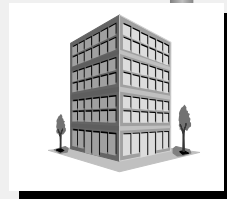


Enterprise Architecture

**Enterprise Design Objectives:
Complexity and Change**



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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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"Architecture"

If the object you are trying to create is simple, you can see the whole thing all at one time, and it is not likely to change, (e.g. a log cabin, a program, etc.), then you don't need Architecture. All you need is a tool (e.g. an ax, a compiler, etc.), some raw material (e.g. a forest, some data, etc.) and some time (then, build log cabins, write programs, etc.).

On the other hand, if the object is complex, you can't see it in its entirety at one time and it is likely to change considerably over time (e.g. a hundred story building, an Enterprise, etc.), now you need Architecture.

In short, the reasons you need Architecture:

COMPLEXITY AND CHANGE

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"Architecture"

COMPLEXITY

If you can't describe it, you can't create it
(whatever "it" is).

CHANGE

If you don't retain the descriptive representations after you create them (or if you never created them in the first place) and you need to change the resultant implementation, you have only three options:

- A. Change the instance and see what happens.
(High risk!)
- B. Recreate ("reverse engineer") the architectural representations from the existing ("as is") implementation. (Takes time and costs money!)
- C. Scrap the whole thing and start over again.

"Architecture"

There is not a single descriptive representation for a complex object ... there is a SET of descriptive representations.

Descriptive representations (of anything) typically include "Abstractions":

- A. Bills of Material (What)
- B. Functional Specs (How)
- C. Drawings (Where)
- D. Operating Instructions (Who)
- E. Timing Diagrams (When)
- F. Design Objectives (Why)

as well as Perspectives:

1. Scoping Boundaries (Strategists)
2. Requirement Concepts (Owners)
3. Design Logic (Designers)
4. Plan Physics (Builders)
5. Part Configurations (Implementers)
and the
6. Product Instances (Operators)

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Abstractions

INTERROGATIVE PERSPECTIVE	WHAT	HOW	WHERE	WHY	WHEN	WHY	TARGET CONTRIBUTIONS
SCOPE							STRATEGISTS
BUSINESS							EXECUTIVE LEADERS
SYSTEM							ARCHITECTS
TECHNOLOGY							ENGINEERS
COMPONENT							TECHNICIANS
OPERATIONS							WORKERS
AUDIENCE PERSPECTIVES	INVENTORY	PROCESS	NETWORK	ORGANIZATION	TIMING	MOTIVATION	TARGET DOMAINS
	Bills of Material	Functional Specs	Drawings	Operating Instructions	Timing Diagrams	Design Objectives	

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"Enterprise Architecture"

Therefore "**Enterprise Architecture**" would be the total set of descriptive representations (models) relevant for describing an Enterprise, that is, the descriptive representations required to create (a coherent, optimal) Enterprise and required to serve as a baseline for changing the Enterprise once it is created. The total set of relevant descriptive representations would necessarily have to include all the intersections between the

Abstractions:

- A. Inventory Models (Bills of Material)
- B. Process Models (Functional Specs)
- C. Geographic Models (Drawings)
- D. Work Flow Models (Operating Instructions)
- E. Cyclical Models (Timing Diagrams)
- F. Objective Models (Design Objectives)

and the Perspectives:

- 1. Scope Boundaries (Scoping Boundaries)
 - 2. Business Models (Requirement Concepts)
 - 3. System Models (Design Logic)
 - 4. Technology Models (Plan Physics)
 - 5. Tooling Configurations (Part Configurations)
- resulting in the
- 6. The Enterprise Implementation (Product Instance)

"Enterprise Architecture"

The total set would necessarily have to include

Abstractions:

WHAT

Inventory Models equal Bills of Materials
(Entity Models
and Data Models ARE Bills of Material)

HOW

Process Models equal Functional Specs
(Transformation Models)

WHERE

Network Models equal Drawings
(Geographic Models) (Geometry)
(Distribution Models)

WHO

Organization Models equal Operating Instructions
(Work Flow Models)
(Presentation Architecture)

