Enterprise Architecture

Enterprise Physics 101

John A. Zachman
Zachman International

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Preface

This seminar is NOT about increasing the stock price by the close of market, Friday afternoon.

Nothing magic is happening!
It's ALL Physics

It IS about the laws of [illegible] the success of an Enterprise ... part[illegible]ding success in the turbulent tim[illegible]e Information Age.

It is a presentation on Physics ... Enterprise Physics.

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Day 1: Urgency and Introduction to EA

- Business Architecture
- Data Models and Info. Architecture

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Day 1: Urgency and Introduction to EA

- Global Environment
- Definition of Enterprise Architecture
- Ontology versus Methodology
- Zachman Framework Story
- **Business Architecture**
- **Data Models and Info. Architecture**
- Laws of Physics

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Introduction

Enterprise Architecture presently appears to be a grossly misunderstood concept among managem

It is NOT an In

Technology i

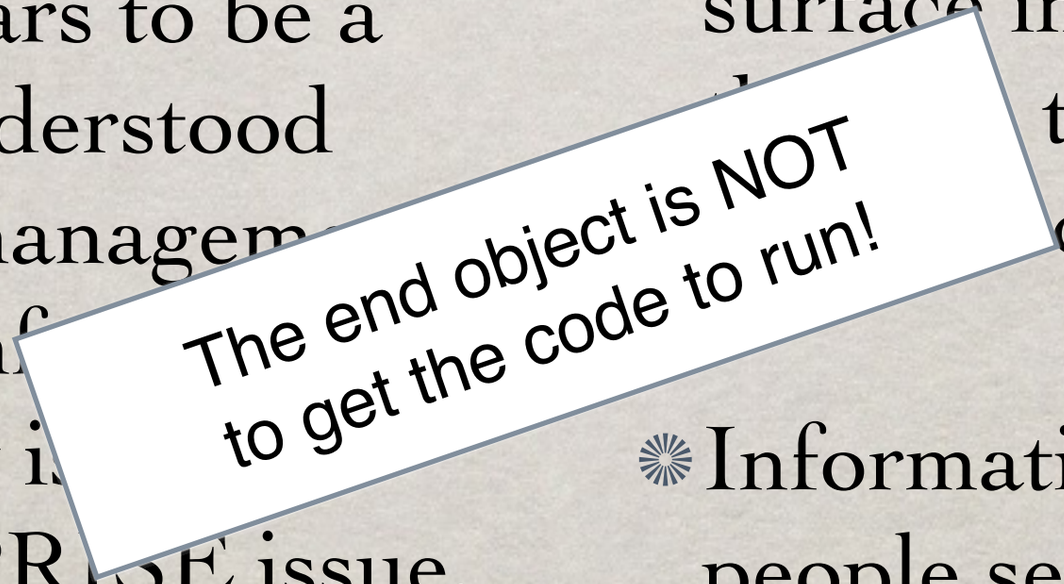
It is an ENTERPRISE issue.

It is likely perceived to be an Information Technology issue as opposed to a Management issue for two reasons:

- Awareness of it tends to surface in the Enterprise

the Information

community.



- Information Technology people seem to have the skills to do Enterprise Architecture if any Enterprise Architecture is being or is to be done.

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The Information Age

"The next information revolution is well underway. But it is not happening where information scientists, information executives, and the information industry in general are looking for it. It is not a revolution in technology, machinery, techniques, software, or [illegible]d. It is a revolution in CONCEPTS."

Peter Drucker. Forbes A[illegible]

"Future Sh[illegible]ange.

"The [illegible]ucture of change.

"P[illegible]he culture of change.

-Alvin Toffler

Change strategy to assemble-to-order
or get your brains beat out
(extreme complexity/extreme change)

"We are living in an extraordinary moment in history. Historians will look back on our times, the 40-year time span between 1980 and 2020, and classify it among the handful of historic moments when humans reorganized their entire civilization around a new tool, a new idea."

Peter Leyden. Minneapolis Star Tribune. June 4, 1995

"On the Edge of the Digital Age: The Historic Moment"

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The Challenge

What is your strategy (Chief) for addressing:
Orders of magnitude increases in complexity,
and
Orders of magnitude increases in the rate of change?

Seven thousand years of history would suggest the only known strategy for addressing complexity and change is...

ARCHITECTURE

If it gets so complex you can't remember how it works ...
you have to write it down (Architecture)
If you want to change how it works ...
you start with what you have written down (Architecture)

The key to complexity and change: Architecture.

The question is: What is "Architecture,"
Enterprise Architecture?

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Introduction to
Enterprise Architecture

Defining Enterprise Architecture

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Architecture

Architecture … what is it?

Some people think this is Architecture:

That is a common

MISCONCEPTION

(Note: This same misconception about Enterprises is what leads people to misconstrue Enterprise Architecture as being big, monolithic, static, inflexible and unachievable and … it takes too long and costs too much.)

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Architecture

This is the RESULT of architecture. In the RESULT you can see the Architect's "architecture".
The RESULT is an implementation, an instance.

"Architecture" IS the set of descriptive representations relevant for describing a complex object (actually, any object) such that an instance of the object can be created and such that the descriptive representations serve as the baseline for changing an object instance (assuming that the descriptive representations are maintained consistent with the instantiation).

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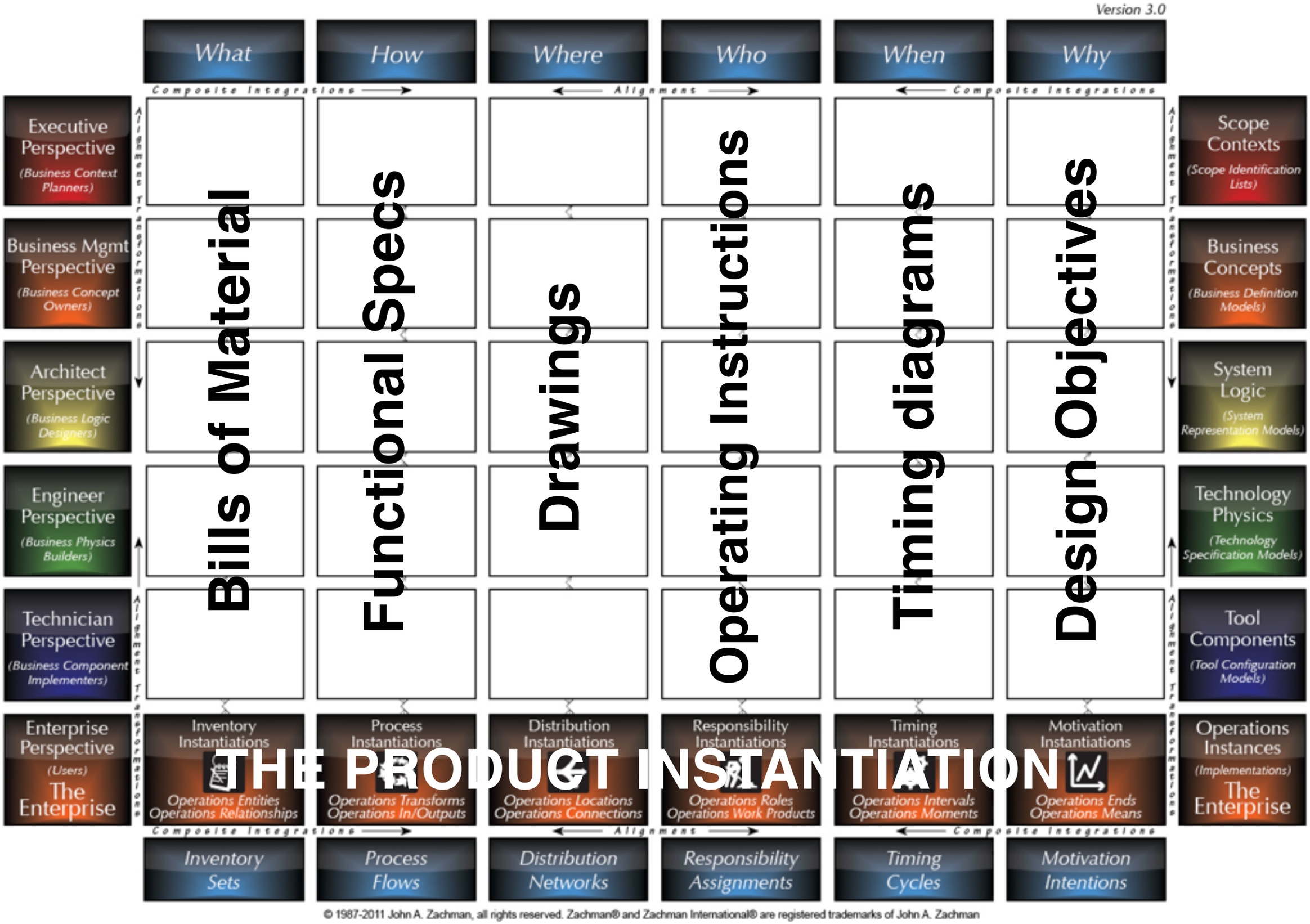
The Framework for Anything Architecture



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Complexity

Reduce the sample size through Classification

One Dimensional

Decomposition (Hierarchy, "Taxonomy")

The deeper the tree, the smaller the parts (faster and cheaper).

The same content can occur in multiple nodes.

ANALYSIS

Lends itself to implementation (Manufacturing)

Multi Dimensional

Normalization (Matrix, Cube)

One (type of) fact in one place (set theory).

