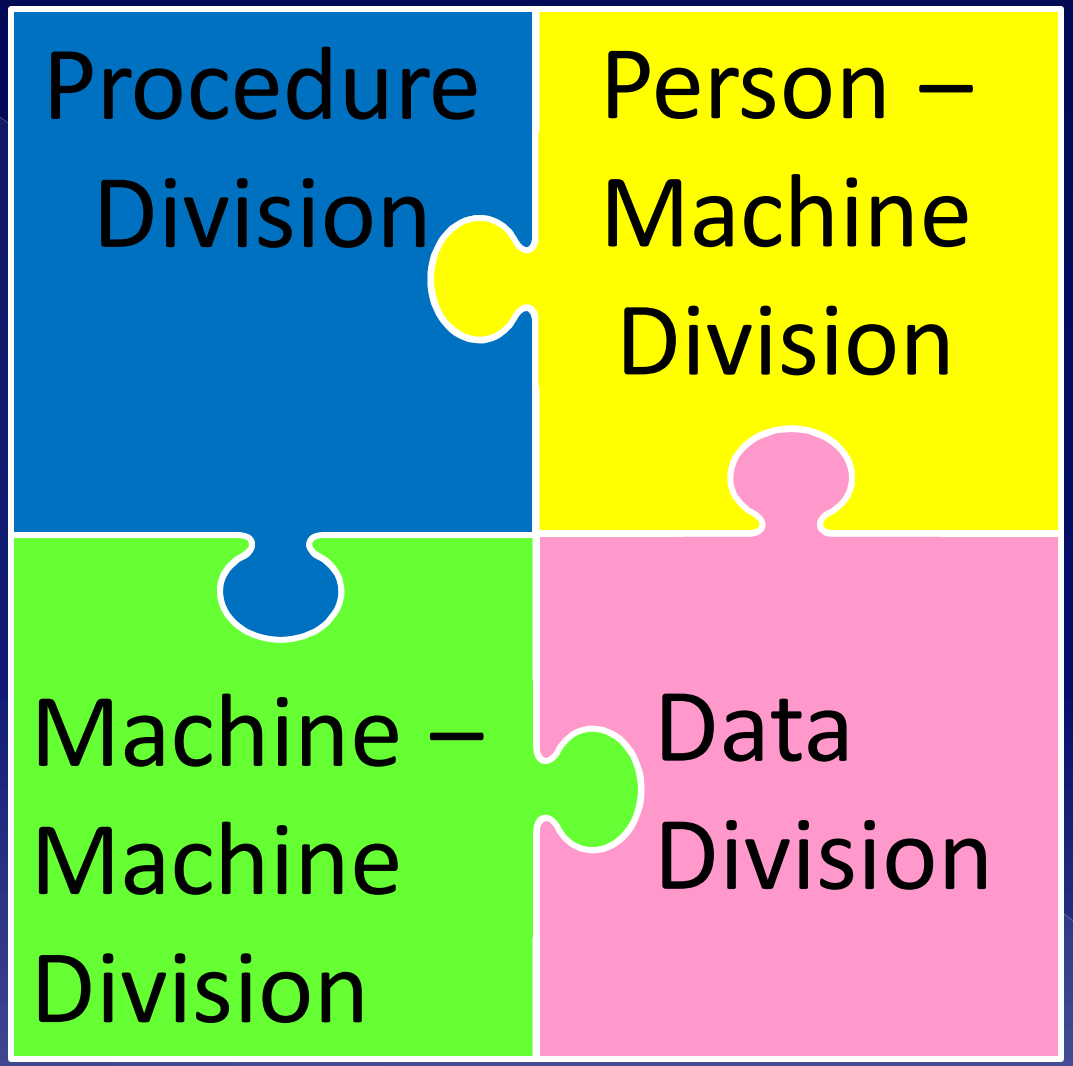

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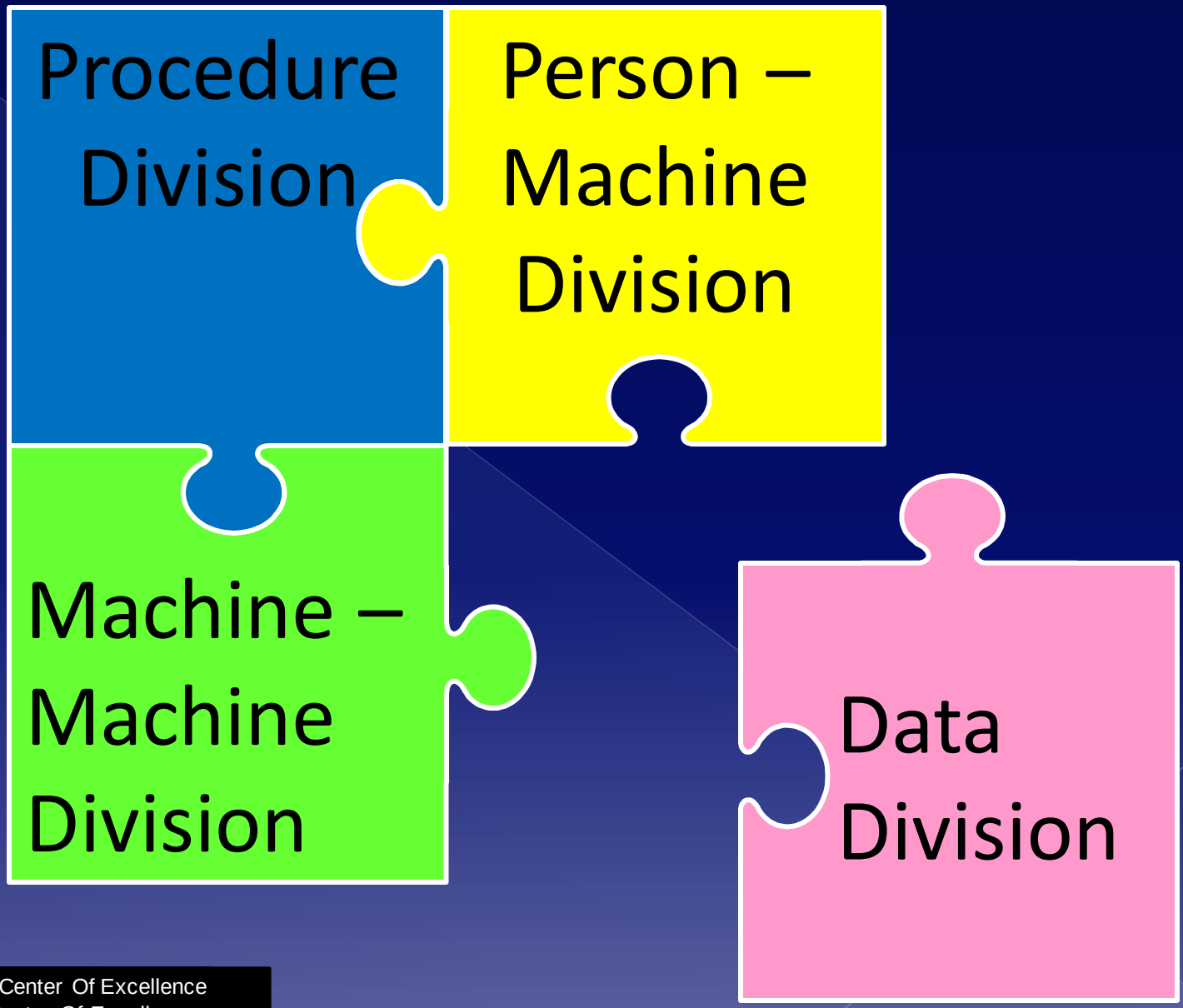

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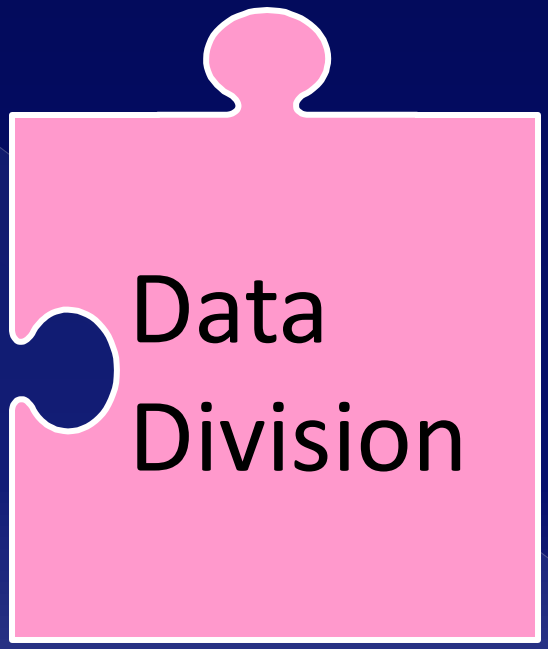
The Four Types of Training Data

AI and Otherwise



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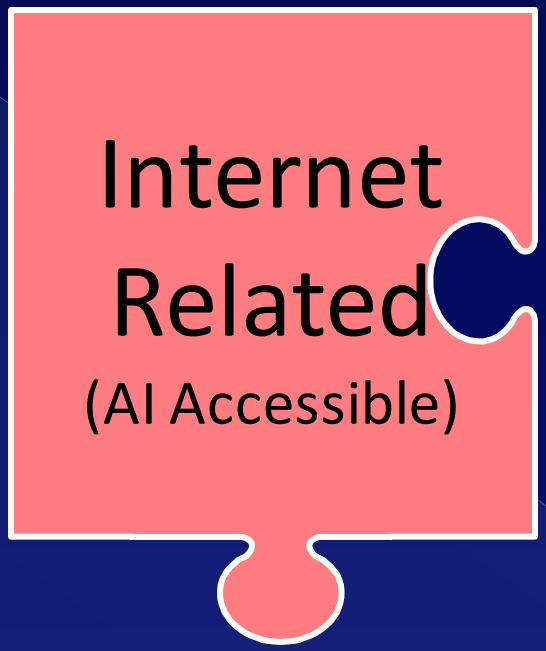
The Four Types of Training Data (Data Division)

AI and Otherwise



Data on the Internet with no provenance

(provenance – history of ownership of an object)

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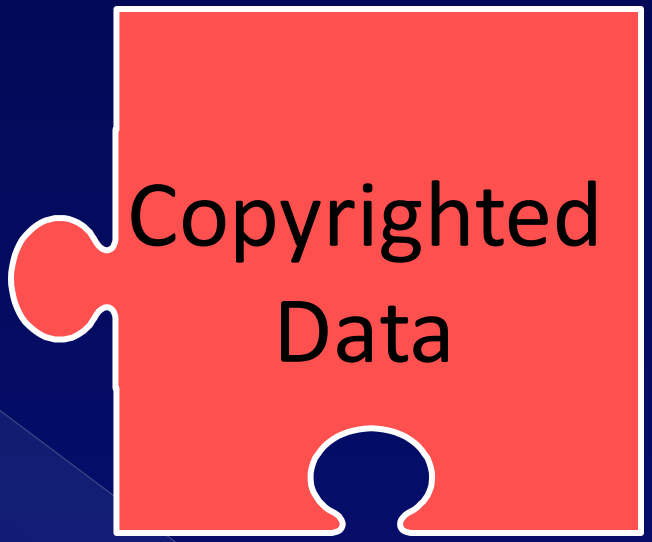
AI and Otherwise



Data on the Internet – Copyrighted

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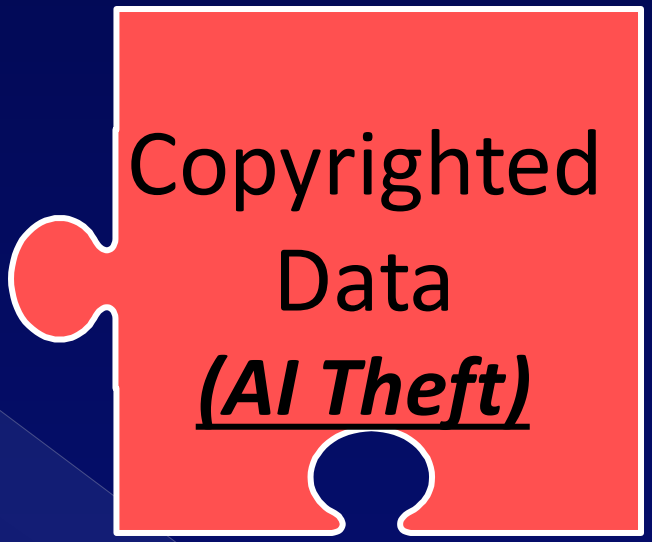

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The GREAT Analogy!

To Apple, Love Taylor

I write this to explain why I'll be holding back my album, 1989, from the new streaming service, Apple Music. I feel this deserves an explanation because Apple has been and will continue to be one of my best partners in selling music and creating ways for me to connect with my fans. I respect the company and the truly ingenious minds that have created a legacy based on innovation and pushing the right boundaries.

I'm sure you are aware that Apple Music will be offering a free 3-month trial to anyone who signs up for the service. I'm not sure you know that Apple Music will not be paying writers, producers, or artists for those three months. I find it to be shocking, disappointing, and completely unlike this historically progressive and generous company.

This is not about me. Thankfully I am on my fifth album and can support myself, my band, crew, and entire management team by playing live shows. This is about the new artist or band that has just released their first single and will not be paid for its success. This is about the young songwriter who just got his or her first cut and thought that the royalties from that would get them out of debt. This is about the producer who works tirelessly to innovate and create, just like the innovators and creators at Apple are pioneering in their field…but will not get paid for a quarter of a year's worth of plays on his or her songs.

These are not the complaints of a spoiled, petulant child. These are the echoed sentiments of every artist, writer and producer in my social circles who are afraid to speak up publicly because we admire and respect Apple so much. We simply do not respect this particular call.

