# Enterprise Architecture and the Information Age Enterprise


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# What is Architecture?

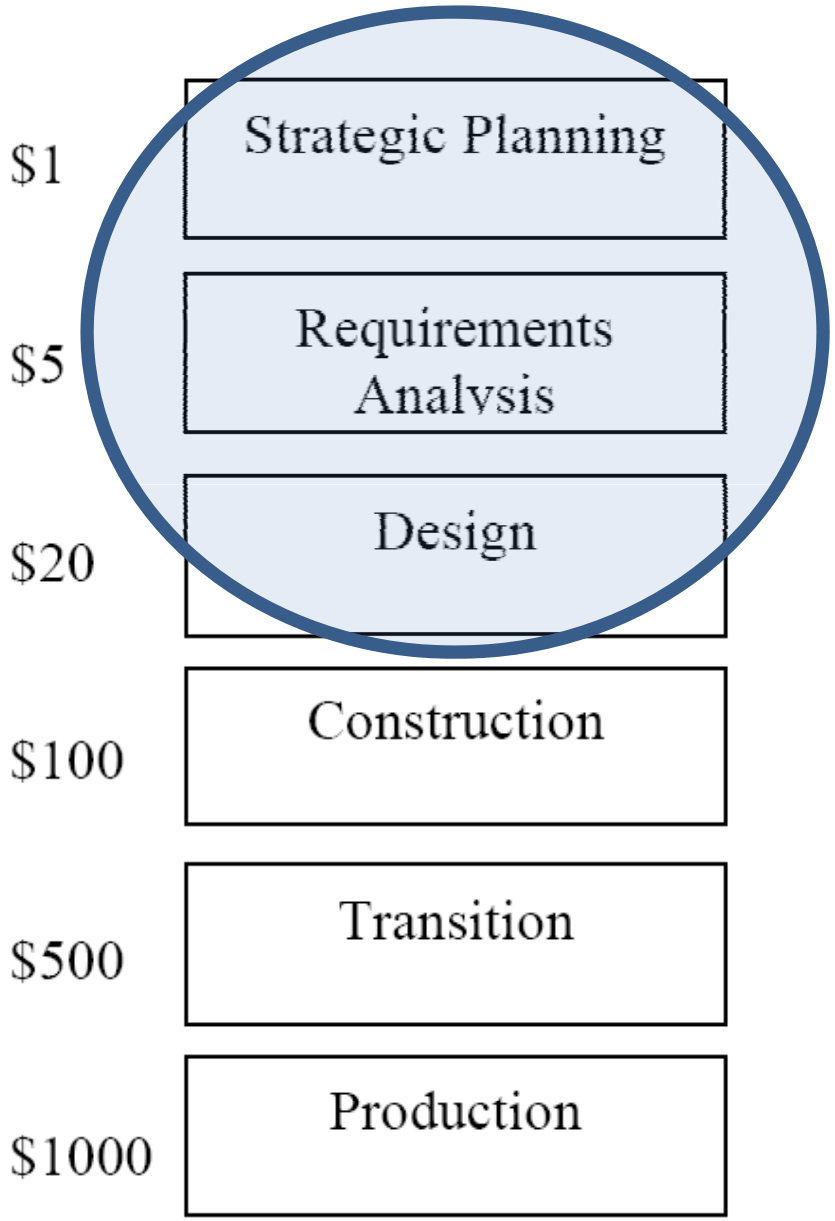
- The **underlying design or structure** of anything.
  - It **exists whether or not it is made explicit** (known).
  - If it is **not explicit, assumptions must be made**.
- **If explicit, Architecture is …**
  - **"the set of descriptive representations about an object." – John Zachman**
  - **a model or representation of an object created in order to …**
    - **"see" the object,**
    - **"communicate" with others about the object,**
    - **"do" something with or to the object: create, manage, evaluate, or change it.**