Identify and eliminate recurrences (redundancies)

SYNTHESIS

Lends itself to design (Engineering)

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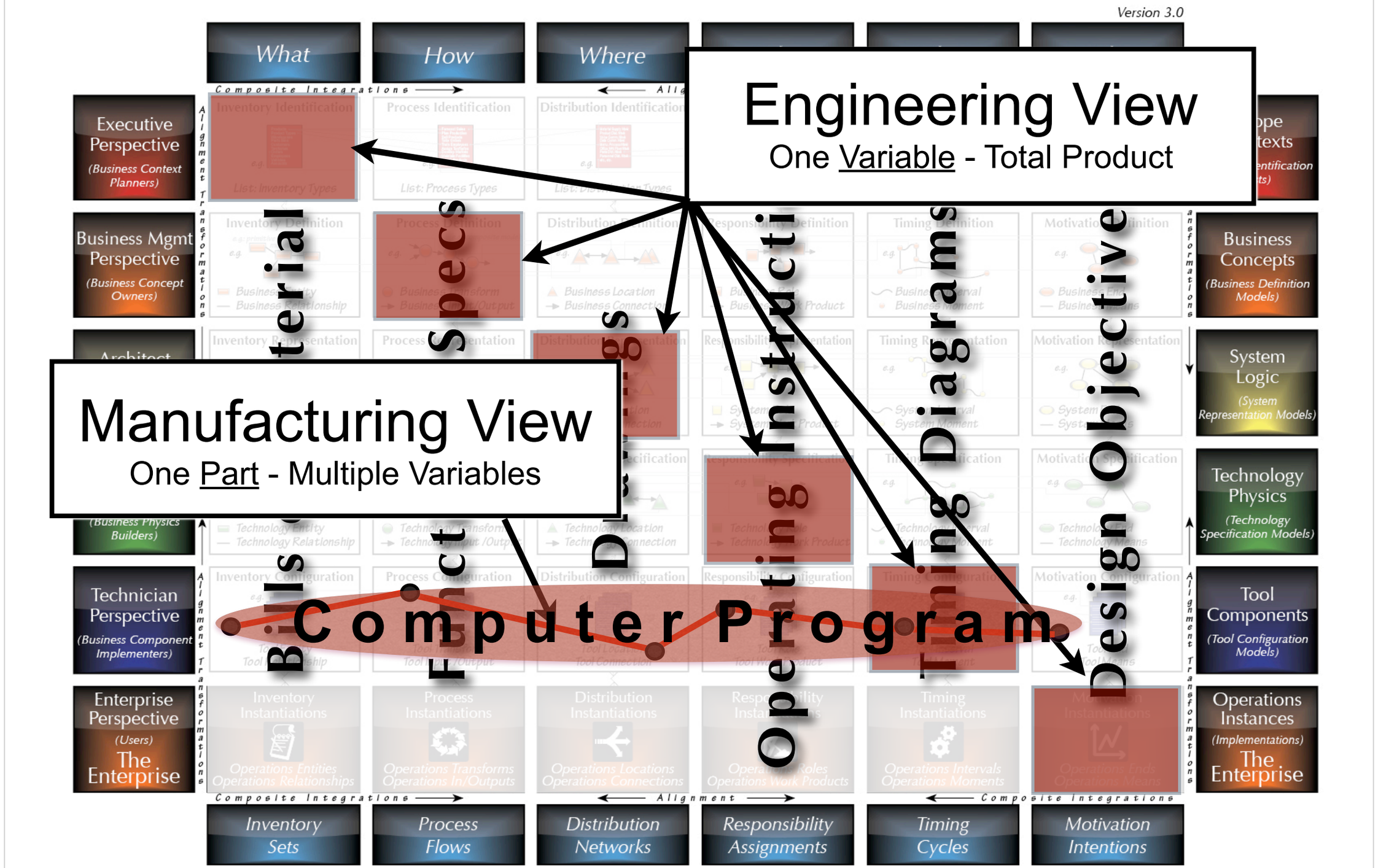
Engineering Versus Manufacturing



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Manufacturing vs Engineering

Manufacturing work requires

multi-variable,

holistic descriptions

of ***parts*** of the object.

(Composite)

(Analysis - Decomposition)

(This is the CURRENT paradigm)

IN CONTRAST

Engineering work requires

single-variable,

ontologically-defined descriptions

of the ***whole*** of the object.

(Primitive)

(Synthesis Normalization)

(This is the NEW paradigm)

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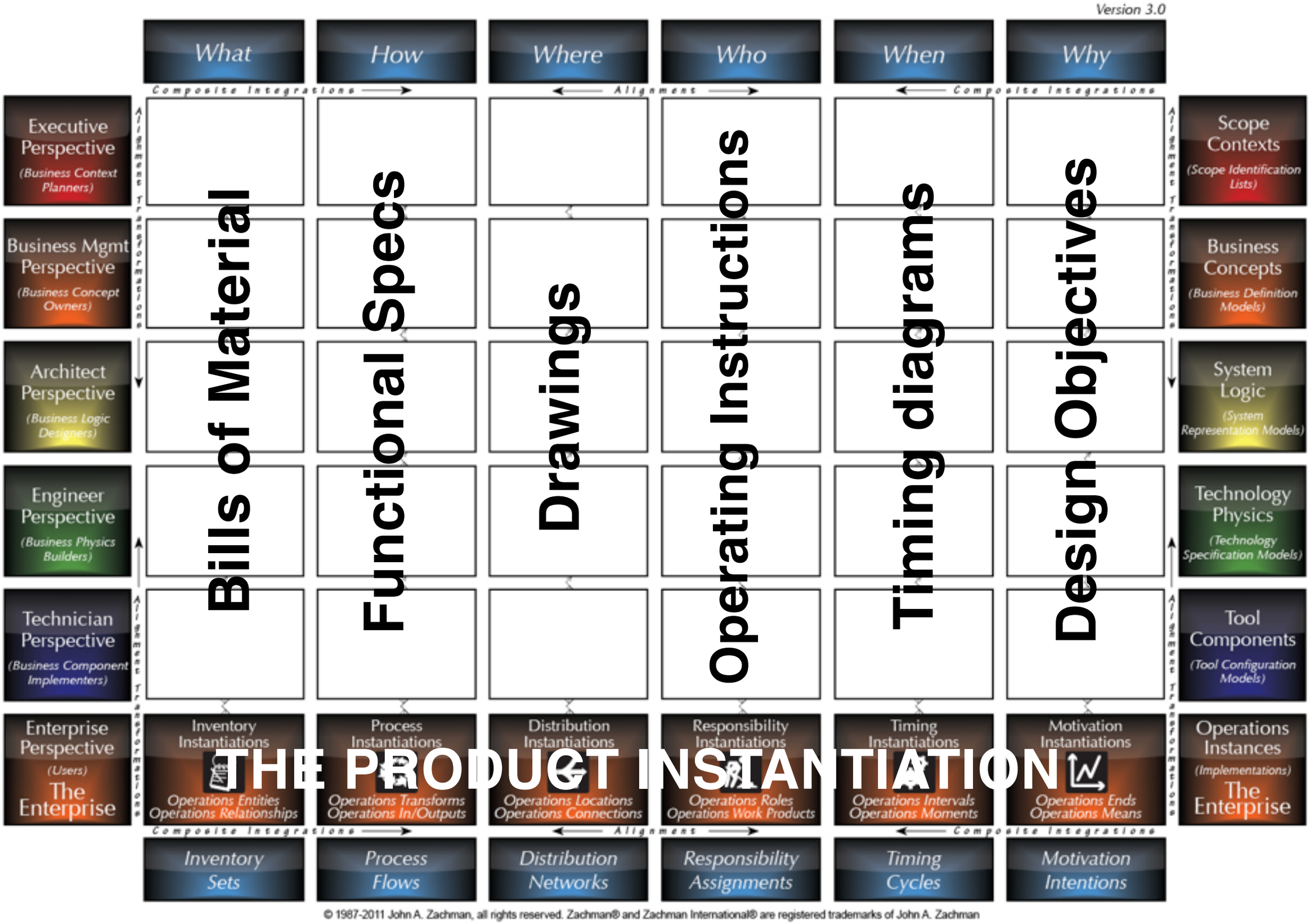

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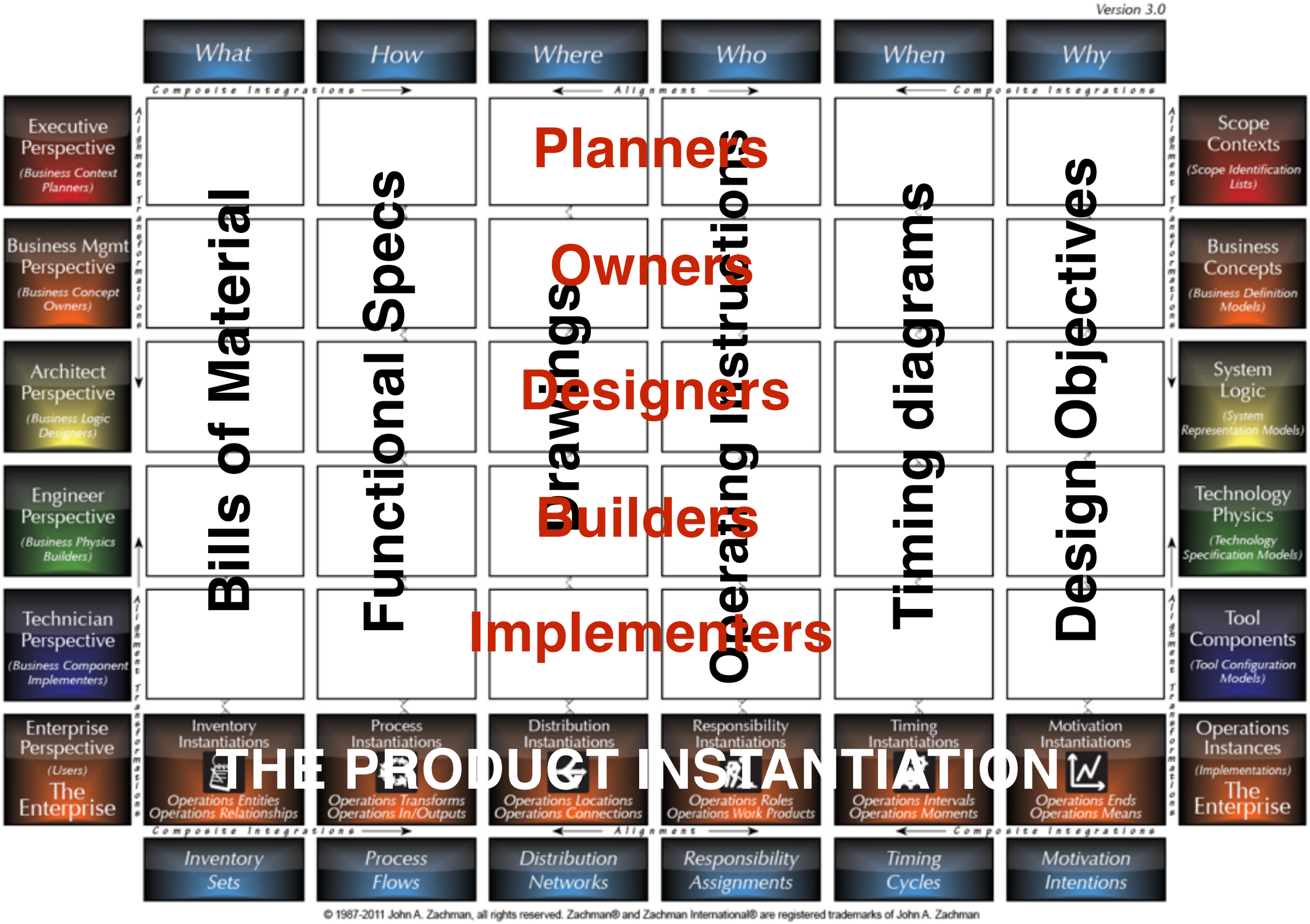