I realize that Apple is working towards a goal of paid streaming. I think that is beautiful progress. We know how astronomically successful Apple has been and we know that this incredible company has the money to pay artists, writers and producers for the 3-month trial period… even if it is free for the fans trying it out.

Three months is a long time to go unpaid, and it is unfair to ask anyone to work for nothing. I say this with love, reverence, and admiration for everything else Apple has done. I hope that soon I can join them in the progression towards a streaming model that seems fair to those who create this music. I think this could be the platform that gets it right.

But I say to Apple with all due respect, it's not too late to change this policy and change the minds of those in the music industry who will be deeply and gravely affected by this. **We don't ask you for free iPhones. Please don't ask us to provide you with our music for no compensation.**

Taylor

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The Four Types of Training Data (Data Division)

AI and Otherwise

An exchange that both parties believe is of value

(example: Exchange an email address for an article or presentation)

Balanced Exchange

(Not AI Accessible)

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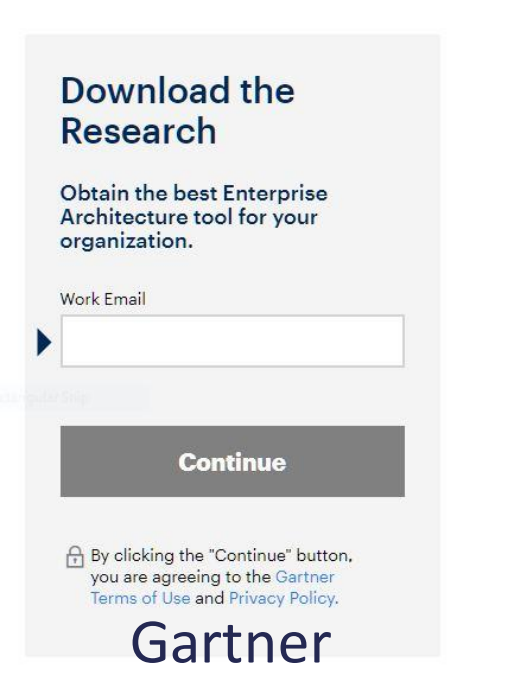
The Four Types of Training Data (Data Division)
AI and Otherwise

Balance Exchange - An exchange that both parties believe is of value

(example: Exchange an email address for an article or presentation)



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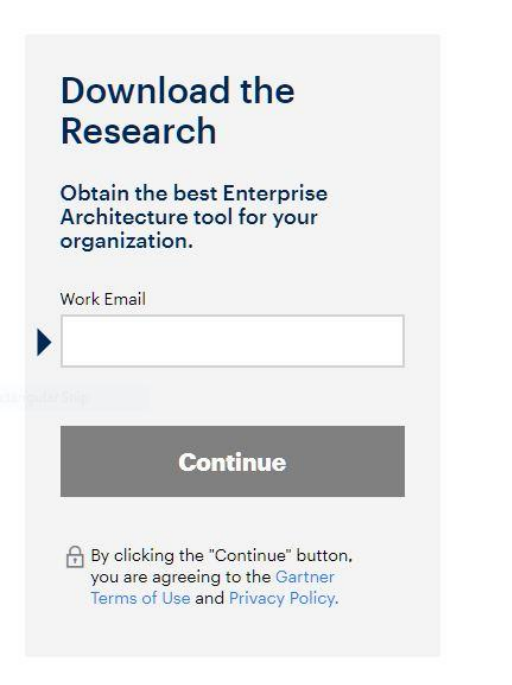

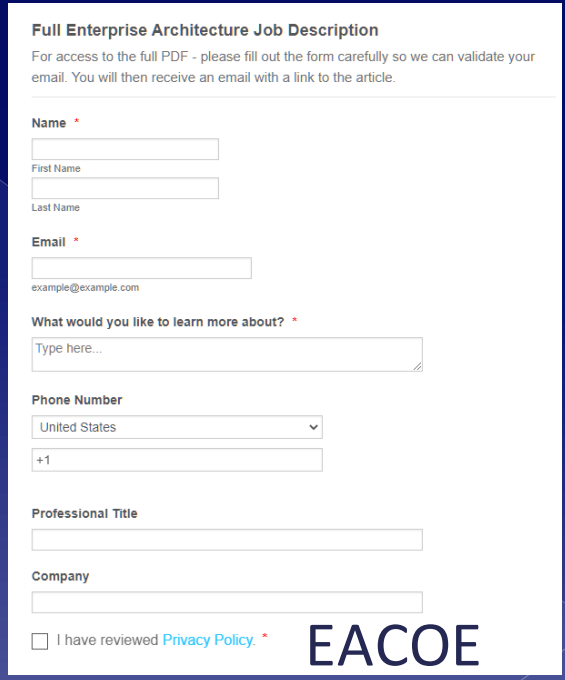

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The Four Types of Training Data (Data Division)

AI and Otherwise

Best Practice

(Not AI Accessible)

A Best Practice is a competitive advantage that both parties believe is of value for that exchange.

A Best Practice is a method, process, procedure, framework, or approach that provides an individual or organization with a measurable competitive advantage, in a given area of interest, and is not generally available to others. It is the "***DNA***" of the organization that provides the competitive advantage.

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The Four Types of Training Data (Data Division)

AI and Otherwise

A Best Practice is a competitive advantage that both parties believe is of value for that exchange.

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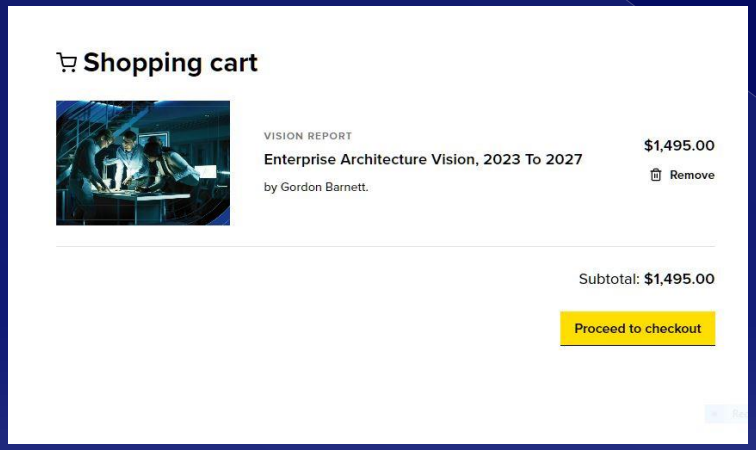

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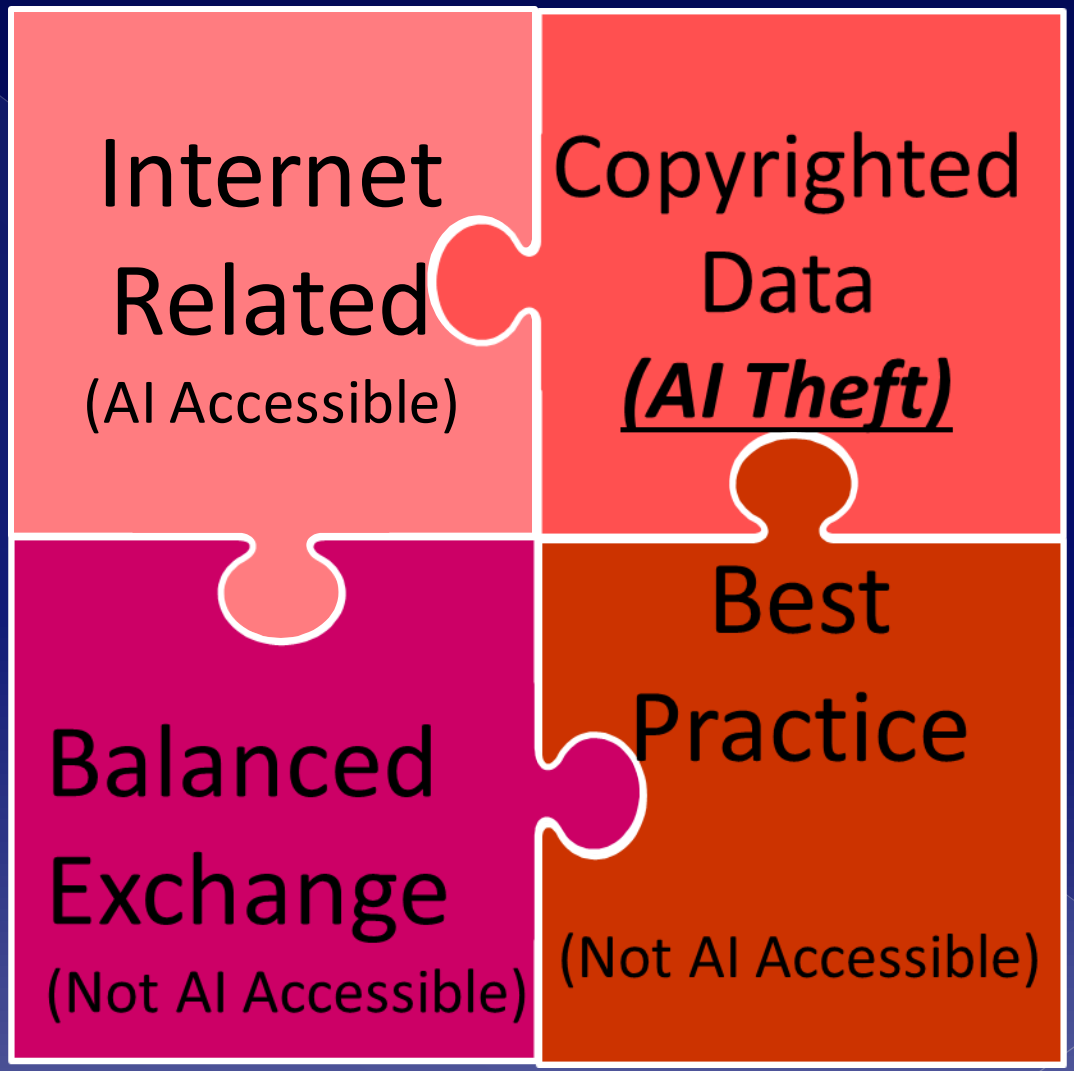
The Four Types of Training Data (Data Division)

AI Training Data - 1 (or 2) of 4



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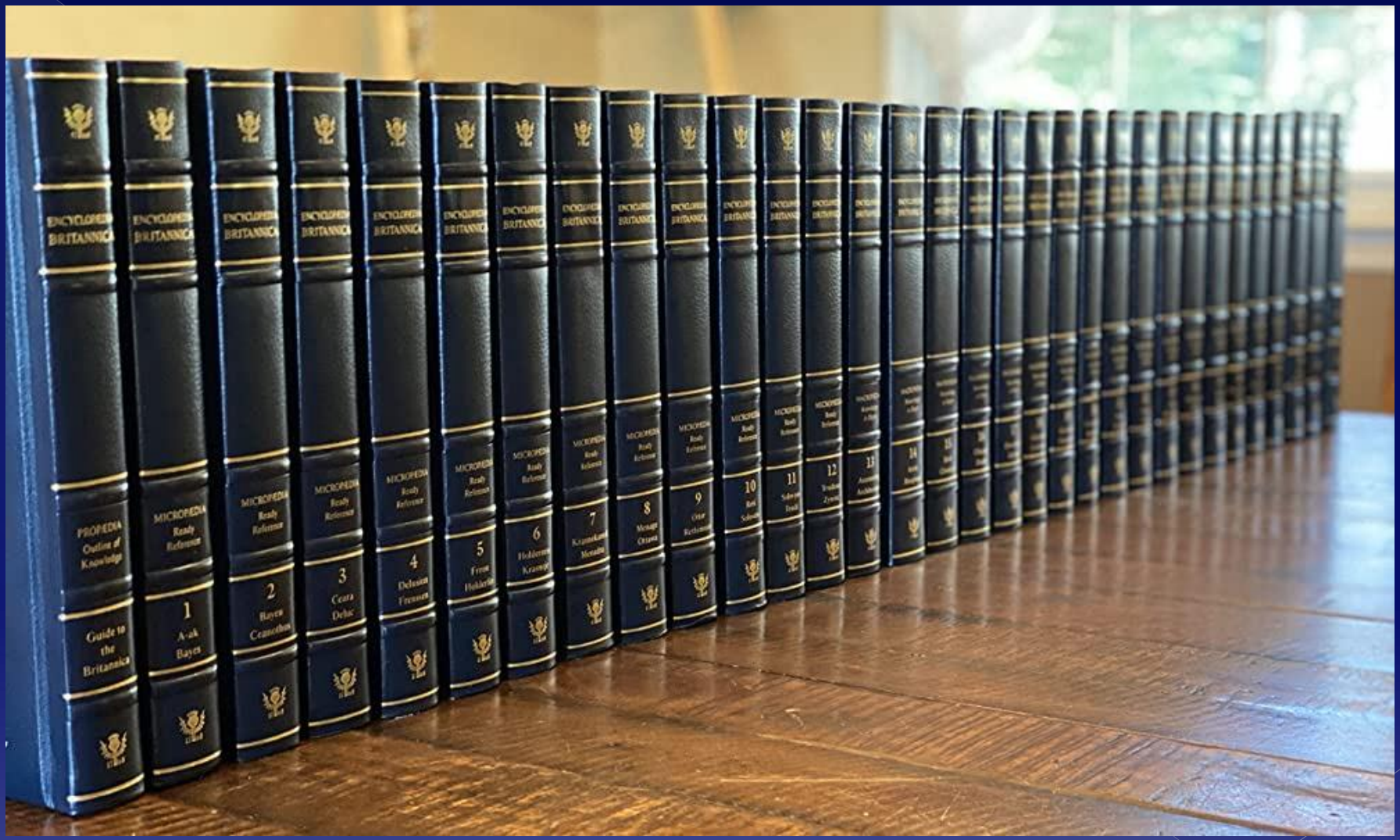