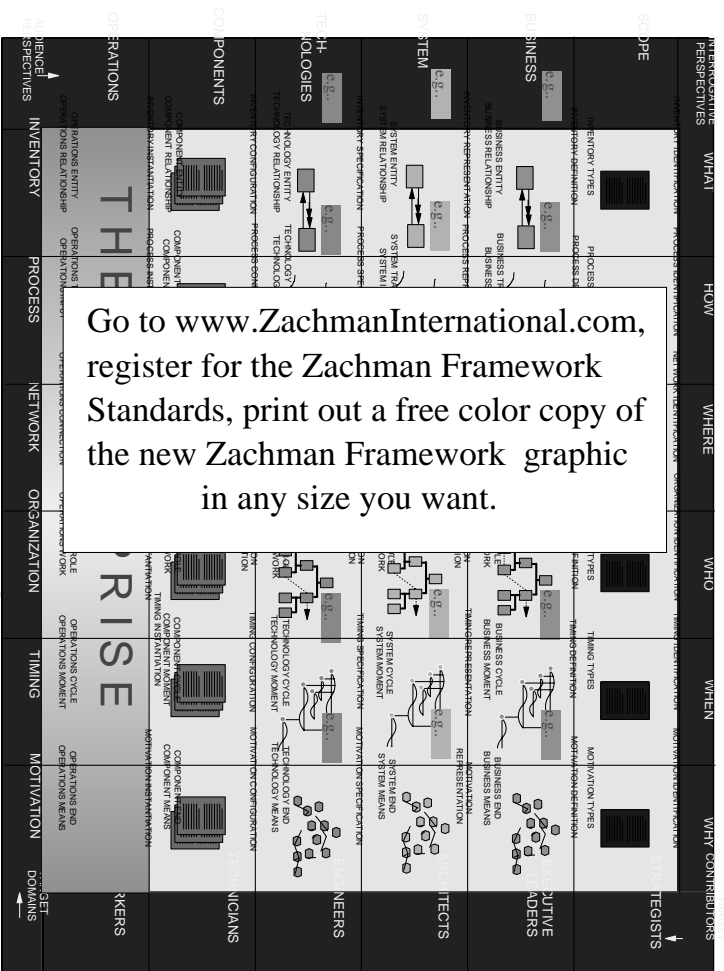
WHEN

Timing Models equal Timing Diagrams
(Control Structures)
(Cyclical Models)
(Dynamics Models)

WHY

Motivation Models equal Design Objectives

ENTERPRISE ARCHITECTURE



Go to www.ZachmanInternational.com, register for the Zachman Framework Standards, print out a free color copy of the new Zachman Framework graphic in any size you want.

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Perspectives

INTERROGATIVE PERSPECTIVE	WHAT	HOW	WHERE	WHO	WHEN	WHY	TARGET CONTRIBUTORS
SCOPE	Scope Boundaries equals Scope Boundaries						STRATEGISTS
BUSINESS	Business Models equal Requirement Concepts						EXECUTIVE LEADERS
SYSTEM	Systems Models equal Design Logic						ARCHITECTS
TECHNOLOGY	Technology Models equal Plan Physics						ENGINEERS
COMPONENT	Tooling Configurations equal Part Configurations						TECHNICIANS
OPERATION	Enterprise Implementation equals Product Instances						WORKERS
AUDIENCE PERSPECTIVES	INVENTORY	PROCESS	NETWORK	ORGANIZATION	TIMING	MOTIVATION	TARGET DOMAINS

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Architecture Is Architecture

I learned about architecture for Enterprises by looking at architecture for:

Airplanes, Buildings, Locomotives, Computers,
... Complex Industrial Products

It is all the same ...

Bills of Material, Functional Specs, Drawings, ... etc.
Requirements, Schematics, Blueprints, ... etc.

ENTERPRISES have:

Bills of Material, Functional Specs, Drawings, ... etc.

ENTERPRISES have:

Requirements, Schematics, Blueprints, ... etc.