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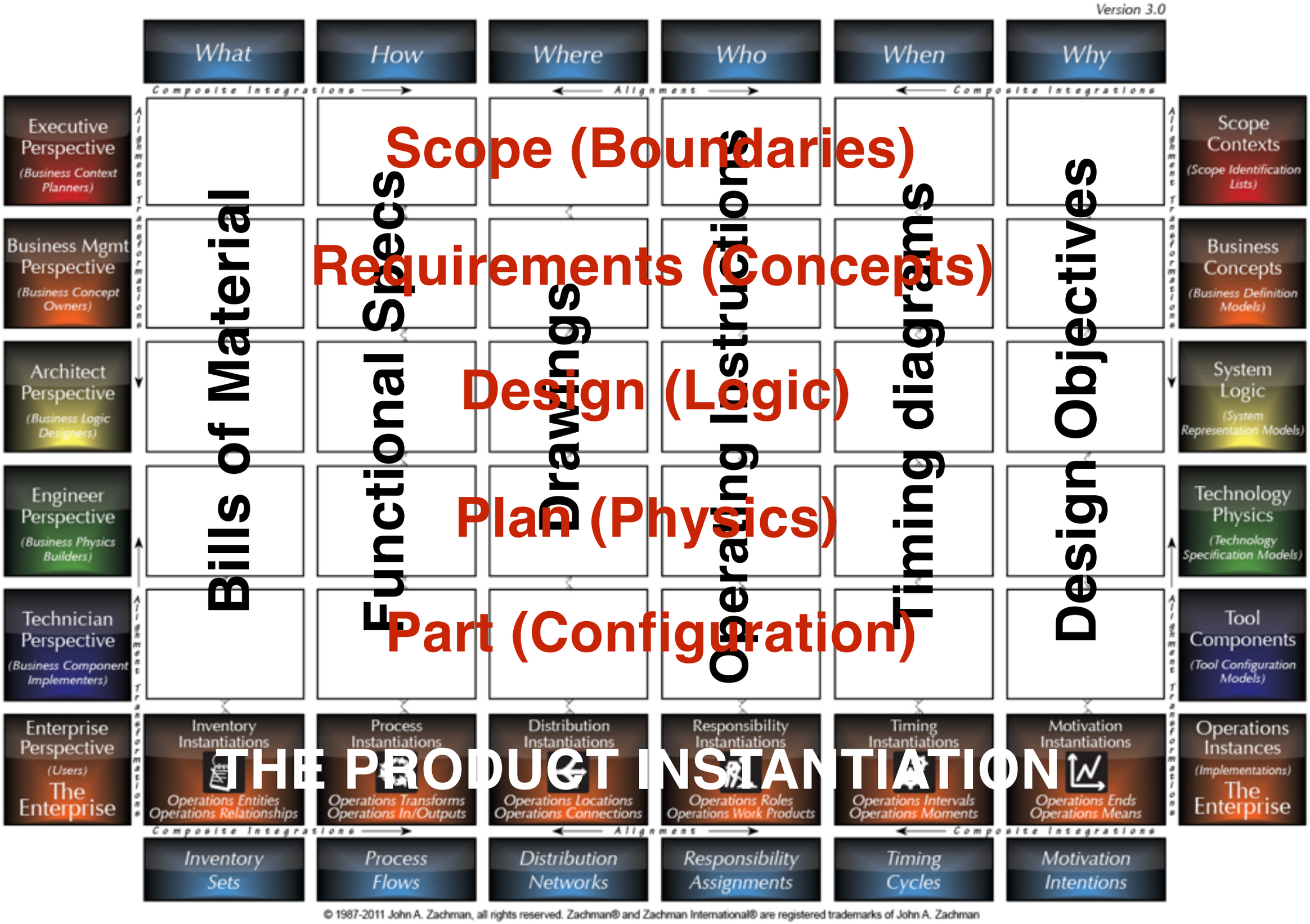

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Reification

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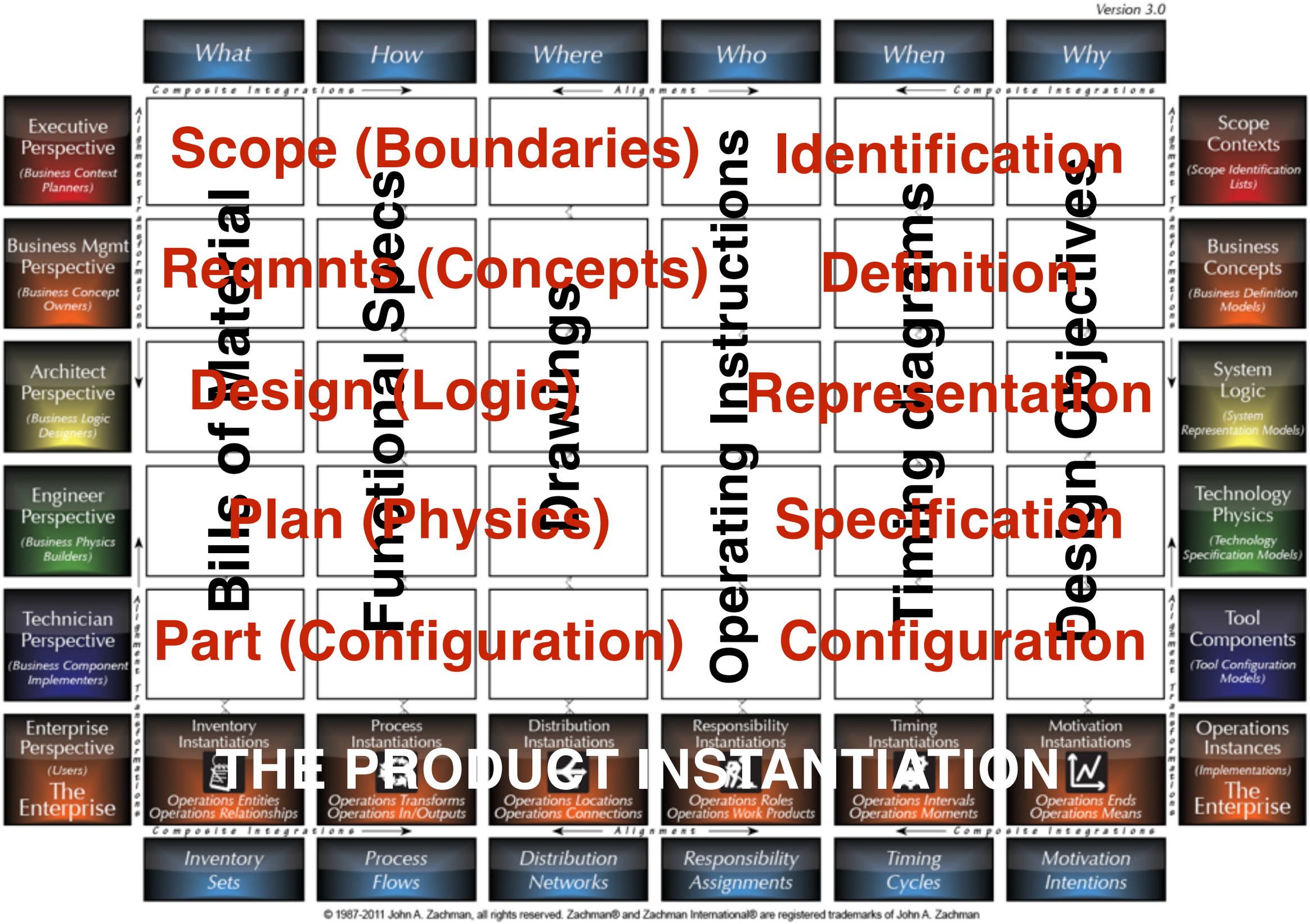

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The Zachman Framework for Enterprise Architecture™

The Enterprise Ontology ™

Version 3.0

Audience Perspectives / Classification Names	What	How	Where	Who	When	Why	Classification Names / Model Names
	Composite Integrations →		*Alignment* →		*Composite Integrations* →		
Executive Perspective *(Business Context Planners)*	**Inventory Identification** e.g. *List: Inventory Types*	**Process Identification** e.g. *List: Process Types*	**Distribution Identification** e.g. *List: Distribution Types*	**Responsibility Identification** e.g. *List: Responsibility Types*	**Timing Identification** e.g. *List: Timing Types*	**Motivation Identification** e.g. *List: Motivation Types*	**Scope Contexts** *(Scope Identification Lists)*
Business Mgmt Perspective *(Business Concept Owners)*	**Inventory Definition** e.g. *Business Entity — Business Relationship*	**Process Definition** e.g. *Business Transform → Business Input/Output*	**Distribution Definition** e.g. *Business Location → Business Connection*	**Responsibility Definition** e.g. *Business Role → Business Work Product*	**Timing Definition** e.g. *Business Interval ~ Business Moment*	**Motivation Definition** e.g. *Business End — Business Means*	**Business Concepts** *(Business Definition Models)*
Architect Perspective *(Business Logic Designers)*	**Inventory Representation** e.g. *System Entity — System Relationship*	**Process Representation** e.g. *System Transform → System Input /Output*	**Distribution Representation** e.g. *System Location → System Connection*	**Responsibility Representation** e.g. *System Role → System Work Product*	**Timing Representation** e.g. *System Interval ~ System Moment*	**Motivation Representation** e.g. *System End — System Means*	**System Logic** *(System Representation Models)*
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Technician Perspective *(Business Component Implementers)*	**Inventory Configuration** e.g. *Tool Entity / Tool Relationship*	**Process Configuration** e.g. *Tool Transform / Tool Input /Output*	**Distribution Configuration** e.g. *Tool Location / Tool Connection*	**Responsibility Configuration** e.g. *Tool Role / Tool Work Product*	**Timing Configuration** e.g. *Tool Interval / Tool Moment*	**Motivation Configuration** e.g. *Tool End / Tool Means*	**Tool Components** *(Tool Configuration Models)*
Enterprise Perspective *(Users)* **The Enterprise**	**Inventory Instantiations** *Operations Entities / Operations Relationships*	**Process Instantiations** *Operations Transforms / Operations In/Outputs*	**Distribution Instantiations** *Operations Locations / Operations Connections*	**Responsibility Instantiations** *Operations Roles / Operations Work Products*	**Timing Instantiations** *Operations Intervals / Operations Moments*	**Motivation Instantiations** *Operations Ends / Operations Means*	**Operations Instances** *(Implementations)* **The Enterprise**
	Composite Integrations →		*Alignment* →		*Composite Integrations* →		
Audience Perspectives / Enterprise Names	**Inventory Sets**	**Process Flows**	**Distribution Networks**	**Responsibility Assignments**	**Timing Cycles**	**Motivation Intentions**	

Alignment Transformations (vertical, between rows)

**Horizontal integration lines are shown for example purposes only and are not a complete set. Composite, integrative relationships connecting every cell horizontally potentially exist.*

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Framework Graphic

For the latest version of the Framework Graphic,
register at **www.Zachman.com**
for a high resolution .pdf file.