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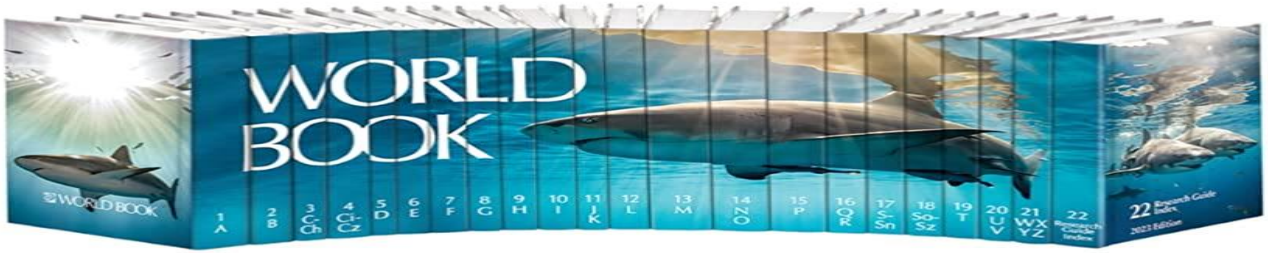

The World Book Encyclopedia 2023 set includes more than 25,000 photographs, maps, diagrams and features hundreds of new and revised articles reflecting changes in current events. **Expert contributors, advisors, and subject area specialists ensure the readability and accuracy of The World Book Encyclopedia 2023 set.** (emphasis added) As the only general reference encyclopedia still published today, The World Book Encyclopedia 2023 provides authoritative content on almost every topic to learners of all ages. Tens of thousands of index entries make it easy to find information. Abundant colorful photos, illustrations, and maps supplement the easy-to-read text. Bring your questions to World Book for answers! – Cost $1,199.00

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Gaining Competitive AI Advantage With EACOE Enterprise Architecture and BACOE Business Architecture

An Example

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Tim Harford – Financial Times – March 29/30, 2014

Big Data – Are We Making a Big Mistake

Cheerleaders for big data have made four exciting claims, each one reflected in the success of Google Flu Trends: that data analysis produces uncannily accurate results; that every single data point can be captured, making old statistical sampling techniques obsolete; that it is passé to fret about what causes what, because statistical correlation tells us what we need to know; and that scientific or statistical models aren't needed because, to quote "The End of Theory", a provocative essay published in Wired in 2008, "with enough data, the numbers speak for themselves".

Unfortunately, these four articles of faith are at best optimistic oversimplifications. At worst, according to David Spiegelhalter, Winton Professor of the Public Understanding of Risk at Cambridge university, they can be "complete bollocks. Absolute nonsense."

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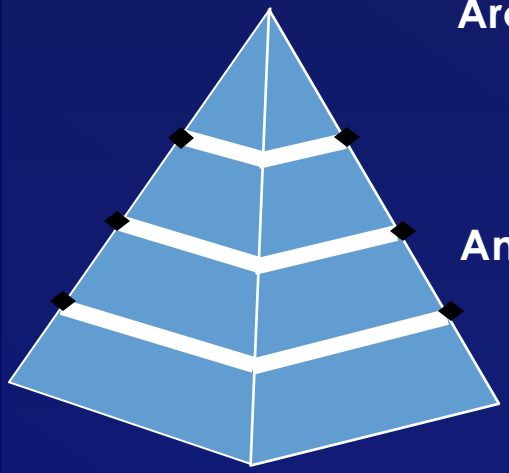
Agile Solution Lifecycle



Architect

Analysis

Design

Assemble

Goals	Business Processes	Data	
Data Model	Process Model	Environment	
Database Design	Process / Screen Design	Module Design	Interface Design
Database	Screen	Program	Interface

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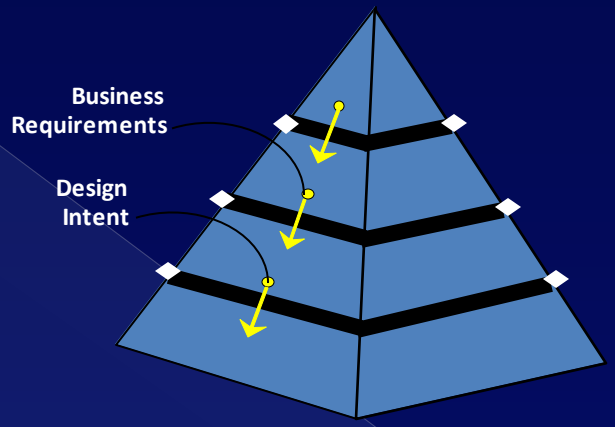
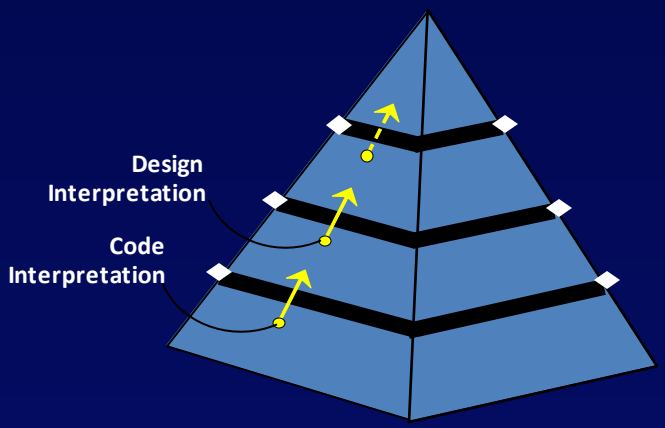
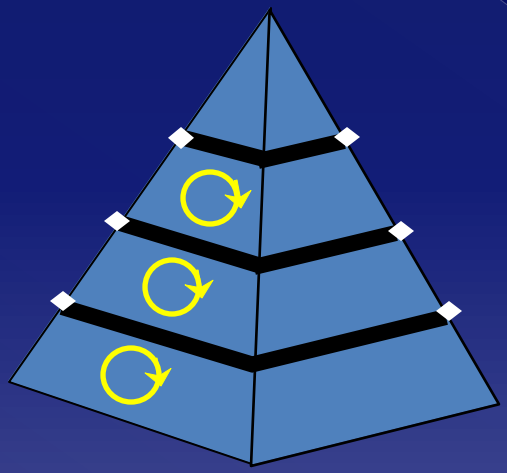
Lifecycle Paths



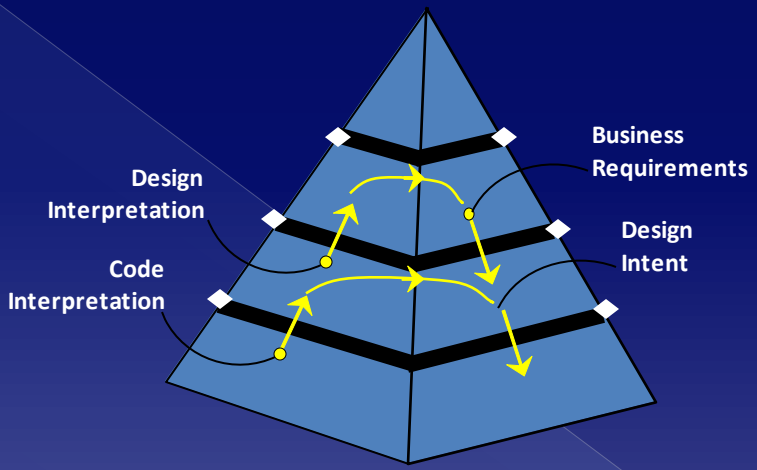
Forward Engineering



Reverse Engineering



Restructuring



Re-Engineering

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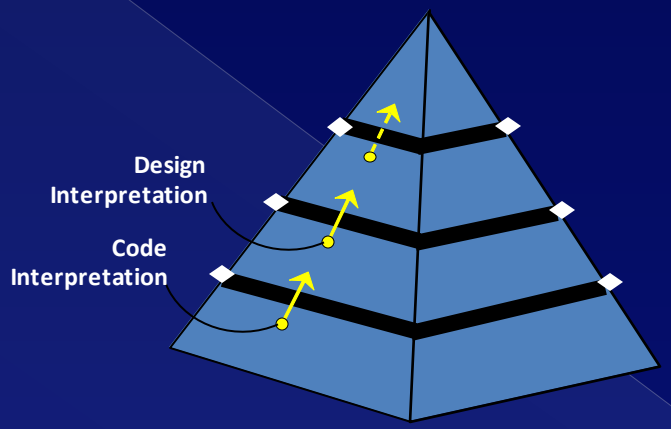
Reverse (data) Engineering



Reverse Engineering

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Reverse (data) Engineering

- If we attempt to reverse data engineer from a system whose documentation is lost or seriously out of date (from years of maintenance), *we will become aware of business requirements and design intent that can only be recovered by human insight and retained knowledge.* The most significant translation loss is the loss of meaning.

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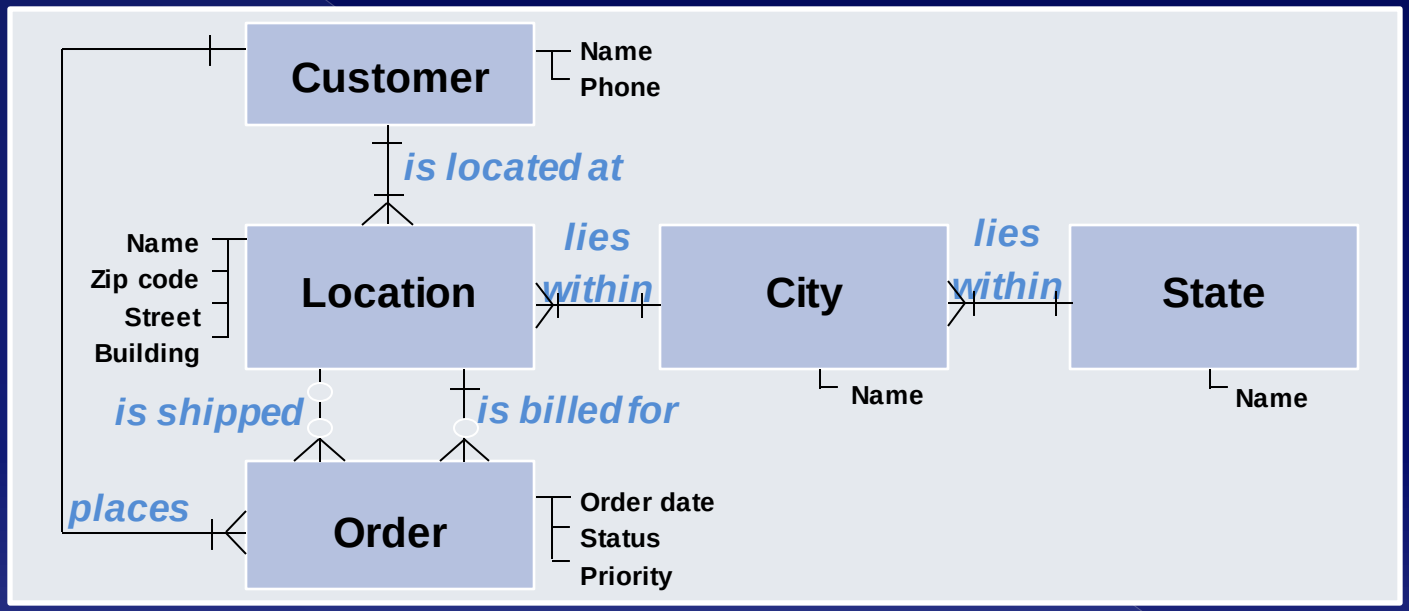
Requirements to Design



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Requirements to Design

- Business requirements captured by the data model are normally translated into a database design.

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Requirements to Design

IEDOrd01

OrderNum	OrdDate	Status	Priority	Customer	Shipto	Billto
9 (5) Unique Indexed Required	9 (4) Comp Required	X (1) Required	9 (1) Required Default = 0	Foreign IEDCust01 Required	Foreign IEDLoc01 Optional	Foreign IEDLoc01 Required

IEDLoc01

LocNum	Name	ZipCode	Street	Building	City	Customer
9 (5) Unique Indexed Required	X (25) Optional	X (1) Required	9 (1) Required	X (6) Optional	Foreign IEDCty01 Required	Foreign IEDCus01 Required

IEDCty01

CityNum	Name	State
9 (5) Unique Indexed Required	X (25) Required	Foreign IEDSta01 Required

IEDSta01

StateNum	Name
9 (5) Unique Indexed Required	X (25) Required

IEDCus01

CustNum	Name
9 (5) Unique Indexed Required	X (25) Required

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Relational Design

- At this point we have simply taken a data model and produced an uncompromised relational design equivalent, yet we have already lost meaning. Let's look at what would happen if we were to reverse-engineer from these relational tables.