The Engineering Design Artifacts (the descriptive representations of anything) fall into a two dimensional classification system:

- A. The focus of the description (Abstraction)
(What, How, Where, Who, When, Why)
- B. The usage of the description (Perspective)
(Owner, Designer, Builder)

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.

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).

The Zachman Framework is NOT a methodology for creating the implementation (an instantiation) of the object (i.e. the Framework is an ontology, not a methodology).

A Framework is a **STRUCTURE**.

(A Structure **DEFINES** something.)

An Ontology is a theory of existence - what **IS**

An Ontology **IS** a Structure.

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 vs Methodology

The Framework does not imply anything about:

- a. whether you do Architecture or whether you simply build systems (that is, whether you build Primitive Models, the single variable intersections between the Abstractions and the Perspectives or whether you build multi-variable, composite models made up of components of several Primitive Models)
- b. how you do Architecture (top-down, bottom-up, left to right, right to left, where to start, etc., etc.)
- c. the long term/short term trade-off relative to instantiating the expression of the components of the object (i.e. what is formalized in the short term for implementation purposes versus what is engineered for long term reuse).
- d. how much flexibility you want for producing composite models (Enterprise implementations) from your Enterprise Architecture (primitive models), that is, how constrained (little flexibility) or unconstrained (much flexibility) you make the horizontal, integrative relationships between the Cell components across the Rows and the vertical, transformational relationships of the Cell components down the Columns.

(These are significant, identifiable methodological choices ... not prescriptions of the Framework.)

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The Framework Is a Schema

The Fmwrk is a two-dimensional classification system for ENTERPRISE descriptive representations NOT I/S.

The classification scheme for each axis grew up quite independently from the Framework application.

The classification for each axis is:

- a. Comprehensive
- b. Non-redundant

Therefore, each cell of the Framework is:

- a. Unique
- b. "Primitive" (one single Abstraction by one single Perspective) and the total set of cells is complete.

The Framework logic is universal, independent of its application - totally neutral relative to methods/tools.

**The Framework is a "normalized" schema ...
... NOT a matrix.**

That's what makes it a good analytical tool.

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I have provided Enterprise Architecture resources to help you with your Enterprise Architecture endeavors including:

- a. Zachman Enterprise Framework Standards (detailed contents for the Enterprise Framework Cells).
- b. Printable A4 version (8c1/2 X 11) of the new Enterprise Framework graphic.
- c. Several topical articles I have written including, "Why Framework Standards", "What is Enterprise Architecture", "My Definition of the Zachman Framework", etc.
- d. Calendar for my public appearances and seminars.
- e. Information about my electronic book, "The Zachman Framework: A Primer for Enterprise Engineering and Manufacturing".
- f. A biography for John A. Zachman
- g. Links to other Zachman International activities.

This is the only website containing Zachman-related material that is created by or specifically approved by me, John A. Zachman.

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Introducing a Metaphor

A reasonable metaphor for the Framework is the Periodic Table. The Periodic Table is an ontology ... a schema ... a normalized schema ... one element goes in one and only one cell. The Periodic Table doesn't do anything. It reflects nature. The Periodic Table (an ontology) is used by Chemists (practitioners) to define a Process (a methodology) for producing compounds (results, implementations, composites). If an alchemist uses the Periodic Table to define the process, the process can be dynamically defined (or re-defined) and will be repeatable and produce predictable results ... and the alchemist will become a Chemist. On the other hand, if the alchemist ignores the Periodic Table, they can define a process (a methodology) that will produce results, point-in-time solutions, based on their own skills and experience. The process (methodology) will be fixed (not changeable) and the alchemist will forever remain an alchemist.

Practitioners (methodologists) are constrained
by time and results.

Theoreticians (scientists) are constrained
by natural laws and integrity.

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The Periodic Table Metaphor

Before Mendeleev figured out the Periodic table, Alchemists (practitioners) could create compounds based on their experience ... whatever worked. After Mendeleev figured out the Periodic Table, Chemistry became a science. Creating compounds became predictable and repeatable based on the natural laws (Physics) expressed in the Periodic Table. Within 50 years, the Chemists and Physicists (practitioners) were splitting atoms.