(For a publication release of the Framework Graphic
send requests to the Contact Us link on zachman.com)

You may be interested in several articles by John A. Zachman at
Zachman.com
"Architecture Is Architecture Is Architecture"
"John Zachman's Concise Definition of the Zachman Framework"
and
"The Zachman Framework Evolution" by John P. Zachman

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Architecture Is Architecture

I simply put Enterprise names on the same descriptive representations relevant for describing anything.

Why would anyone think that the descriptions of an Enterprise are going to be any different from the descriptions of anything else humanity has ever described?

ARCHITECTURE IS ARCHITECTURE IS ARCHITECTURE

I don't think Enterprise Architecture is arbitrary ... and it is ***not negotiable***. My opinion is, we ought to accept the definitions of Architecture that the older disciplines of Architecture and Construction, Engineering and Manufacturing have established and focus our energy on learning how to use them to actually engineer Enterprises.

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Introduction to
Enterprise Architecture

Two Different Things

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Ontology

The Zachman Framework™ schema technically is an ontology -
a theory of the existence of a structured set
of essential components of an object
for which explicit expression is necessary (is mandatory?)
for designing, operating and changing the object
(the object being an Enterprise, a department, a value chain,
a "sliver," a solution, a project,
an airplane, a building, a bathtub or whatever or whatever).

A Framework is a STRUCTURE.
(A Structure DEFINES something.)

Methodology

A Methodology is a PROCESS.
(A Process TRANSFORMS something.)

A Structure IS NOT A Process
A Process IS NOT a Structure.

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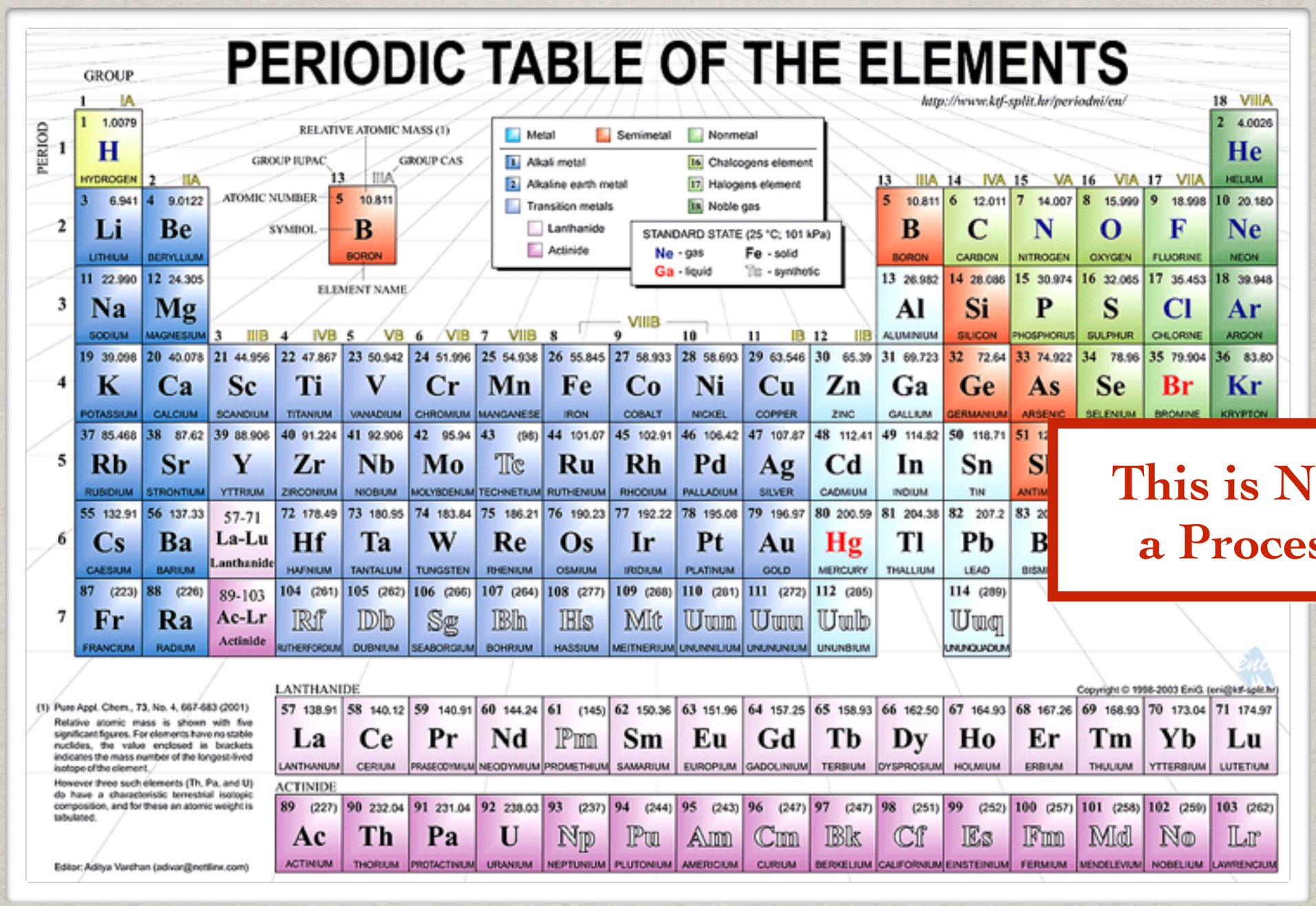
Ontology



This is NOT a Process.

Elements are Timeless

Until an ontology exists, nothing is repeatable, nothing is predictable.
There is no DISCIPLINE.

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Process

(Methodology)

A Process TRANSFORMS something.

This is a Process:

Add Bleach to an Alkali and it is transformed into Saltwater.

This is NOT an Ontology.

Compounds are Temporal

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Process

(methodology)

Add Bleach to an Alkali and
it is transformed into Saltwater.

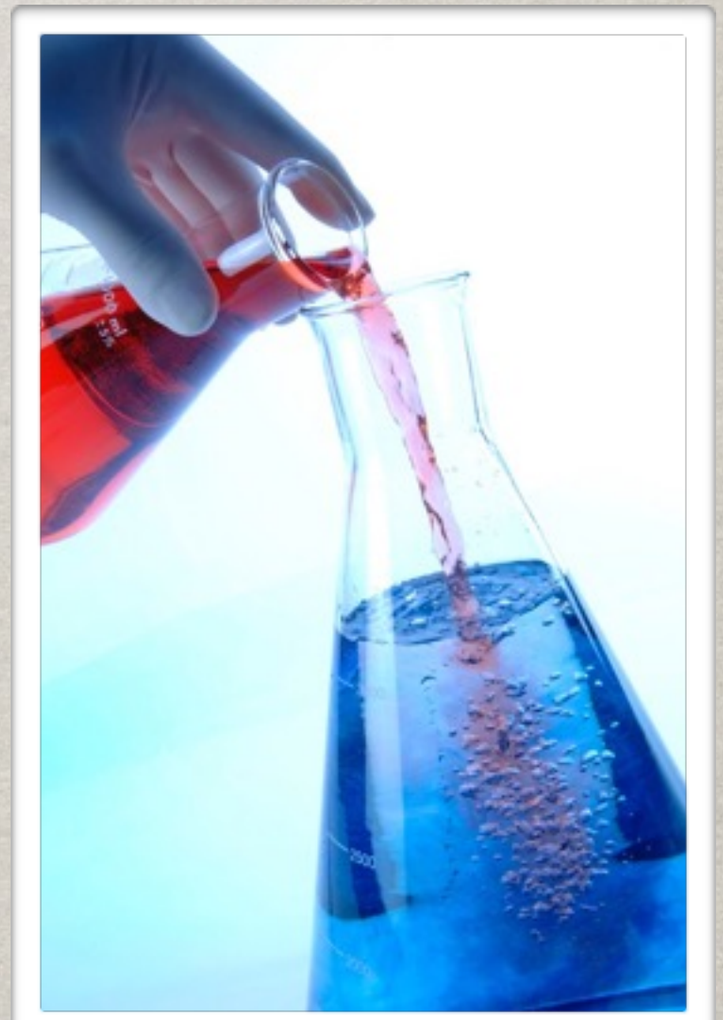
$$HCl + NaOH \rightarrow NaCl + H_2O$$

Compounds

Salt	$NaCl$
Aspirin	$C_9H_8O_4$
Vicodin	$C_{18}H_{21}NO_3$
Naproxen	$C_{14}H_{14}O_3$
Ibuprophen	$C_{13}H_{18}O_2$
Viagra	$C_{22}H_{30}N_6O_4S$
Sulphuric Acid	H_2SO_4
Water	H_2O

etc., etc., etc.