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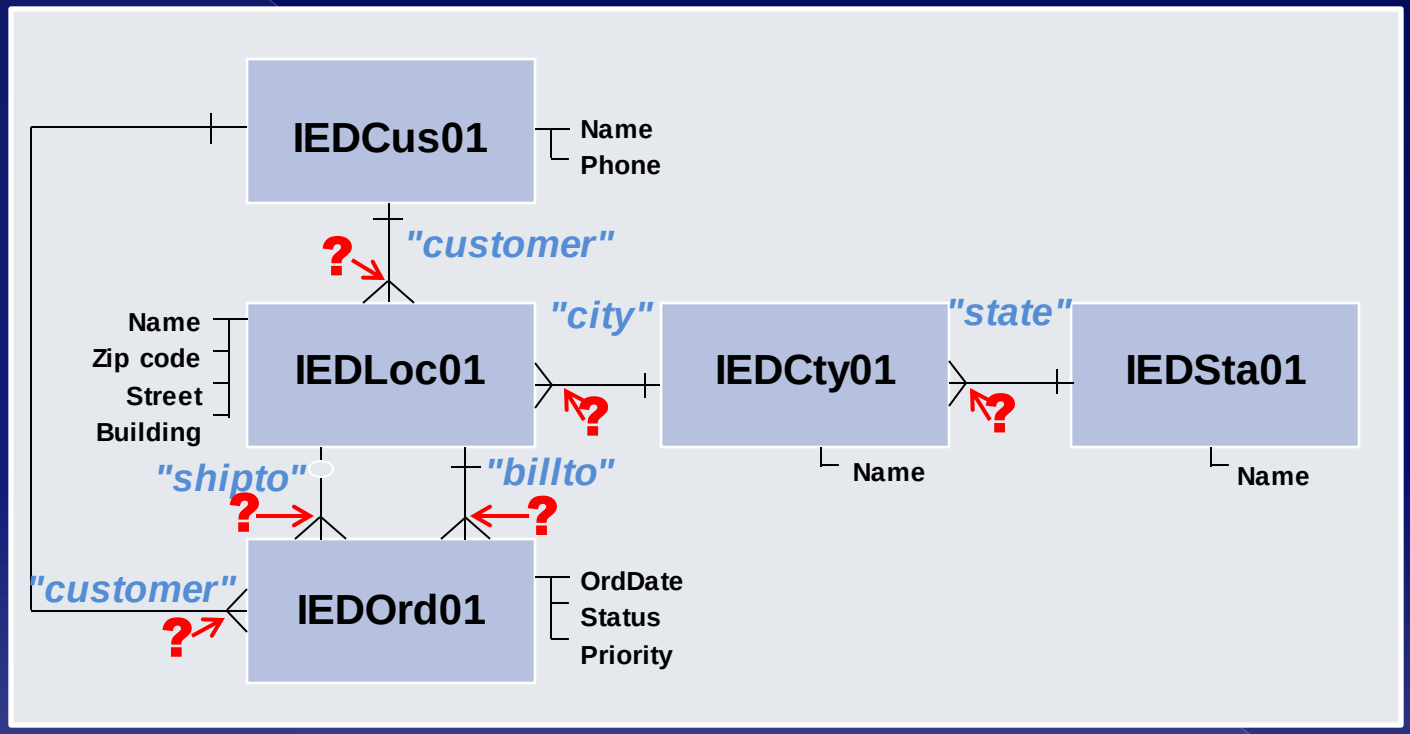
Back to Requirements



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Tuning and Maintenance

- We have also lost business understanding and business rules.
- Our loss is worsened as the components are subjected to maintenance.
- Because of the loss that occurs as we proceed down the lifecycle, reverse-engineering cannot *completely* reconstruct the data design intent or business data requirements.

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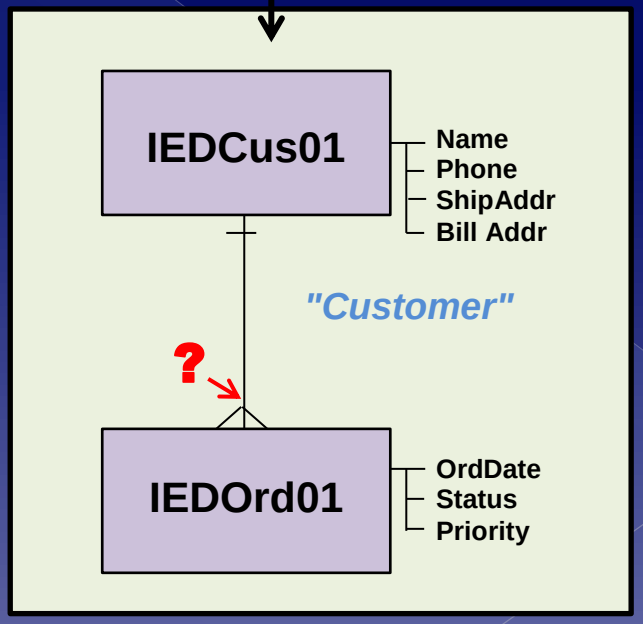
After Tuning and/or Maintenance

IEDOrd01

OrderNum	OrdDate	Status	Priority	Customer
9 (5) Unique Indexed Required	9 (4) Comp Required	X (1) Required	9 (1) Required Default = 0	Foreign IEDCust01 Required

IEDCus01

CustNum	Name	Phone	ShipAddr	BillAddr
9 (5) Unique Indexed Required	X (25) Required	9 (10) Required	X (50) Optional	X (50) Required



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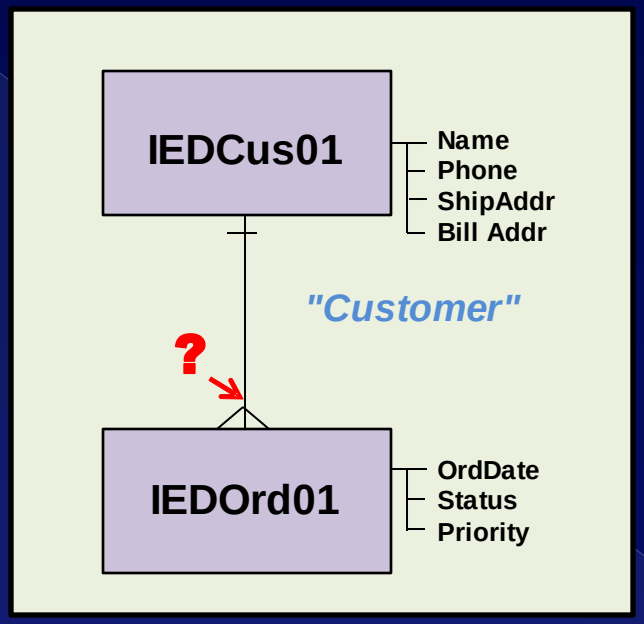
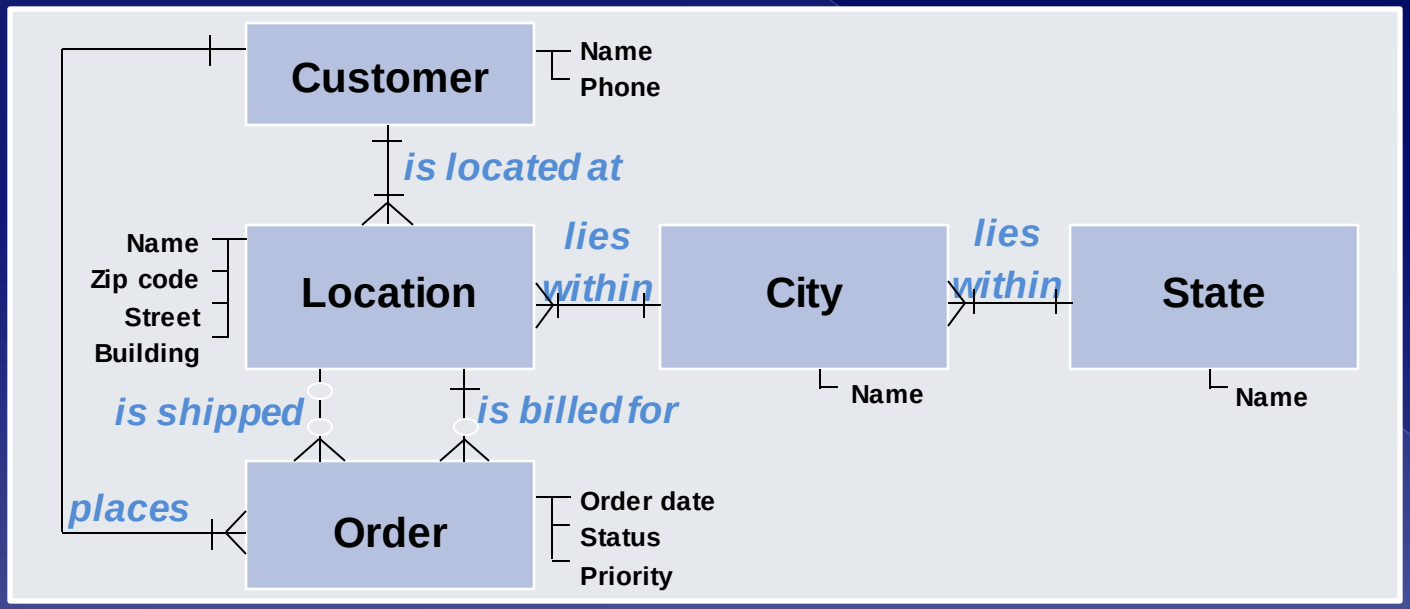


How do we get from this understanding



To this understanding

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HMMMMM

- That is why AI “Hallucinates”

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HMMMMM

- That is why AI “Hallucinates”
  - Definition: an experience involving the apparent perception of something not present

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HMMMMM

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- Better Term for “Hallucinates”
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  - MISTAKE!!

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HMMMMM

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HMMMMM

- Quality Data must proceed any use – must is now somewhat ignored

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HMMMMM

- Quality Data must proceed any use
- Most systems and its associated databases have not been “forward engineered” – with full traceability from the “business” understanding

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HMMMMM

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HMMMMM

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- Caveat emptor!

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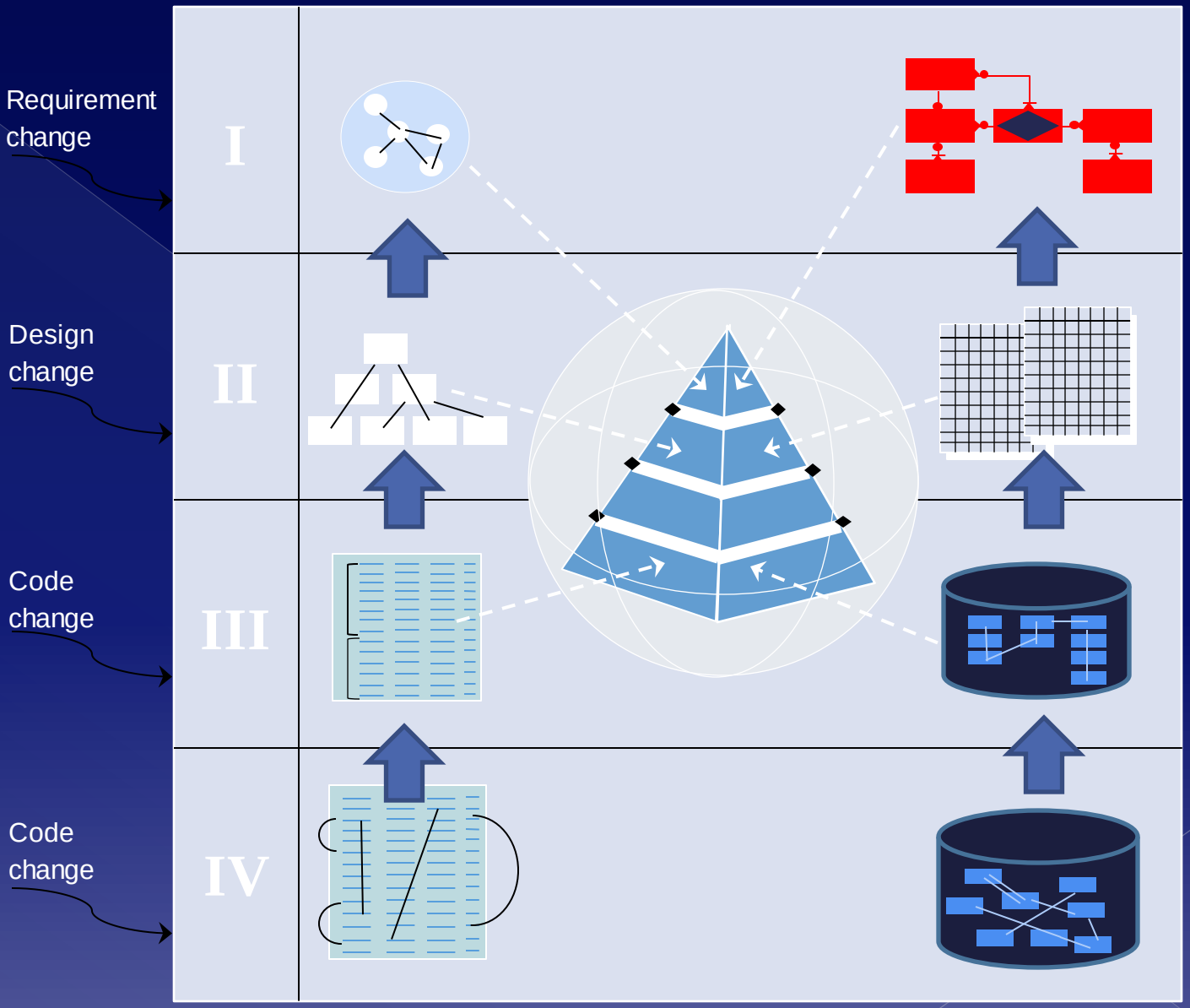
Lifecycle Control



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Trying to Communicate This

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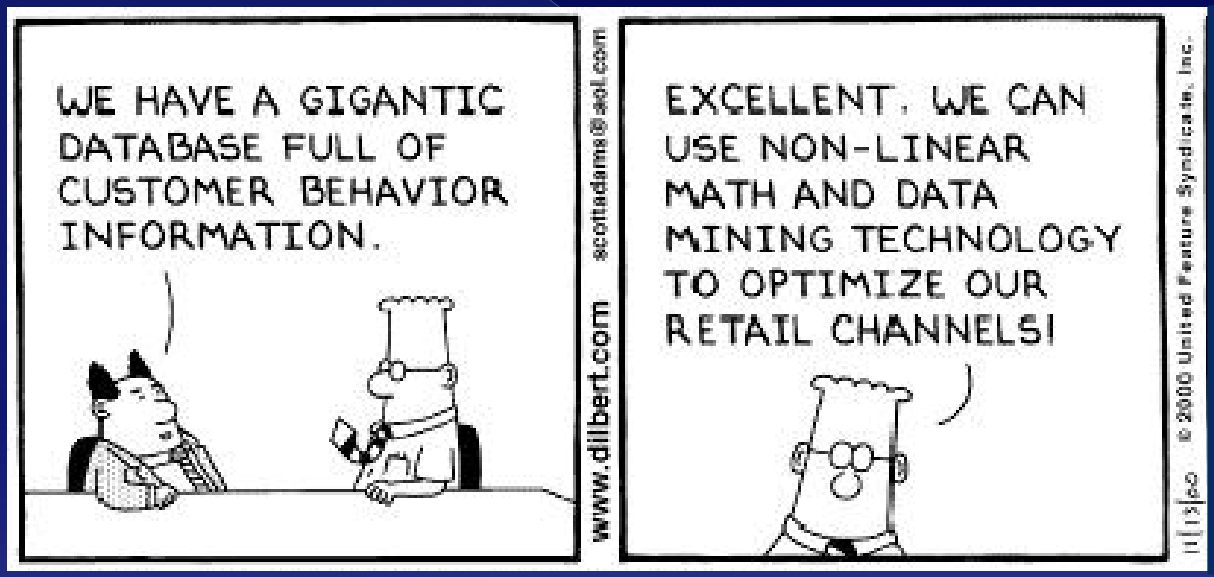

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Trying to Communicate This

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Observation – Stakeholders do not want this!