If I am right that Architecture is Architecture is Architecture, and if my work understanding the underlying primitives (elements) of Architecture correctly reflects the natural laws of classification and has integrity, maybe my Framework will form the basis for making Enterprise Architecture a science ... and maybe in 50 years, the methodologists (practitioners) will be able to engineer Enterprises to be assembled to order from reusable "primitive" components dynamically. I don't know. I hope so. We'll probably know in 50 years.

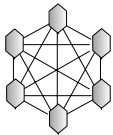
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Segue to ZF² Presentation

At this point, in the interest of time, I believe I selected several foils out of a lengthy presentation I put together discussing the new Zachman Framework² as follows.

Zachman Framework²™ ENTERPRISE Engineering and Manufacturing

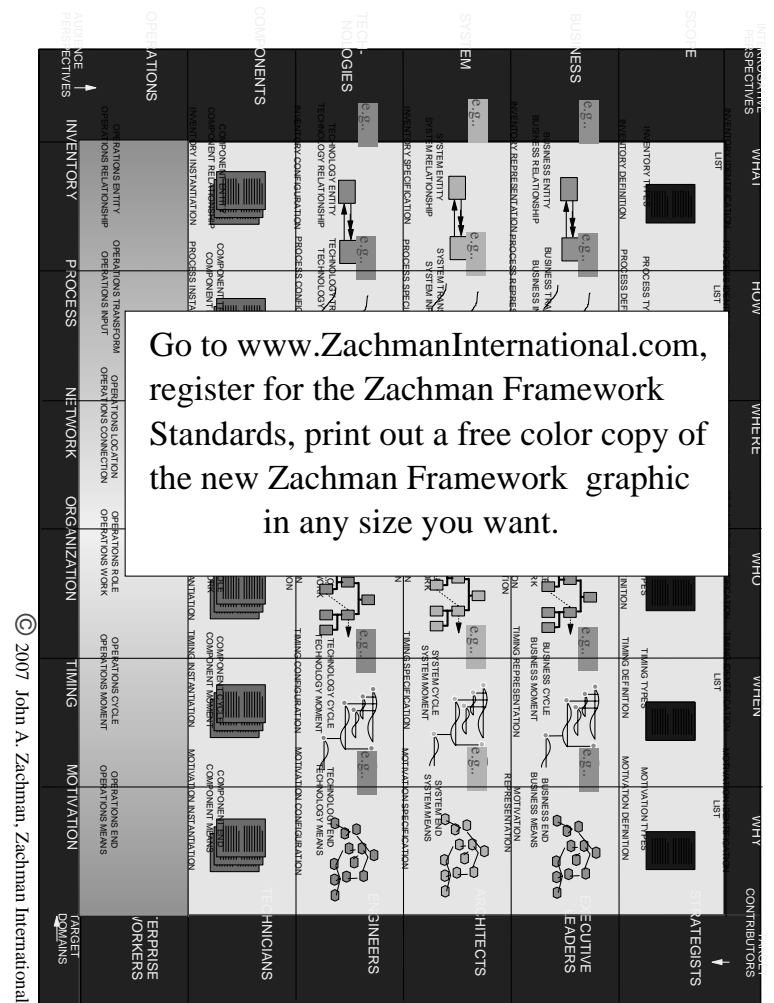
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Agenda

- I. Why Zachman Framework 2™ Standards ?
- II. Introduction to Changes
 - A. New Framework Graphic
 - B. Language Support
 - C. Reestablish the Forgotten (Implementation) Relationships
- III. What Hasn't Changed?
 - A. The Underlying Theory
 - B. The Classification Concepts
 - C. The Normalized Structure of Descriptions
 - D. The Framework Is an Enterprise Ontology
- IV. Internet Standards Support (10/31/07)
 - A. Graphic Navigation
 - B. Hyperlinks to Historic Materials and Dictionary Definitions
 - C. Framework Graphic Printing Capability
 - D. Official Zachman Framework-related Certifications
 - E. Access to the other three Meta Framework Standards
- V. What's Next?
 - A. Certifiable Elaborations
 - B. Licensing
 - C. Certification (Individuals, Methodologies, Tools, Curriculum, etc.)
- VI. Conclusions

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Changes in New Graphic

In the presentation you saw, I pointed out on the new Framework graphic the major changes that had been made.