Compounds are Temporal



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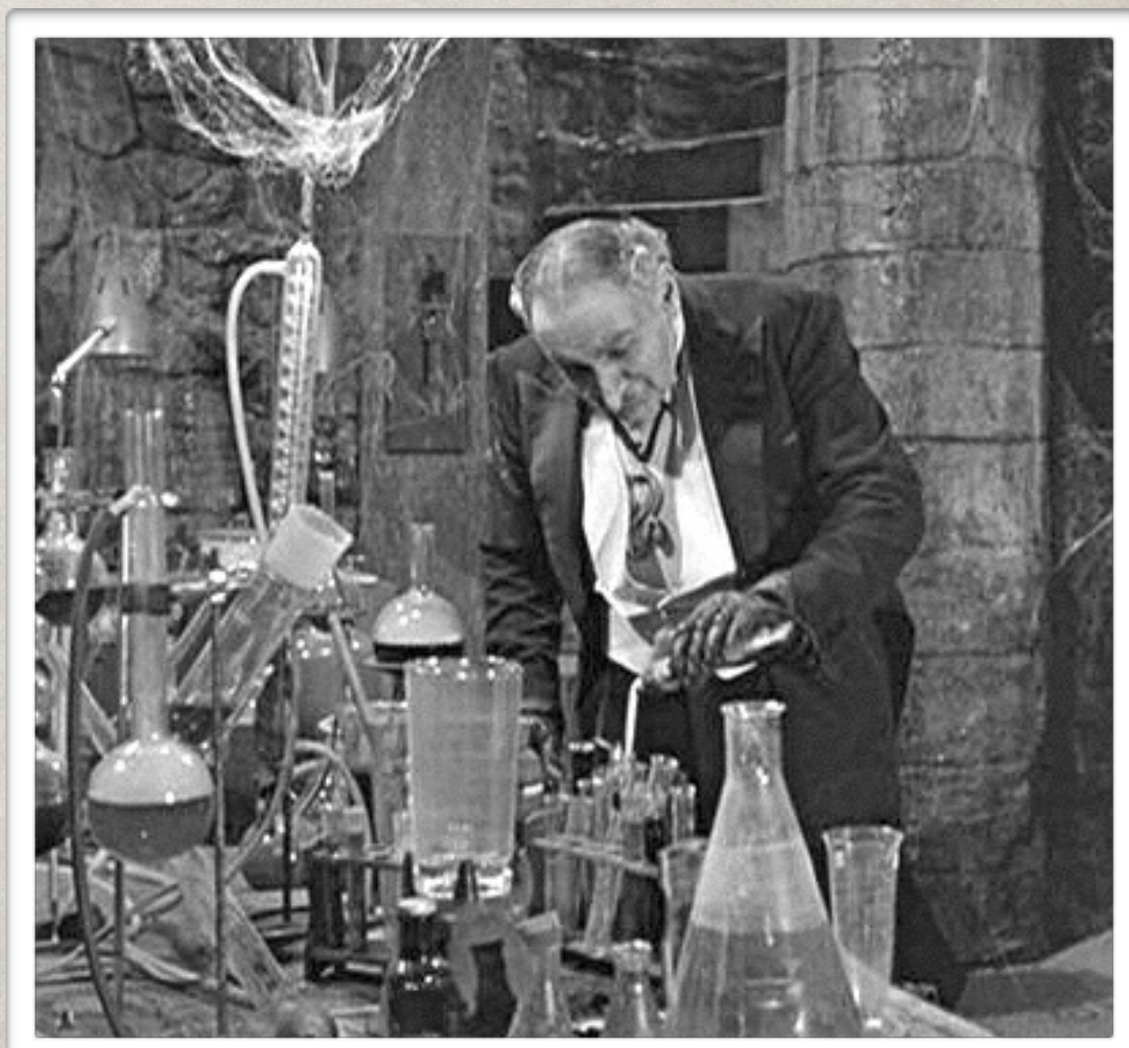
Alchemy - A Practice

This is a Methodology WITHOUT an Ontology

A Process with no ontological structure is ad hoc, fixed and dependent on practitioner skills.

This is NOT a science.

It is ALCHEMY, a "**practice**."



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Ontology

This is NOT a Process.

"Primitives" are Timeless.

Until an ontology exists, nothing is repeatable, nothing is predictable.

There is no DISCIPLINE.

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Process

(METHODOLOGY)

Composites

(COMPOUNDS)

COBOL Programs
Objects
BPMN Models
Swimlanes
Business Architecture
Capabilities
Mobility
Applications
Data Models
Security Architecture
Services

COTS
Technology Architecture
Big Data
Missions/Visions
Agile Code
Business Processes
DoDAF Models
Balanced Scorecard
Clouds
I.B. Watson
TOGAF Artifacts

Etc., etc., etc.

Compounds are Temporal

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Ontology vs Methodology

An Ontology is the classification of the total set of "**Primitive**" (elemental) components that exist and that are relevant to the existence of an object.

A Methodology produces "**Composite**" (compound) implementations of the Primitives.

Primitives (elements) are timeless.

Composites (compounds) are temporal.

People who build **Composite** Models
think the **Roman Coliseum** is Architecture.

People who build **Primitive** Models
think the **Descriptive Representations** are Architecture.

What do YOU think is Architecture?

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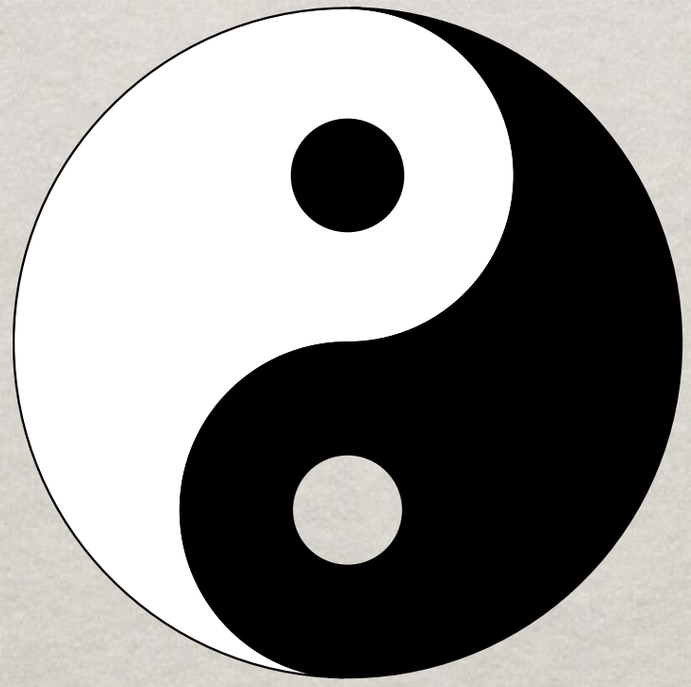
Ontology and Methodology

It is NOT either Ontology OR Methodology

It IS Ontology AND Methodology



Ontology and Methodologies
do not COMPETE
they COMPLETE

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Ontology and Methodology

Methodologies **WITH** Ontology produce
ARCHITECTURE

Methodologies **WITHOUT** Ontology produce
LEGACY

Timeless architectural Primitives (Ontology)
can be dynamically assembled (Methodology)
into an infinite number of
temporal Enterprise implementation Composites,
that is,
Custom Enterprises, mass-produced in quantities of 1 for immediate delivery.
(Enterprise "Mass-Customization.")

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Introduction to
Enterprise Architecture

A
Zachman Framework
Story

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The Zachman Framework for Enterprise Architecture™

The Enterprise Ontology ™

Version 3.0

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Alignment Transformations							*Alignment Transformations*
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Technician Perspective *(Business Component Implementers)*	Inventory Configuration	Process Configuration	Distribution Configuration	Responsibility Configuration	Timing Configuration	Motivation Configuration	Tool Components *(Tool Configuration Models)*
Enterprise Perspective *(Users)* The Enterprise	Inventory Instantiations *Operations Entities Operations Relationships*	Process Instantiations *Operations Transforms Operations In/Outputs*	Distribution Instantiations *Operations Locations Operations Connections*	Responsibility Instantiations *Operations Roles Operations Work Products*	Timing Instantiations *Operations Intervals Operations Moments*	Motivation Instantiations *Operations Ends Operations Means*	Operations Instances *(Implementations)* The Enterprise
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Audience Perspectives / *Enterprise Names*	*Inventory Sets*	*Process Flows*	*Distribution Networks*	*Responsibility Assignments*	*Timing Cycles*	*Motivation Intentions*	

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Murder/Kidnapping Case

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Alignment Transformations

In two weeks - identified new terrorist Cell and linkages with all existing cells