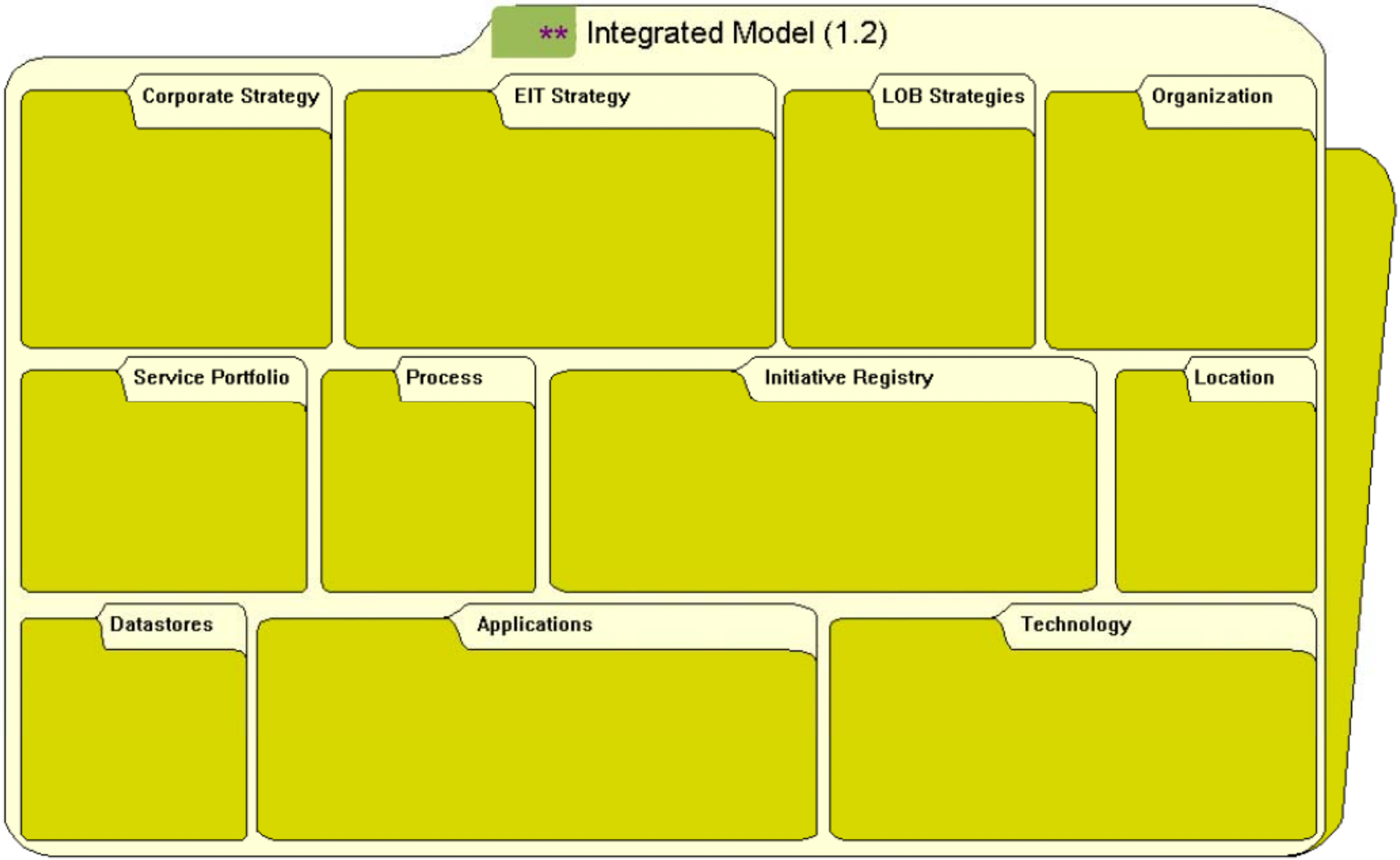
# *Why Enterprise Architecture?*

***You cannot effectively manage something you cannot "see" and understand (know)!***

**Especially if it's big, complicated, or will grow or change at some point in time, or if you need to communicate accurately with others about it.**