NO – This may be the IT end state

Is this the End State Objective?

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Stakeholders want this - SUMMARY EXAMPLE ONLY

Capability 1:

Ensure

Project 1: Develop a Full Inventory of (Very Important (4))	Project 2: (Critical (5))	Project 3: (Very Important (4))
•Desired Future State: •Current State Analysis: •Gap Closure Required:	•Desired Future State: •Current State Analysis: •Gap Closure Required:	•Desired Future State: •Current State Analysis: •Gap Closure Required:

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Observation – This is what the Stakeholder Wants

This is the End State Objective!

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HMMMMM

- How do we get there??

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HMMMMM

- How do we get there??
  - We suggest EACOE THING (Data) Architecture, using The Enterprise Framework ™

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HMMMMM

- How do we get there??
  - We suggest EACOE THING (Data) Architecture, using The Enterprise Framework ™
- Let us call it Data Modeling for AI

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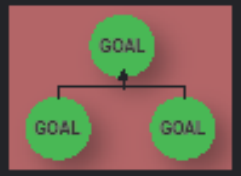
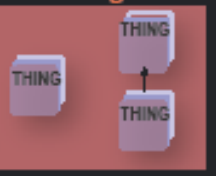
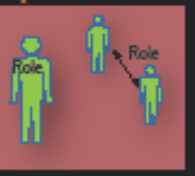
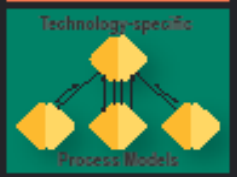
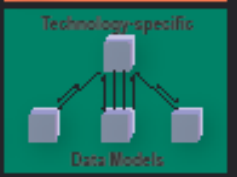
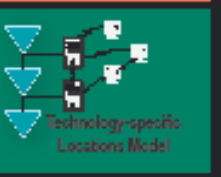
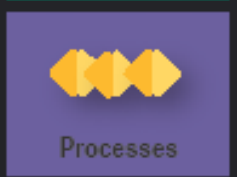
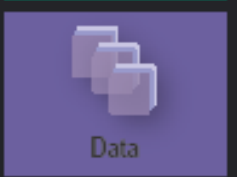
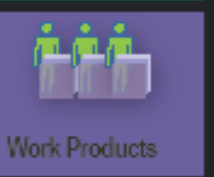
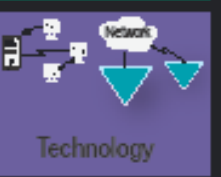
The Enterprise Framework™

	WHY are we doing what we are doing?	**HOW** do we do what we do or need to do?	**WHAT** things are of interest to us?	**WHO** is of interest to us?	**WHERE** are the locations of interest to us?	**WHEN** are we required to do what we do?
	Strategies & Goals	**Processes & Activities**	**Materials & Things**	**Roles & Responsibilities**	**Locations & Geography**	**Events & Triggers**
DESCRIBE The Business						
DEFINE The Relationships						
SPECIFY Components & Services *(Technology-neutral)*						
IDENTIFY Technology *(Technology-specific)*						
SELECT Solutions						
THE ENTERPRISE	**GOALS**	**PROCESSES**	**MATERIALS**	**ROLES**	**LOCATIONS**	**EVENTS**

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The Enterprise Framework™

	WHY are we doing what we are doing?	HOW do we do what we do or need to do?	WHAT things are of interest to us?	WHO is of interest to us?	WHERE are the locations of interest to us?	WHEN are we required to do what we do?
	Strategies & Goals	**Processes & Activities**	**Materials & Things**	**Roles & Responsibilities**	**Locations & Geography**	**Events & Triggers**
DESCRIBE The Business	GOAL, GOAL, GOAL	PROCESS, PROCESS, PROCESS	THING, THING, THING	Role, Role	LOCATION, LOCATION, LOCATION	TRIGGER, EVENT, EVENT
DEFINE The Relationships	Relationships Between Goals	Relationships Between Processes	Relationships Between Materials & Things	Relationships Between Roles & Responsibilities	Location, Enterprise Locations & How They Relate	Events That Cause The Enterprise To Respond
SPECIFY Components & Services *(Technology-neutral)*	Components Required To Meet Goals	Components That Comprise The Processes	Data Model Of Materials Without Regard For Technical Implementation	Description Of The Roles Responsible For Creating Material & Things	Network, Description Of The Location Relationships In Technology-neutral Terms	Description Of The Events Of Interest To The Enterprise
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Data Architecture for AI

Business Description of Things

Description

In its simplest form, this model is an Ontology of all tangible and intangible **things** that are of interest to the Enterprise.

An indented ontology is used to include sub-classes of things under the main classes as required. Alternatively, classes of things may be modeled diagrammatically as illustrated below.

Elements

Each element of this model is a plural noun, e.g., Promotions, or a noun phrase **[noun modifier + noun]** e.g., Media Promotions.

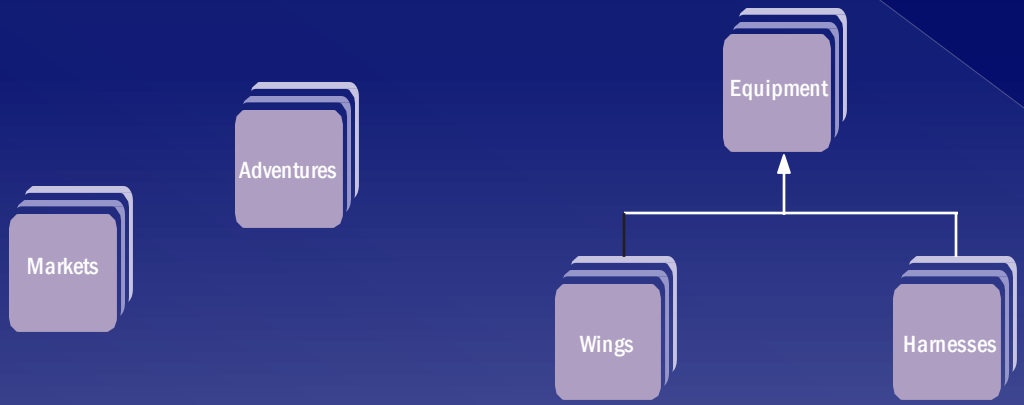
Definition

Each element of the model should be accompanied by a template text definition, similar to that found in a glossary but as applied to the Enterprise, containing enough information as the reader needs to understand the concept. Definitions should be structured as follows:

<Class of Things Name> <connecting word or phrase, e.g., is or is characterized by> <broad description of class, with references to its sub-classes>

<Sub-class of Things Name> classify and describe **<things describing Materials category>**

Diagram Example



Primary responsibility for Enterprise perspective: ***Enterprise Architect***
Primary responsibility for Business perspective: ***Business Architect***

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Business Interactions of Interest Regarding Things

Description

This model identifies and describes the actual **things** and the relationship between these things, that are significant to the Enterprise.

Elements

The elements of this model consist of **containers** describing each thing, and the relationships among them.

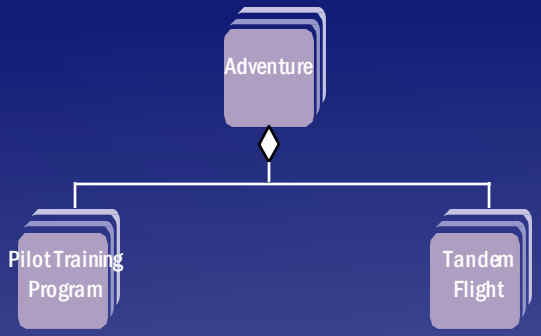
Definition

Each Thing should be defined by a unique name: a template text description to describe the applicable element in the Business Descriptions model.

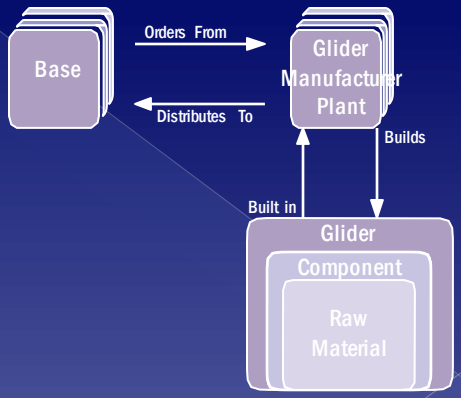
Relationships among Things include, but are not limited to, two commonly used patterns: **decomposition** and **generic**. Decomposition relationships are generally self-evident and don't require labels. Generic relationships are usually labelled.

Diagram Examples

Relationships



Generic Relationship



Primary responsibility for Enterprise perspective: ***Enterprise Architect***

Primary responsibility for Business perspective: ***Business Architect***

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Data Architecture for AI

Technology Neutral Data Representation

Description

A formal model of the data describing **things** managed by the Enterprise, without regard to the subsequent physical implementation or technologies.

Elements

The elements of this model are data entity types (or, simply, entities) and their relationships.

Definition

Each entity is defined by its unique name and description, as required.

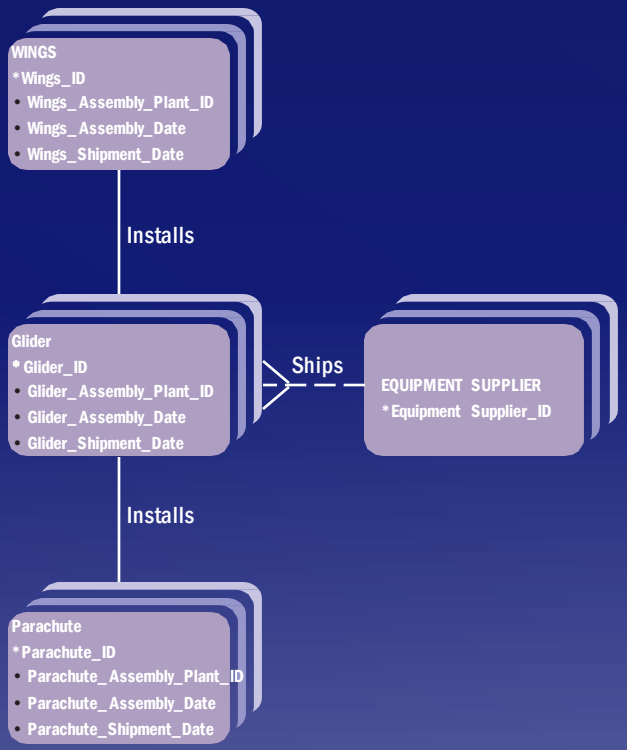
The relationships among entities are identified by name and are classified according to cardinality and optionality.

Cardinality indicates the number of instances (zero, one or many) of an entity in relation to another entity. If a relationship can have a relationship of zero, then the relationship is optional; otherwise the relationship is mandatory.

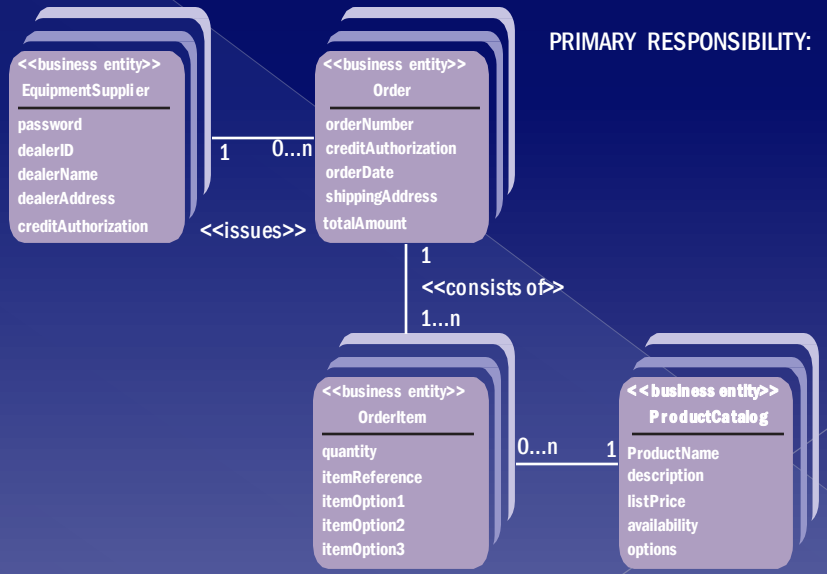
It is beyond the scope of this document to describe in detail all of the possible notations used to create this model. Examples of two notation styles, are illustrated below.

Diagram Examples

Entity Relationship Diagram



Analysis Class Model



PRIMARY RESPONSIBILITY: *Data Architect*

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Data Architecture for AI

Technology Specific Data Representation

Description

A **model of the data** describing things of interest to the Enterprise, structured according to the technology selected for the implementation.

For example: the design requirements of a particular database management technology (relational database, or hierarchical database, or flat file structure, or "paper and pencil", etc.)