Murder/Kidnapping Case

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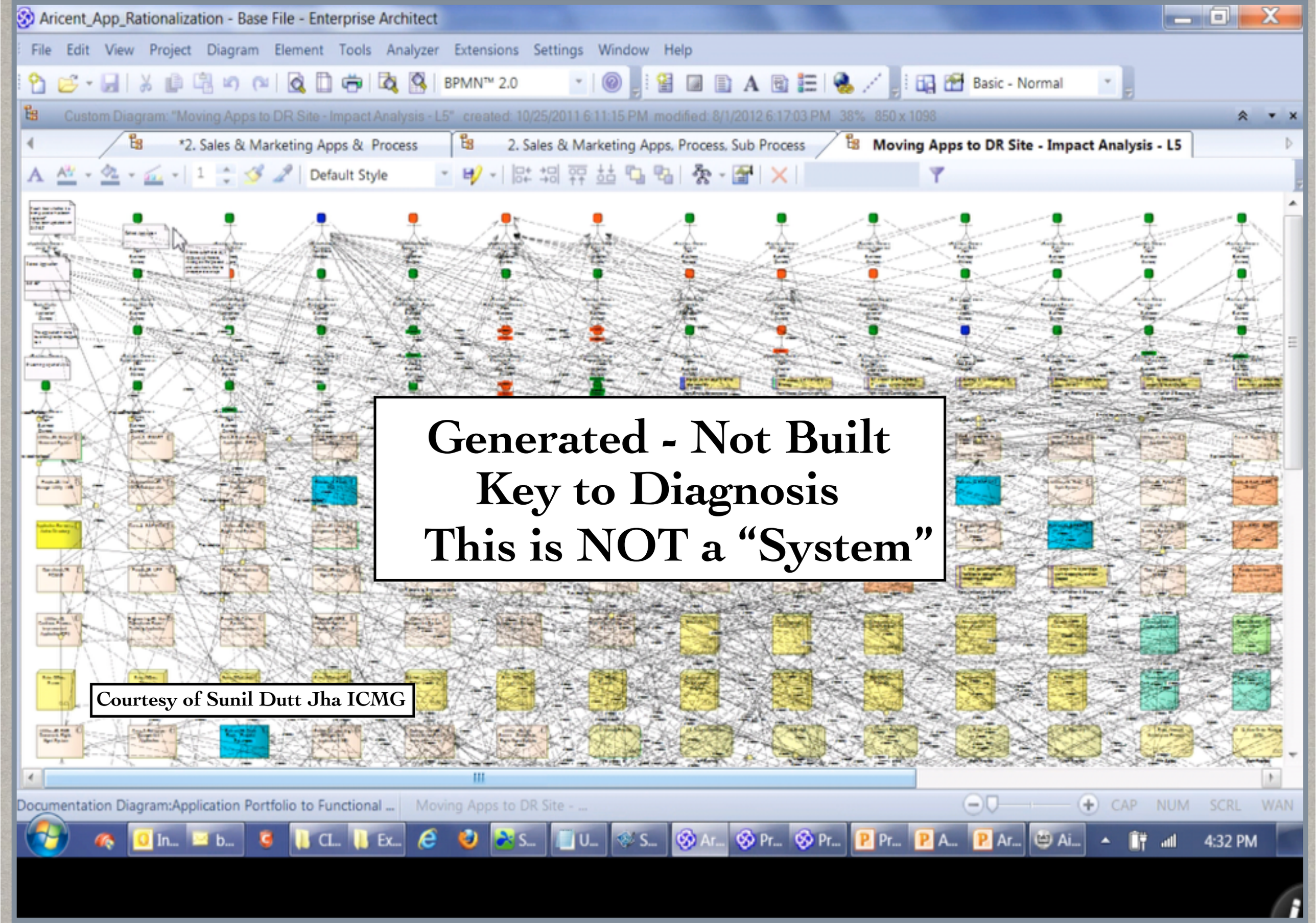
Aricent_App_Rationalization - Base File - Enterprise Architect
File Edit View Project Diagram Element Tools Analyzer Extensions Settings Window Help
BPMN™ 2.0
Basic - Normal
Custom Diagram: "Moving Apps to DR Site - Impact Analysis - L5" created: 10/25/2011 6:11:15 PM modified: 8/1/2012 6:17:03 PM 38% 850 x 1098
*2. Sales & Marketing Apps & Process
2. Sales & Marketing Apps. Process. Sub Process
Moving Apps to DR Site - Impact Analysis - L5
Default Style
Generated - Not Built
Key to Diagnosis
This is NOT a "System"
Courtesy of Sunil Dutt Jha ICMG
Documentation Diagram:Application Portfolio to Functional ...
Moving Apps to DR Site - ...
CAP NUM SCRL WAN
4:32 PM

The Key

1. Single-variable, precisely unique, relevant (not arbitrary), ontologically-defined components.

2. Binary Relationships (only two components at a time).

The Key to
diagnosing the CEO's Problems
and prescribing alternative solutions

This IS an
(incomplete) Enterprise Architecture
(Not Enterprise-wide, No Relationship Entities)

A "system" **REUSES** these Architecture components.

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Introduction to
Enterprise Architecture

Business Architecture

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	Scope Lists (Contexts)						
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	Busines					**oncepts)**	
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Alignment Transformations (left) / *Alignment Transformations* (right)

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Technician Perspective (Business Component Implementers)	Inventory Configuration	Process Configuration			Timing Configuration	Motivation Configuration	Tool Components (Tool Configuration Models)
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Audience Perspectives / Enterprise Names	Inventory Sets	Process Flows	Distribution Networks	Responsibility Assignments	Timing Cycles	Motivation Intentions	

Alignment Transformations

REALITY

Technology Models (Physics)

Tool Models (Configuration)

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Alignment Transformations (left) / *Alignment Transformations* (right)

Technology Models (Physics)

Tool Models (Configuration)

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Inventory Models *Process Models* *Distribution Models*

RESOURCE

Alignment Transformations

Composite Integrations → ← *Alignment* → ← *Composite Integrations*

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Alignment Transformations

Responsibility Models

Timing Models

Motivation Models

BEHAVIOR

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Alignment Transformations							*Alignment Transformations*
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RESOURCE

BEHAVIOR

Responsibility Models

Timing Models

Motivation Models

*Alignment Transformations

*Composite Integrations →

← Alignment →

← Composite Integrations

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Business Mgmt Perspective (Business Concept Owners)	Inventor…	RESOURCE IDEAS	…Definition	Responsibility…	BEHAVIOR IDEAS	…nition	Business Concepts (Business Definition Models)
Architect Perspective (Business Logic Designers)	Inventory Representation	Process Representation	Distribution Representation	Responsibility Representation	Timing Representation	Motivation Representation	System Logic (System Representation Models)
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Technician Perspective (Business Component Implementers)	Inventory…	RESOURCE REALITY	…onfiguration	Responsibility C…	BEHAVIOR REALITY	…guration	Tool Components (Tool Configuration Models)
Enterprise Perspective (Users) The Enterprise	Inventory Instantiations Operations Entities Operations Relationships	Process Instantiations Operations Transforms Operations In/Outputs	Distribution Instantiations Operations Locations Operations Connections	Responsibility Instantiations Operations Roles Operations Work Products	Timing Instantiations Operations Intervals Operations Moments	Motivation Instantiations Operations Ends Operations Means	Operations Instances (Implementations) The Enterprise
Audience Perspectives / Enterprise Names	Composite Integrations →		← Alignment →		← Composite Integrations		
	Inventory Sets	Process Flows	Distribution Networks	Responsibility Assignments	Timing Cycles	Motivation Intentions	

Alignment Transformations (↓) — Alignment Transformations (↑)

THE ENTERPRISE INSTANTIATION

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Business Mgmt Perspective *(Business Concept Owners)*	Inventory Definition **BA?**	Process Definition **BA?**	Distribution Definition **BA?**	Responsibility Definition **BA?**	Timing Definition **BA?**	Motivation Definition **BA?**	Business Concepts *(Business Definition Models)*
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	Composite Integrations →		*← Alignment →*		*← Composite Integrations*		
Audience Perspectives / Enterprise Names	*Inventory Sets*	*Process Flows*	*Distribution Networks*	*Responsibility Assignments*	*Timing Cycles*	*Motivation Intentions*	

Alignment Transformations (between each adjacent pair of rows)

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Alignment Transformations

Bus Arch? (Composite)

Bus Arch? (Composite)

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	Composite Integrations →		← *Alignment* →		← *Composite Integrations*		

Alignment Transformations (between each perspective row)

Bus Arch?
(Composite)

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Alignment Transformations (between adjacent perspective rows)

Business Architecture?
(Composite)

Etc., etc., etc.
(63 combinations)

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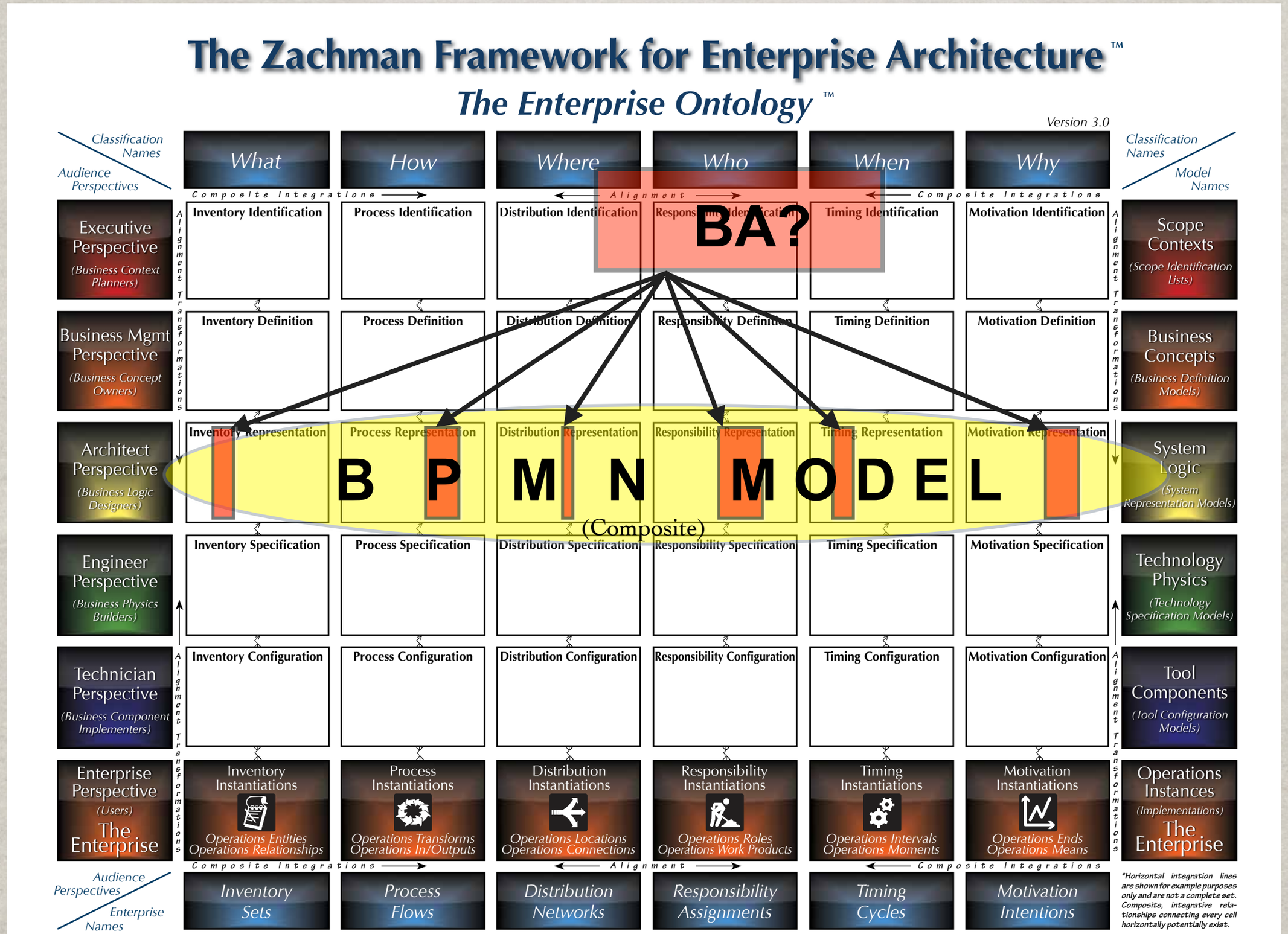