I did not use the following foil that lists all of the changes that have been made in some detail. However, I am including this foil since I cannot point out all of the changes for you in person.

What Has Changed

- A. Column Names - Communications Interrogatives and Enterprise Manifestations
- B. Row Names - Audience/Contributor Roles
- C. Cell Names - Removed e.g.'s. New absolute names based on the Schema
- D. Row 6 - Provision for Instances and Examples (to differentiate from Cell abstractions)
- E. Meta Model relates every Row to Row 6 for traceability and alignment
- F. Meta Entity Names - more precise and more business oriented
- G. Cell graphic icons now have e.g.'s
- H. Row 1 meta-entities are Mass Nouns (Column Names)
- I. Modeling objectives by Row (Identification, Definition, etc.)
- J. No adjectives used in the Framework graphic
- K. Dictionary definition for every word
- L. Helping words to classify by Row.
- M. Helping words to classify by Column
- N. Every Framework graphic is generated from the Repository metamodel (one authorized, consistent source for every Framework graphic (no unauthorized variations) ... however, with provision for "certified" local elaborations.
- O. The Framework graphic can be printed in any form (slide, placemat, poster, etc. from the www.ZachmanInternational.com website.

What Has NOT Changed

A. The Framework Theory

All descriptive representations can be expressed in terms of Things and Relationships (i.e. Thing-Relationship-Thing Models).

B. The logic of the Framework

1. A two dimensional classification system - a "schema".

a. Communications Interrogatives (What, How, Where, Who, When and Why)

b. Audience Perspectives (Scope, Business, System, Technologies, Components and Enterprise)

2. Each intersection (Cell) is a unique, independent variable (Class, Abstraction) - a "normalized" structure, one (meta) fact in one Cell

3. The Cell context defines the meaning of the Enterprise Models' words.

4. The two-dimensional schema is depicted in matrix form

C. Each "Primitive" Cell Model has two meta (i.e. meta, meta) entities, a "Thing" and a "Relationship".

D. Comprehensive and Complete - The classification on both axes is comprehensive and complete - therefore, the intersections (Cells) have to be comprehensive and complete.

The Framework is a classification theory about the nature of an Enterprise and the kinds of "Things" (entities) that have existence in an Enterprise. Therefore, the Framework is an

ENTERPRISE ONTOLOGY

Reestablishing the Forgotten Implementation Relationships

1. Integration Relationships (Horizontal)

"The integration of all Cell models in a Row constitute the complete Enterprise model from the Row's Perspective" (1992 Systems Journal article)

2. Transformation Relationships (Vertical)

Meta entities are related to the Cell above and the Cell below (for "alignment") and meta entities of each Row are related to Row 6 (instances) for "traceability".

3. (For completeness) Meta entities are related to themselves within each Cell.

4. Tight integration between the four meta Frameworks The Row 2 models of one Framework are the "meta" models of all the Cells of another Framework.

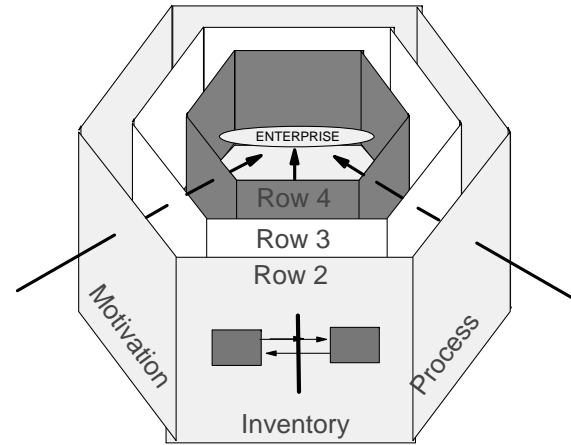
Three dimensional models are required to visualize the Integration and Transformation relationships - these are the IMPLEMENTATION COMPOSITES.