It shows how each data element will be implemented and stored in a certain database technology, if that is the implementation intent.

Elements

The elements of this model are data entities, with fully described attributes, and their relationships, or descriptions that would be appropriate for the specific data implementation technology.

Definition

Each entity is defined by its unique name, description, and attributes as required.

Attributes are data elements that either identify an entity (key attributes) or describe an entity (non-key attributes).

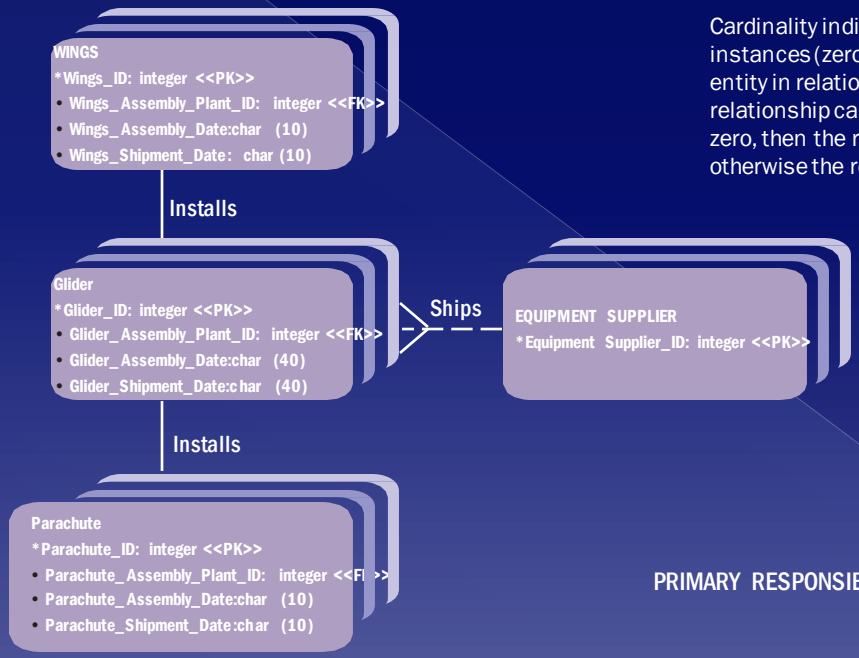
Attributes in this model can be further described their type, integer or character. The lengths of the fields required to store attributes that are designated as character types are also specified.

The relationships among entities are identified by name and are classified according to cardinality and optionality.

Cardinality indicates the number of instances (zero, one or many) of an entity in relation to another entity. If a relationship can have a relationship of zero, then the relationship is optional, otherwise the relationship is mandatory.

Diagram Example

Technology Specific Data Model



PRIMARY RESPONSIBILITY: *Data Architect*

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The "Translation" into AI

How do we move to an AI Environment

Through

An Agile Solution Development Process??

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The "Translation" into AI

THE

E.A.I. ™

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The "Translation" into AI

THE

E.A.I. ™

Enterprise Artificial Intelligence ™

Or

Enterprise Amalgamated Information ™

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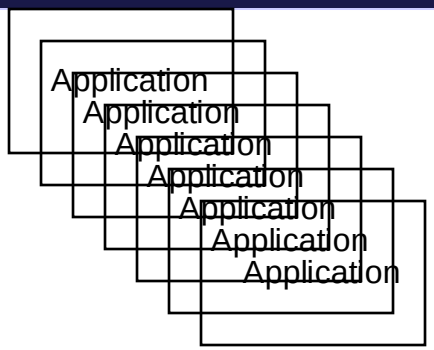
What Stakeholders Want

The "Translation" into AI

Legacy

Applications



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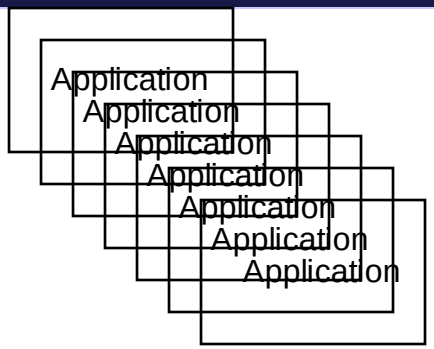
What Stakeholders Want

The "Translation" into AI

Legacy Applications



Data Distribution Center ™

Architected Ontological Distribution Centers

EAI Engine

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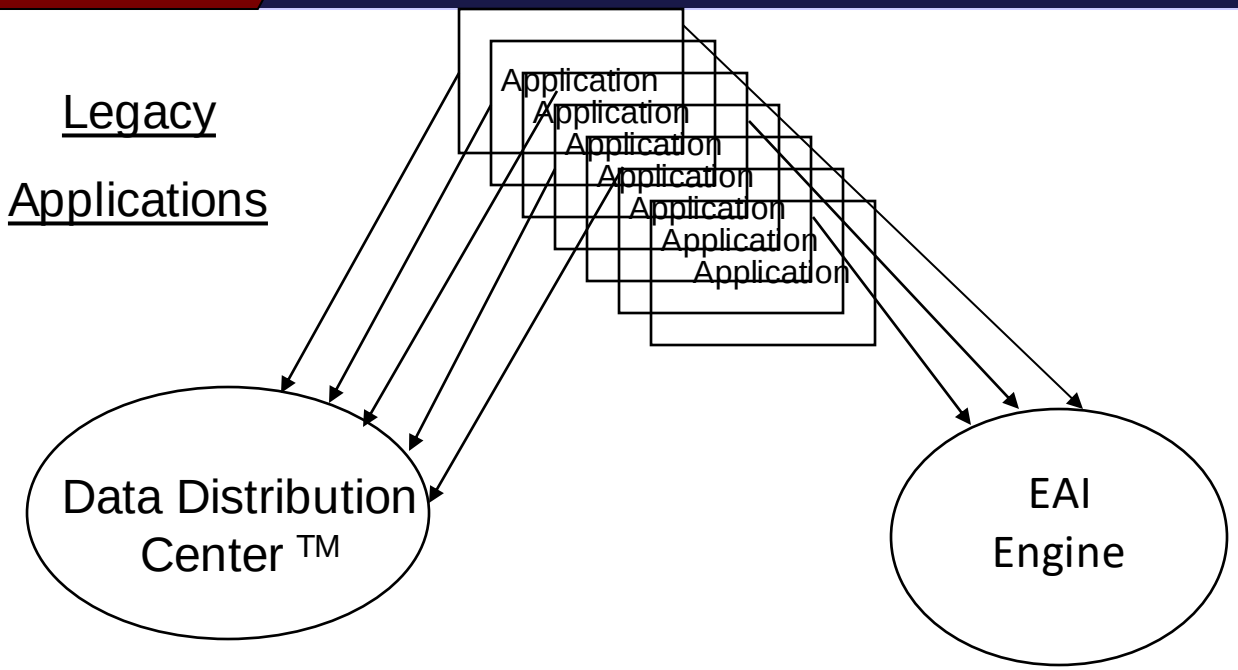
What Stakeholders Want

The "Translation" into AI



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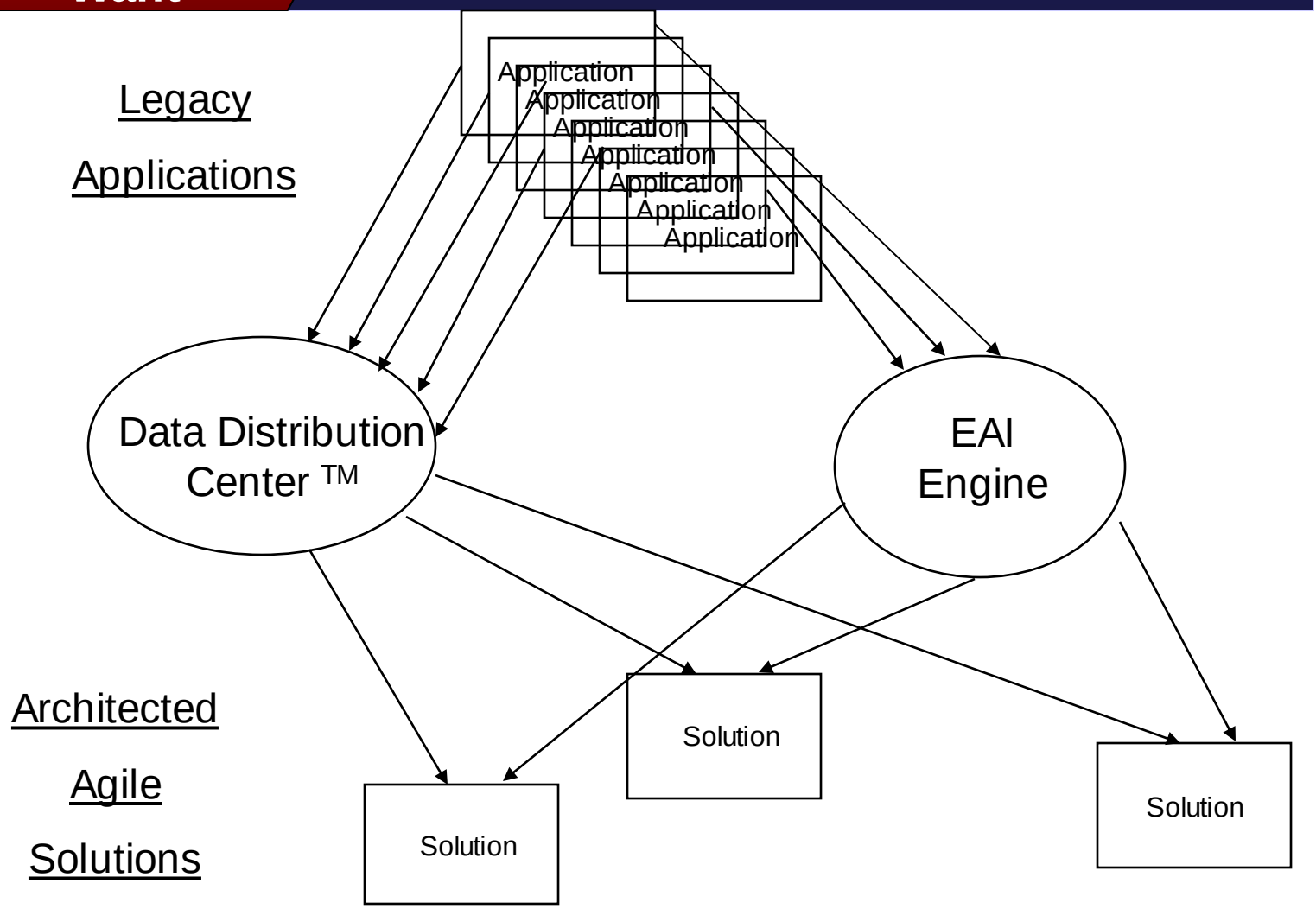
What Stakeholders Want

The "Translation" into AI



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What Stakeholders Want

The Path to an Agile Enterprise use of AI

Over Time

Data Distribution Center ™

EAI Engine

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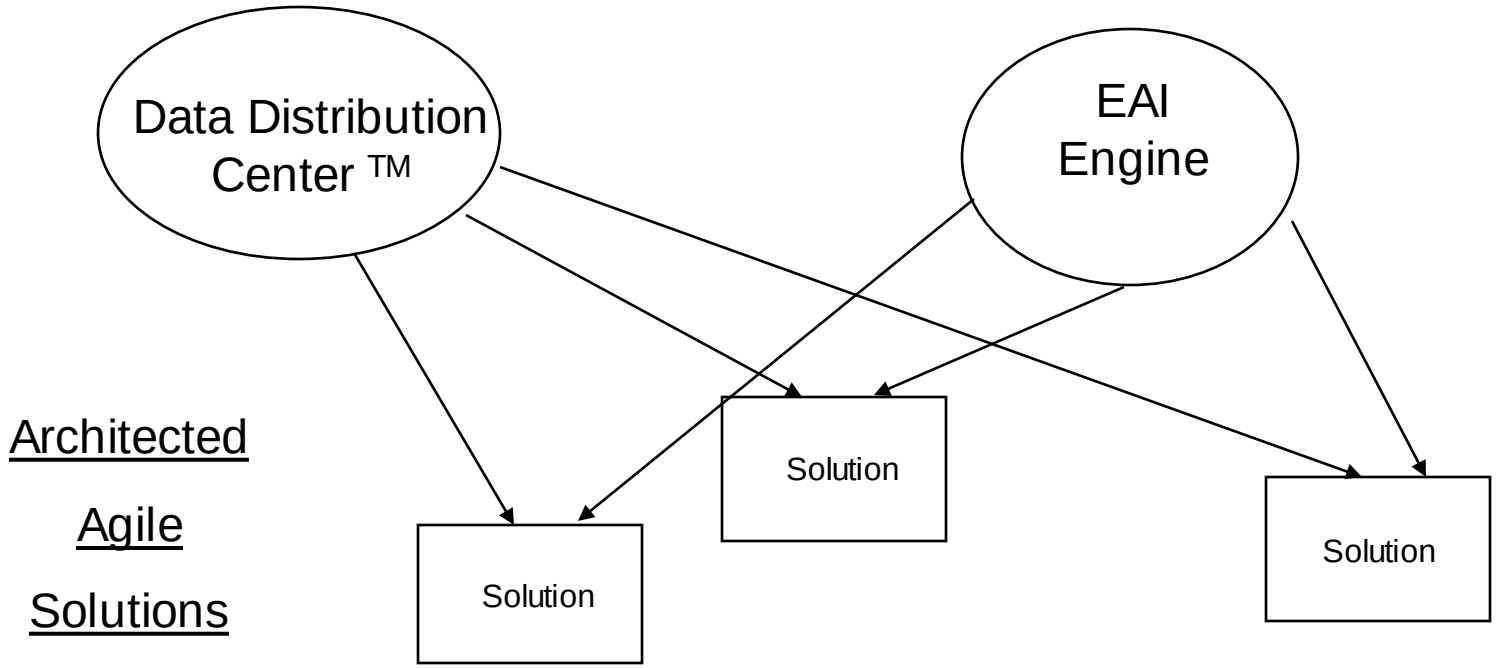
What Stakeholders Want