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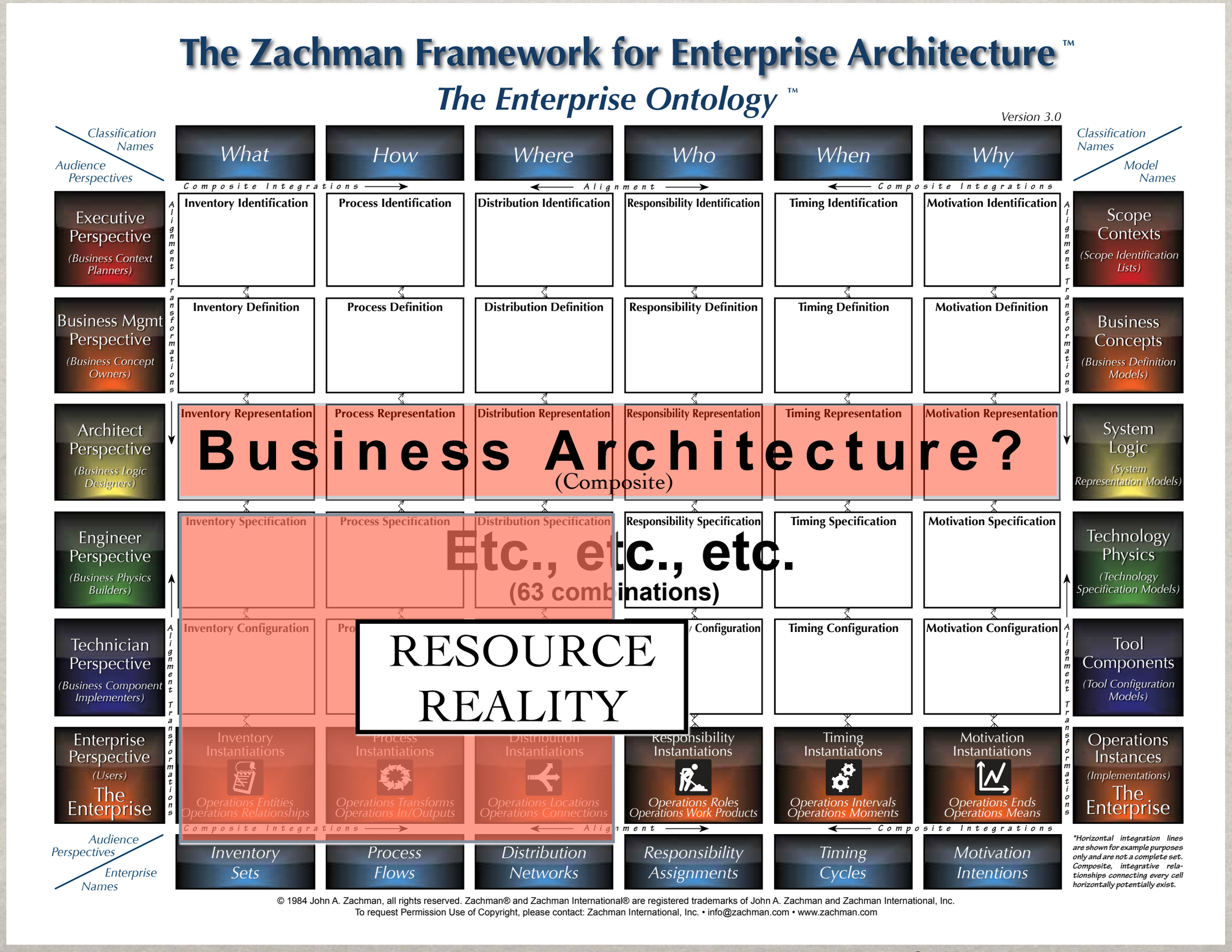

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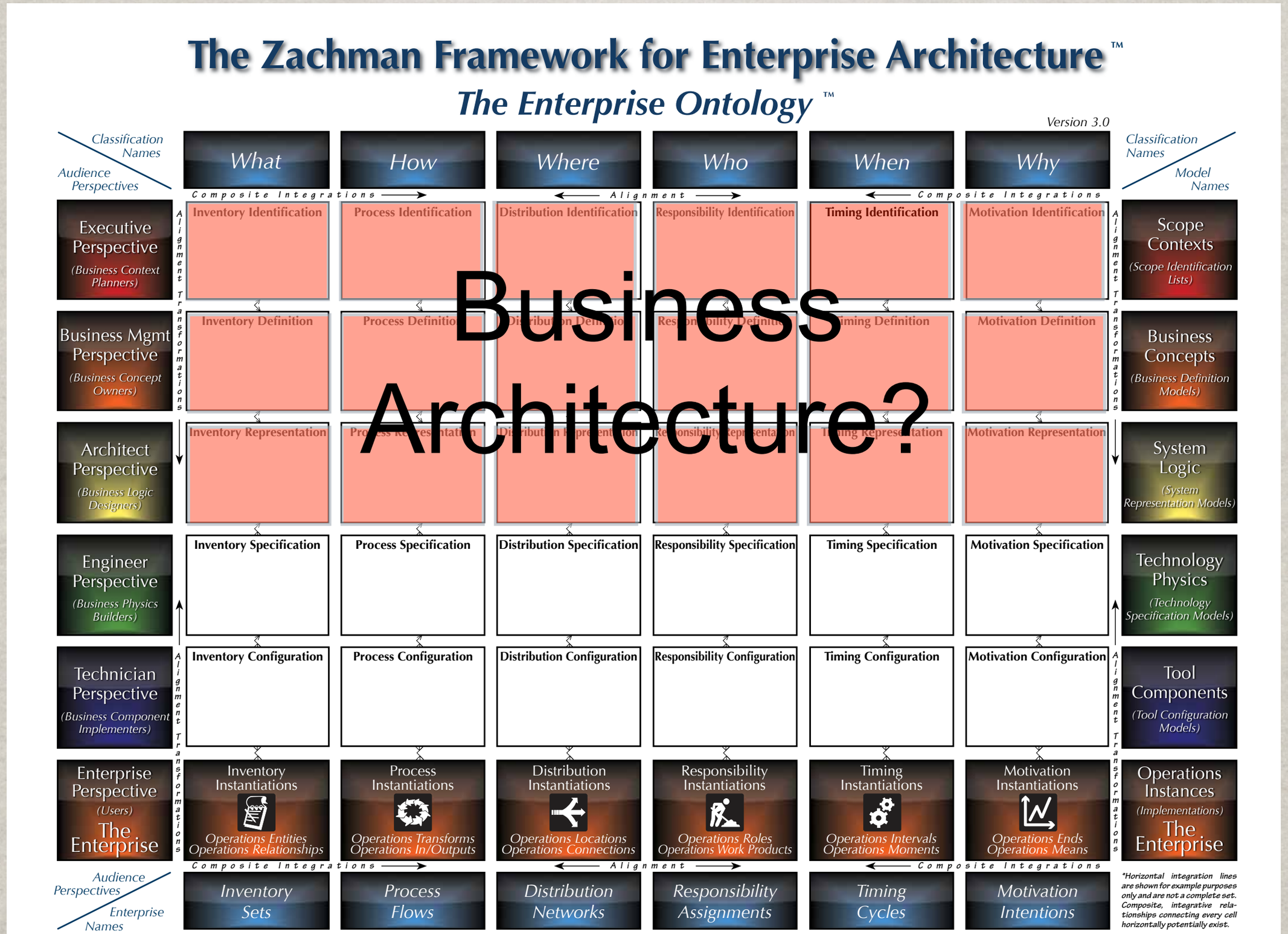

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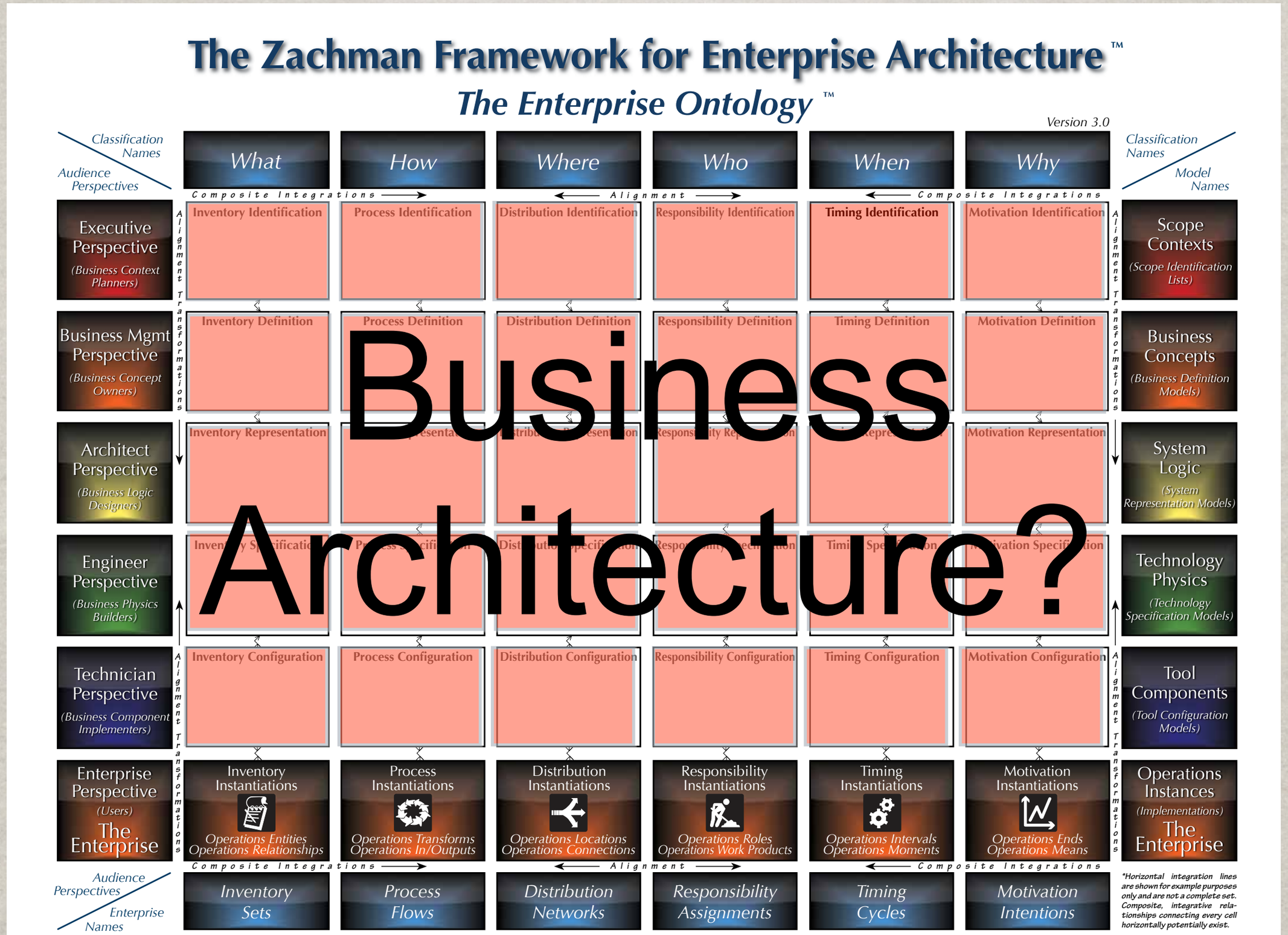

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Introduction to
Enterprise Architecture

Business Architecture Conclusions

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Business Architecture?