A. Hexagon

B. Hexagon Row inside the Row above (Box within a box)

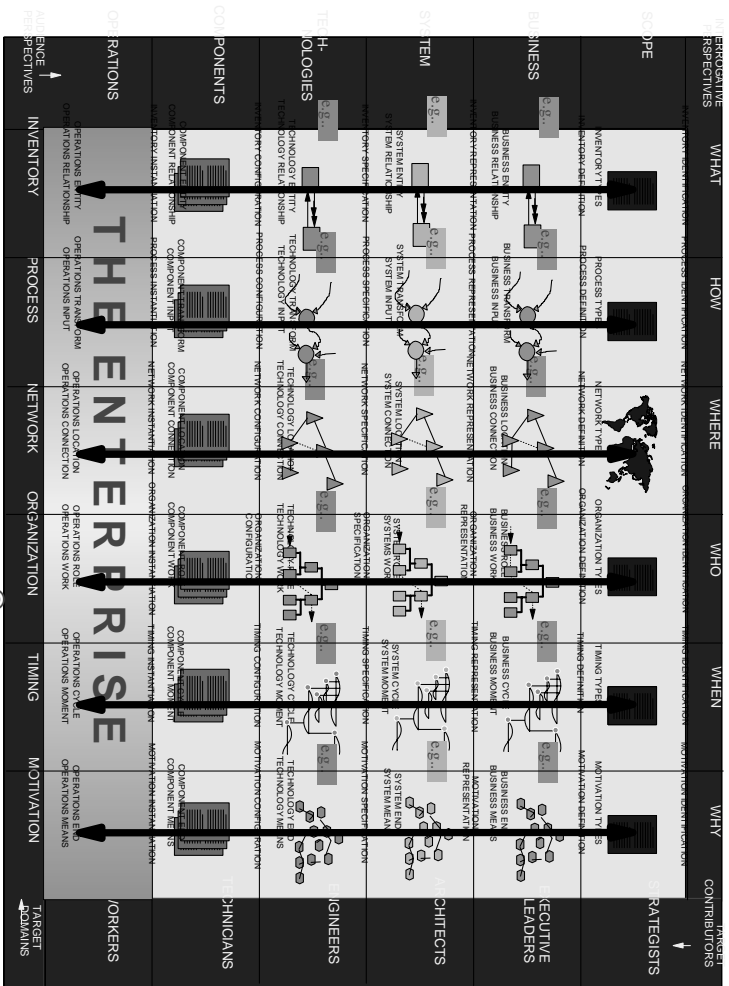
C. Hologram

Transformation Relationships (Vertical Alignment)



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Transformation Relationships



Conclusions

The Zachman Framework itself has not changed.
The classifications on both axes
have been employed by humanity for thousands of years.

Within the last five years, major contributions
have been made to the Framework body of knowledge
and major improvements have been made
to the Framework language,

the ENTERPRISE ONTOLOGY.

Proposition: The Zachman Framework Standards
including the horizontal, vertical and meta integrations
as depicted in the three dimensional Architectural models
constitute an Enterprise "scale model" and
a sufficient, precise definition of Enterprise Architecture
to be foundational for a Scientific Discipline:

ENTERPRISE ENGINEERING AND MANUFACTURING
which, I submit, is
THE ISSUE OF THE CENTURY

Reference Materials

Zachman eBook:

"The Zachman Framework: A Primer for Enterprise
Engineering and Manufacturing"

Explication of Framework Concepts

200 meg of video clips

25 Articles

First draft of Cell Definitions (pre-2005 Standards
announcement)

Enterprise Architecture Standards v2.0 2005

Enterprise Architecture Standards v2.01 available 10/07

Graphic Navigation Support

Dictionary definitions for every Framework term

Hyperlinks to historical materials and dictionary

Zachman Framework²™ Graphic Print capability

Zachman Authorized record of Certifications

for Individuals

for Methods

for Tools

for Curricula, etc., etc.

Education courses by Zachman Framework Associates

www.ZachmanInternational.com/2/Home.asp