The Path to an Agile Enterprise use of AI

Over Time



Architected

Agile

Solutions

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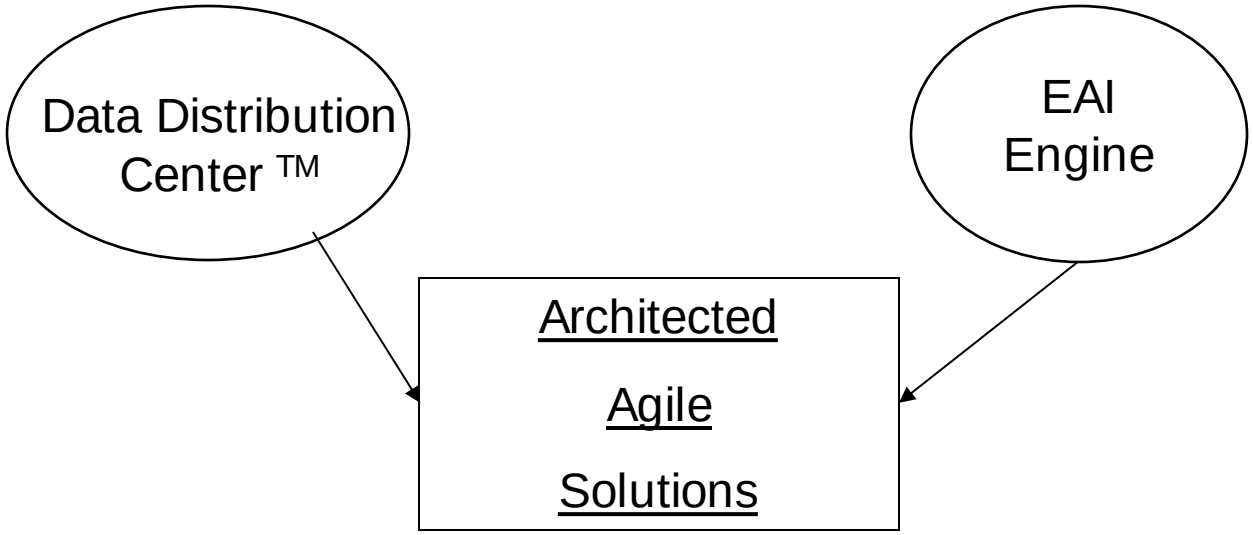
What Stakeholders Want

The Path to an Agile Enterprise use of AI

Over Time



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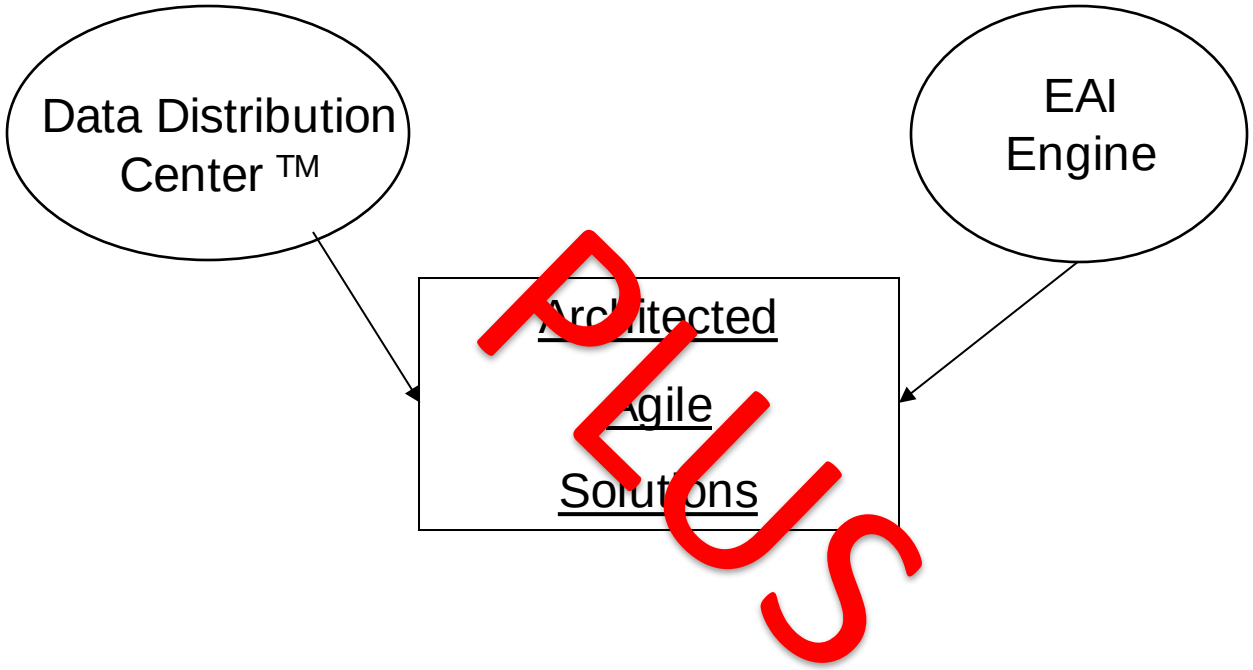
What Stakeholders Want

The Path to an Agile Enterprise use of AI

Over Time



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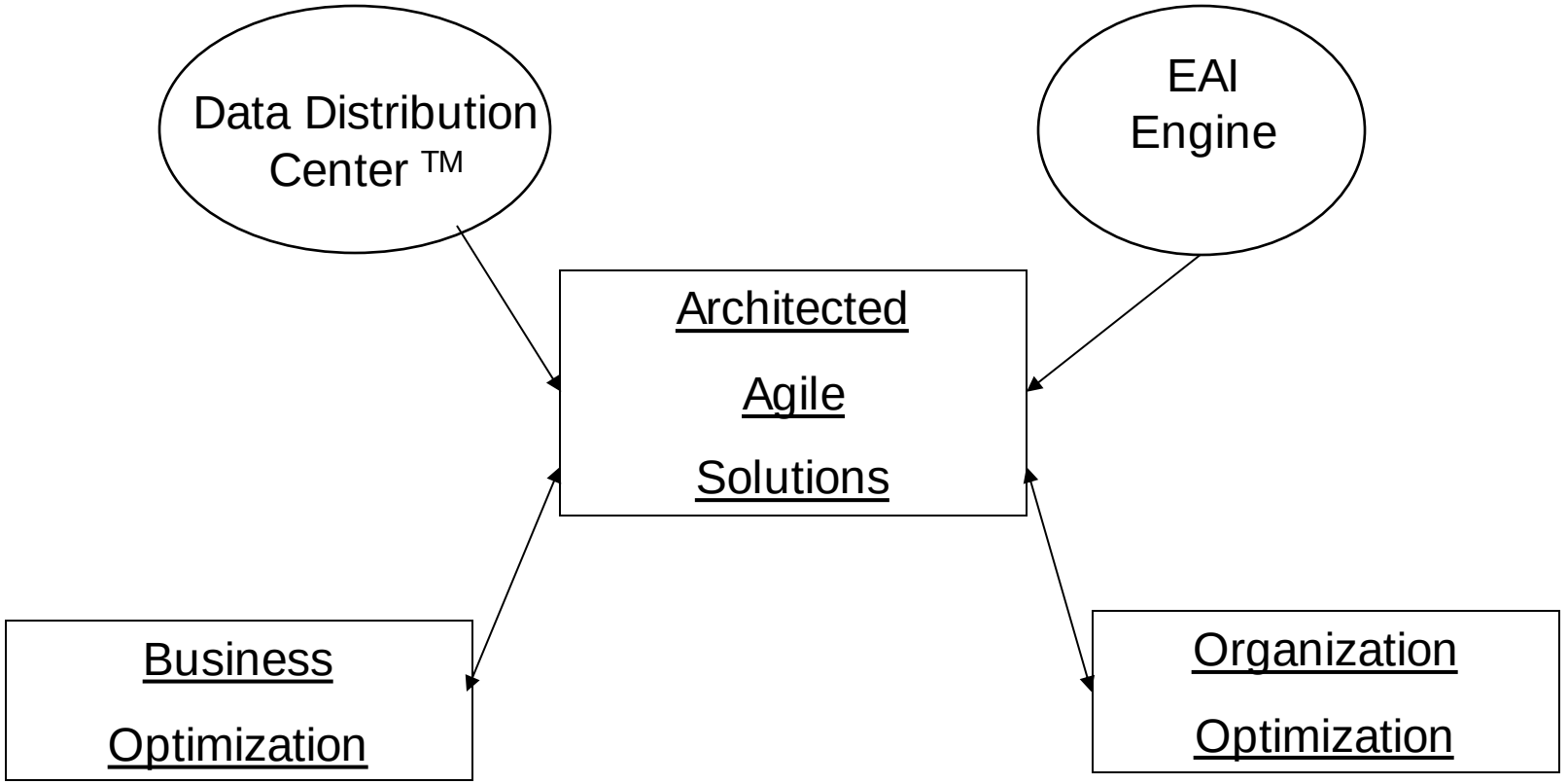

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What Stakeholders Want

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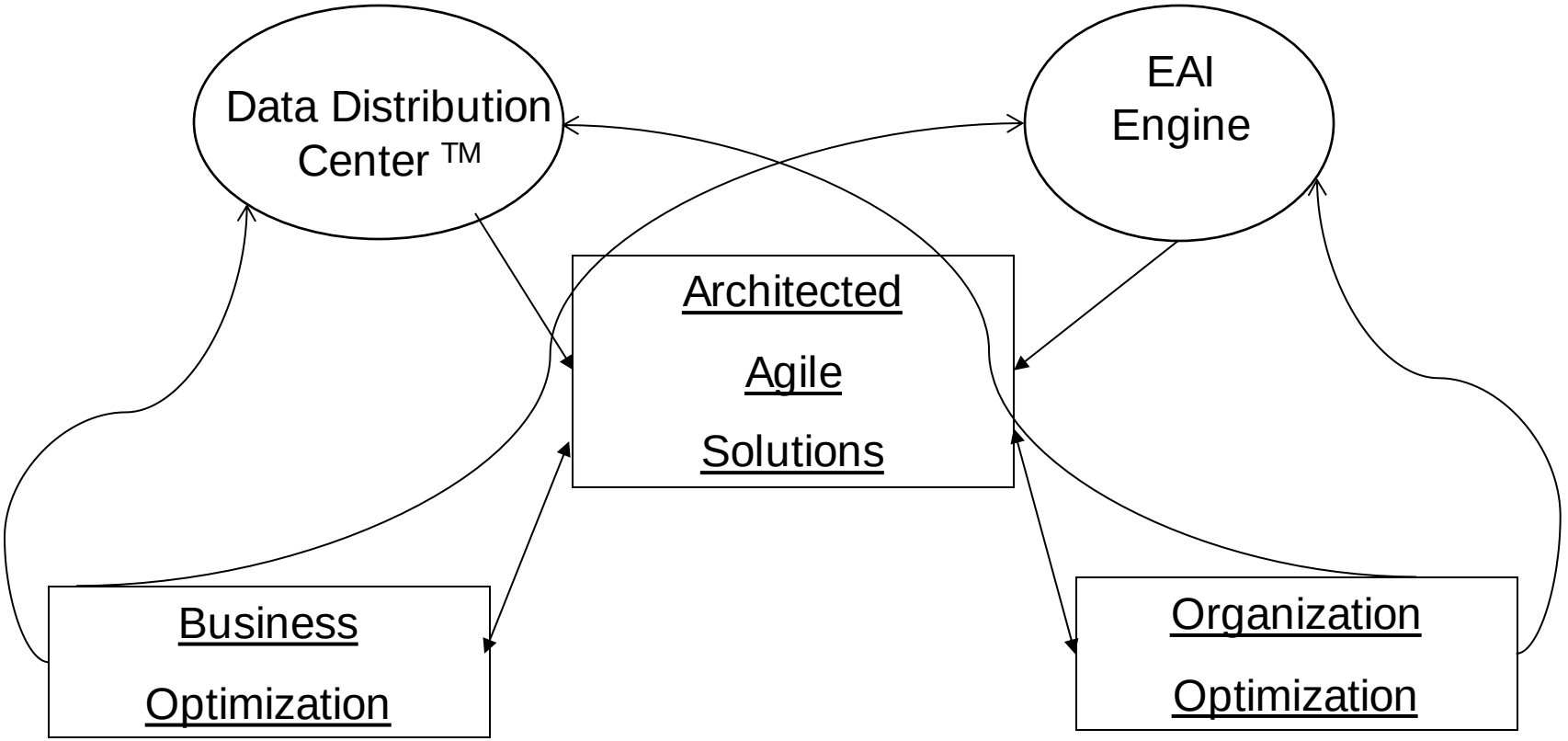
And Then