Row 1 Scope:	Primitives	6
	Possible Composites	63
Row 2 Concepts:	Primitives	6
	Possible Composites	63
Row 3 Logic:	Primitives	6
	Possible Composites	63
Rows 1 - 3: Scope, Concepts, & Logic		1
Rows 1 - 5: Scope, Concepts, Logic, Physics, & Config.		1
Total Possible Plausible Definitions		209

Other Variables:
Level of Detail
Width of Enterprise

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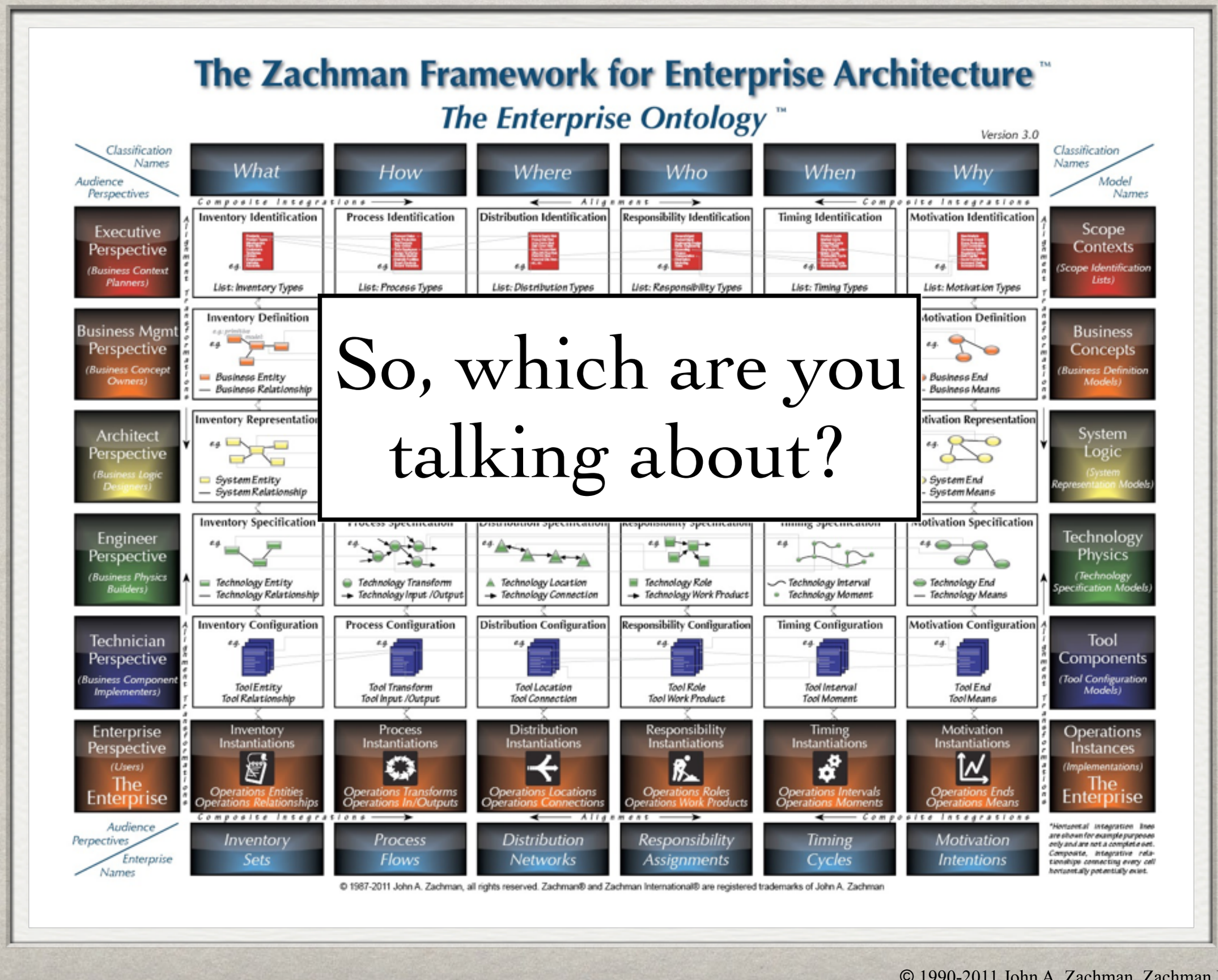
Business Architecture ?



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Business Architecture

YOUR definition???

If you are not being explicit,
you could be talking about
any one of the 209 definitions
and
other people could be hearing
any one of the 208 others.

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My Strategy

I would start populating the inventory of "Primitive" Models that constitute Enterprise Architecture from which I could dynamically assemble whichever one of the 209 plausible definitions of Business Architecture appropriate to address the issue at hand.

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Introduction to
Enterprise Architecture

Data Models and

Info. Arch.

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Reuse

Column 1

DATA
(Data as it exists)
"Attributes"
(Normalized)

Column 2

INFORMATION IS
"Data in context of its use"

"Data Elements "
(**De**-normalized)

Systems Entities

- Customer
- Airport
- Airplane
- Flight

Systems Processes

- Order
  - In → Receive Orders → Out
- Invoice
  - In → Send Invoices → Out
- Reservation
  - In → Reserve Seats → Out
- Manifest
  - In → Transmit Manifest → Out

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Introduction to
Enterprise Architecture

Observations

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Observation

If:

1. The Enterprise has no Enterprise Architecture,

2. EA Primitives do not = the Enterprise at every given moment,

3. And, any fact recurs anywhere in the Enterprise unsynchronized,

Then, I humbly submit that the strong possibility exists that:

1. No one actually knows how the Enterprise works

2. Problems can't be diagnosed and multiple solution alternatives posed/simulated before making investments

3. General Management would not be able to change the Enterprise in time to accommodate the external rate of change.

4. The cost of operations is likely escalating.

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Enterprise Architecture

Conclusions

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Challenge to Enterprise Architects

Reframe the concept of Enterprise Architecture ...

It is not about building models!

It is about solving Enterprise problems (while iteratively and incrementally building out the inventory of complete, reusable, Primitive Models) that constitute:

Enterprise Architecture.

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1965 Systems Problems

1. Didn't meet Requirements. (not "aligned")
2. The data was no good:
   - Not consistent from system to system.
   - Not accurate.
   - Not accessible.
   - Too late.
3. Couldn't change the system. (Inflexible)
4. Couldn't change the technology. (Not adaptable)
5. Couldn't change the business. (Couldn't change the system or the technology so couldn't change business.)
6. Little new development (80% $ for maintenance)
7. Took too long.
8. Cost too much.
9. Always over budget.
10. Always missed schedules.
11. DP budget out of control.
12. Too complicated - can't understand it, can't manage it.
13. Just frustrating.

(Adapted from Doug Erickson)

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2017 Systems Problems

1. Didn't meet Requirements. (not "aligned")
2. The data was no good:
   - Not consistent from system to system.
   - Not accurate.
   - Not accessible.
   - Too late.
3. Couldn't change the system. (Inflexible)
4. Couldn't change the technology. (Not adaptable)
5. Couldn't change the business. (Couldn't change the system or the technology so couldn't change business.)
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11. IT budget out of control.
12. Too complicated - can't understand it, can't manage it.
13. Just frustrating.

(Adapted from Doug Erickson)

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It's Funny...

COBOL didn't fix those problems!

MVS didn't fix those problems!
Virtual Memory didn't fix those problems!

IMS, DB2, Oracle, Sybase, Access, Fortran, PL/1, ADA, C++, Visual Basic, JAVA 2, 360's, 390's, MPP's, DEC VAX's, H200's, Crays, PC's, MAC's, Distributed Processing, didn't fix those problems!

Word, Excel, Powerpoint, Outlook Express, eMAIL, DOS, Windows 95, 98, 2000, NT, ME, XP, Unix, Linux, Object Oriented, COM, DCOM, CORBA, EDI, HTML, XML, UML, the Internet, B2B, B2C, Portals, Browsers didn't fix those problems!

IEF, IEW, ADW, ERWIN, POPKIN, Rational, Casewise, Rochade, Platinum, Design Bank, Data Warehouse, SAP, Baan, Peoplesoft, Oracle Financials, BSP, ISP, EAP, EAI didn't fix those problems!

And, I doubt that Business Architecture, .Net, Agile Programming, Service Oriented Architecture, Cloud Computing, BigData or I.B.Watson (whoever that is) is going to fix the problems.

IT MAKES ONE WONDER IF THERE ACTUALLY IS A TECHNICAL SOLUTION TO THE PROBLEMS!!!

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Engineering Problem

I'm not saying that there is anything wrong with any of these technologies.

In fact, any or all of them may well be very good ...

In fact, you may not be able to solve the Enterprise problem without employing some of these technologies.

However, The Enterprise problem is an ENGINEERING problem, NOT a technical problem.

My perception is that it is going to take actual work, ENGINEERING work, to solve the problems. My plan would be to start building out an inventory of models, PRIMITIVE MODELS, iteratively and incrementally, engineering them for alignment, integration, flexibility, reduced time-to-market, etc., etc.

What would be YOUR plan for solving the problems???

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