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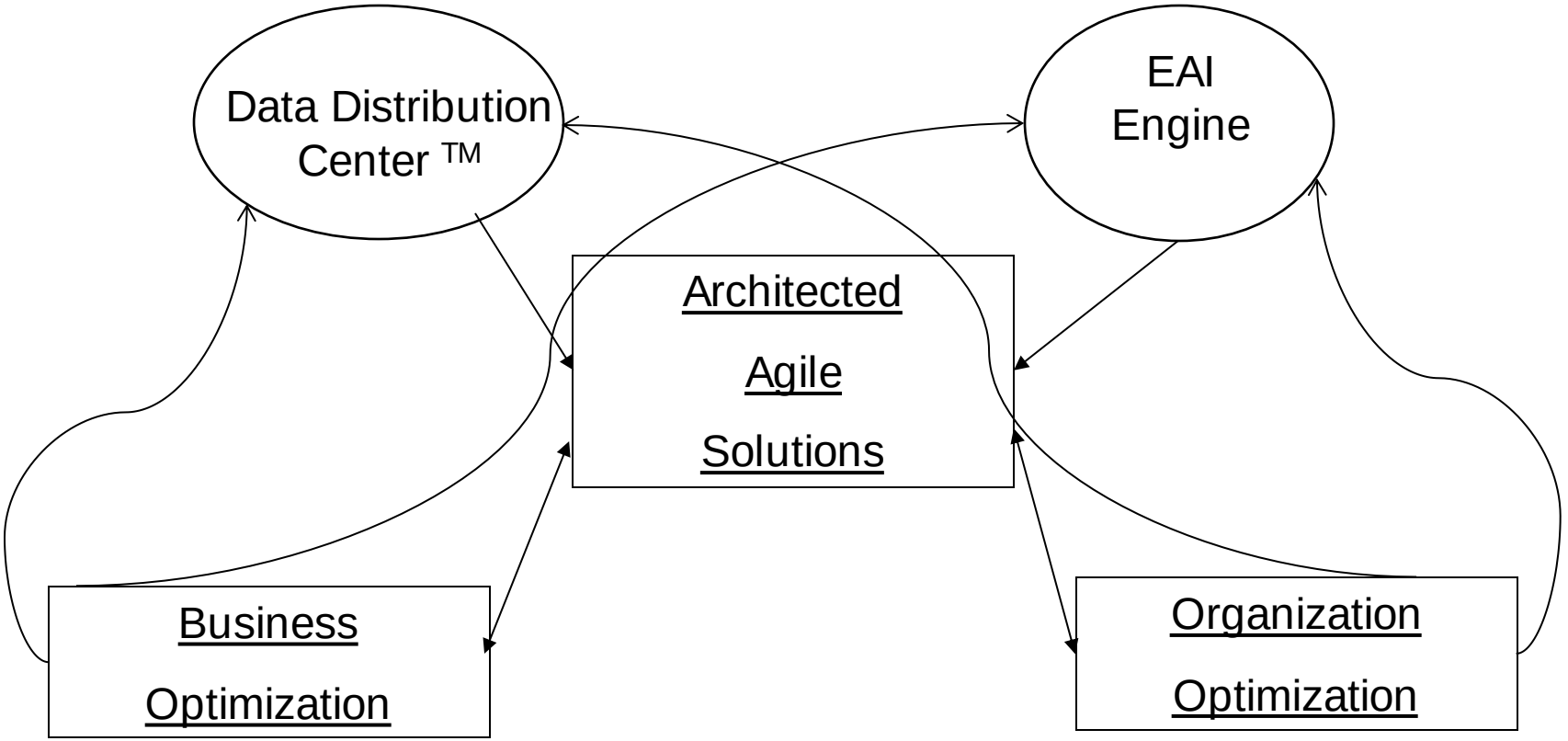
An open Loop Produces Defects

A closed Loop Produces Quality



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The Pathway to a:

Data Warehouse or a

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The Pathway to a:

Data Warehouse or a

Data Lake or a

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The Pathway to a:

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The Pathway to a:

Data Warehouse or a

Data Lake or a

Data Lakehouse or a

Data Distribution Center or a

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What Stakeholders Want

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The Pathway to a:

Data Warehouse or a

Data Lake or a

Data Lakehouse or a

Data Distribution Center or a

Internet based Data WHATEVER!! is

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What Stakeholders Want

The Path to an Agile Enterprise use of AI

The Pathway to a:

Data Warehouse or a

Data Lake or a

Data Lakehouse or a

Data Distribution Center or a

Data WHATEVER!! Is

Good Data!

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Your choices are:

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Your choices should be:

REALITY!

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Sam, you just don't get it!

You have the wrong tool!!

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Sam, you **Still** just don't get it!

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The Path to an Agile Enterprise

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Lets take a look one more time

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What Stakeholders Want

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Sam, you **Still** just don't get it!

You have the wrong technology!!

Its AI!!

The internet facilitates *transactions*,

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What Stakeholders Want

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What Stakeholders Want

The Path to an Agile Enterprise use of AI

Sam, you **Still** just don't get it!

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Its AI!!

The internet facilitates *transactions*,
Software provides *tools*,
"AI" uses *data* to drive *decisions*.

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How?

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The internet facilitates *transactions*,
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How?

By building *models* that map the relationships between *data sets*, which reveal *patterns*.

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Use those patterns to make *predictions*

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Which can in turn be used to drive *decisions*,

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Use those patterns to make *predictions*
Which can in turn be used to drive *decisions*,
Which result in new *actions*

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Which result in new data.

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Which result in new *actions*
Which result in new data.
Then uses this new data to run the process again,

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Which result in new *actions*
Which result in new data.
Then use this new data to run the process again,
Updating the *algorithm*,

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What Stakeholders Want

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Which can in turn be used to drive *decisions*,
Which result in new *actions*
Which result in new data.
Then use this new data to run the process again,
Updating the *algorithm*,

Which is now *machine learning* from experience.

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The Path to an Agile Enterprise use of AI

IT IS ALL BASED ON GOOD DATA!!

And the use of that Data with E.A.I.™

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IT IS ALL ABOUT GOOD DATA!!

Through - Data Architecture

The method of designing and constructing a data resource that is business driven, based on real world understanding, and implemented in appropriate operating environments

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What Stakeholders Want

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IT IS ALL ABOUT GOOD DATA!!

Through - Data Architecture
The method of designing and constructing a data resource that is business driven, based on real world understanding, and implemented in appropriate operating environments

Resulting in:

A Data Resource that provides a consistent foundation across organizational boundaries, to provide identifiable, available, high-quality data, to support business activities and strategies.

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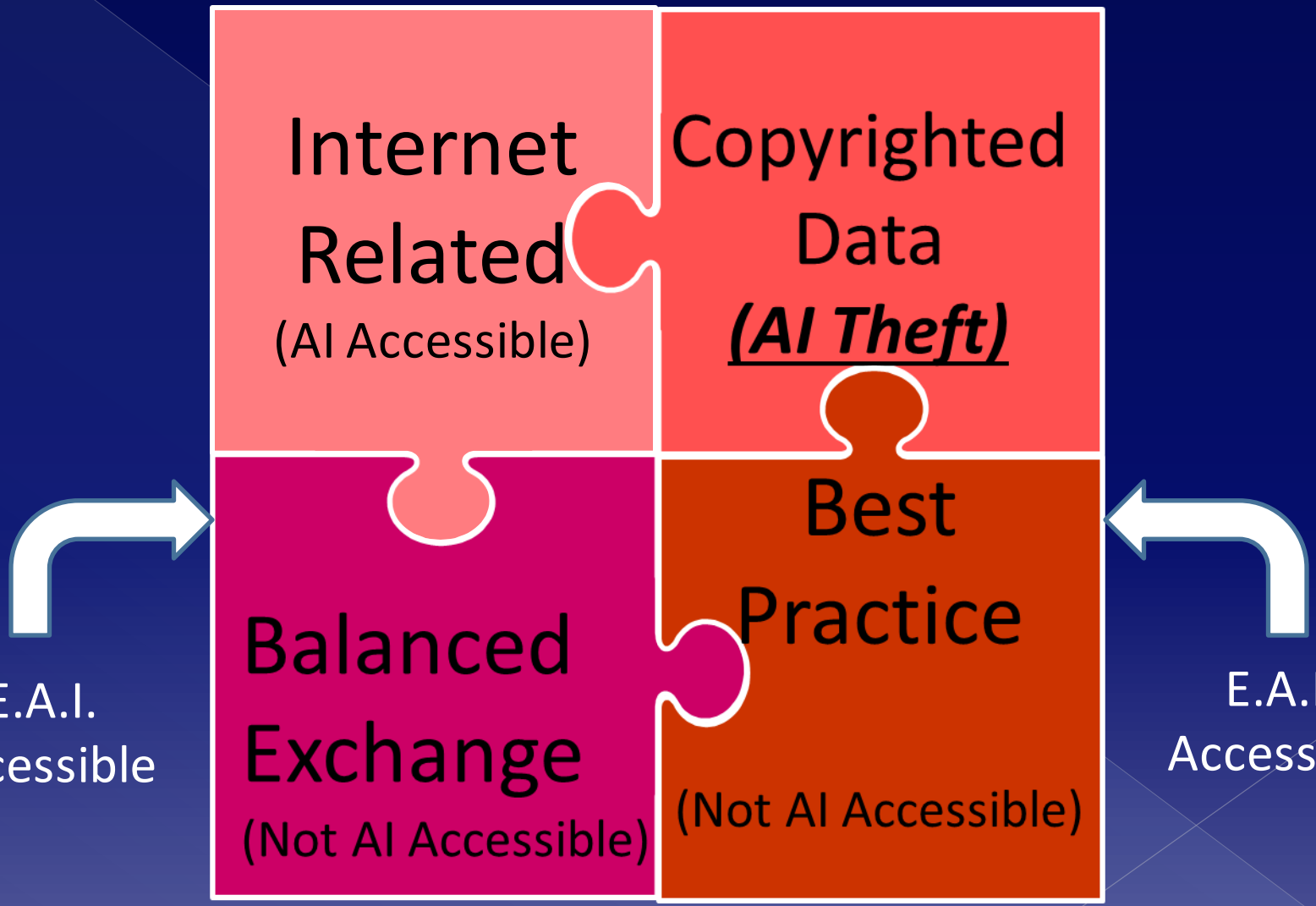
E.A.I. Training Data – The GOOD 2 of 4



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Recognize the Pathway to an Agile Enterprise Use of AI Is A Pathway of Change!

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  - Bring us on your site or distance learning dedicated Business Architecture or Enterprise Architecture workshop (economical with as few as 5 participants)
  - Add "Soft Skills" to your Enterprise Architecture or Business Architecture expertise – see https://www.softskillsforarchitects.com/
  - For the ULTIMATE in Education and Certification, book a 1:1 Workshop (two incredible days!) in Enterprise Architecture or Business Architecture, with Sam Holcman (registration on our websites)
- Follow us on LinkedIn, Facebook, and Twitter
- Email Sam for more information: Sam@BACOE.org or Sam@EACOE.org
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Samuel B Holcman - Biography

- **SAMUEL B. (Sam) HOLCMAN** is the Chairman of the Pinnacle Business Group, Inc., the Managing Director of the Enterprise Architecture Center Of Excellence (EACOE), and the Business Architecture Center Of Excellence (BACOE), and the President of the Zachman Institute for Framework Advancement (ZIFA). He is considered the practitioners practitioner in Enterprise Architecture and Business Architecture, and the leading implementer and world-wide educator and trainer in Enterprise Architecture and Business Architecture methodologies and techniques.

  The Pinnacle Business Group, Inc. and its associated organizations provide its clients with innovative, yet practical solutions to a range of business and systems related challenges and activities. He was the Vice President of Modelware, Methodologies, and BPE (Business Process Engineering) for a major software company. Prior to this experience, Mr. Holcman was the Founder and President of Computer and Engineering Consultants, Ltd. His interests include consulting and research on topics such as enterprise architecture, business architecture, business process engineering, intellectual capital management, organization development, system methodologies and life cycles, corporate business modeling, and accelerated analysis techniques. Mr. Holcman conceptualized and constructed a unique look at system development methodologies, which resulted in the highly regarded ForeSight ™ methodology and methodology management product.

  He has developed a strategic planning process that is used by many Fortune 500 companies, and is the co-developer of the widely used accelerated analysis (JAD-like) technique known as Rapid Analysis. He has also developed an innovative approach to Business Process Re-Engineering known as Business Process Visualization ™ and Organization Network Analysis ™. These techniques are being used to Unlock the Hidden Assets in your Organization ℠.

  In association with Mr. John Zachman, he formed The Zachman Institute for Framework Advancement (ZIFA), to explore, explain, and share the concepts of enterprise architecture. Sam has also focused on understanding the value and management of Intellectual Capital to enterprises. He has developed the Intellectual Capital Maturity Model ™ to provide guidance on how effectively organizations are managing their Intellectual Capital, and steps they can take to more effectively manage this capital, and the Enterprise Architecture Maturity Model, to provide guidance to organizations seeking to improve their understanding and implementation of Enterprise Architecture concepts. He has developed and published works on Cooperatively Optimized Relationships (COR), which is the next generation of understandings in the field of Customer Relationship Management (CRM). To better understand an organizations "DNA", Sam led the development of The Enterprise Framework ™ and The Business Architecture Framework ™. Both The Enterprise Framework, and The Business Architecture Framework have received worldwide acclaim for their understandability, and usability, while maintaining theoretical purity. Most recently, he published the book titled "Reaching the Pinnacle – a Methodology of Business Understanding, Technology Planning, and Change". This book brings a method to the marketing madness that surrounds Enterprise Architecture, and its straightforward and no-nonsense style sheds much light on a poorly understood topic. The book helps business executives and technology professionals through the process of building an Enterprise Architecture appropriate to their organization's needs.

  Sam was with Ford Motor Company for 11 years in data processing, finance, and engineering. He was Vice President of a robotics and factory automation firm for two years. He was also a senior member of a technology delegation to the People's Republic of China, on the invitation of the Chinese and United States Government, and a member of a technology delegation to the Commonwealth of Independent States (Soviet Union).

  Sam has a Bachelor's degree in Bioengineering and Master's Degree in Electrical Engineering from Wayne State University in Detroit, Michigan, and a Master's in Business Administration from the University of Michigan, Ann Arbor. He has been elected to Eta Kappa Nu (electrical engineering honors society), and Tau Beta Pi (engineering honors society), and is a member of numerous societies and professional organizations, and is a frequent speaker at seminars around the world. He can be emailed at Sam@ArchitecturesCOE.org, or reached by telephone on (810) 231-0531.

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Thank you!

Your Journey Begins!

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