# The Cost of an Error (Hay, 2003)



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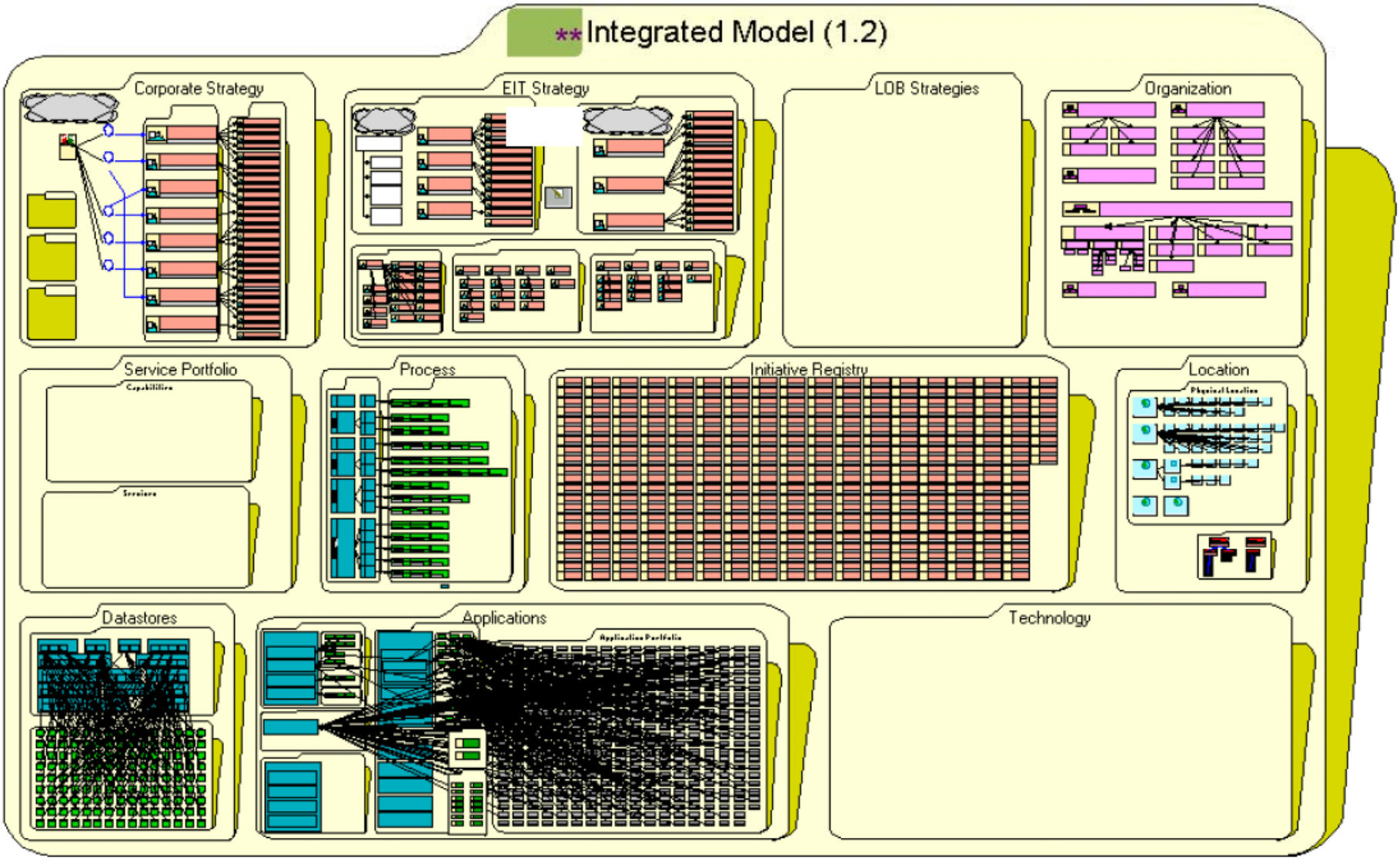


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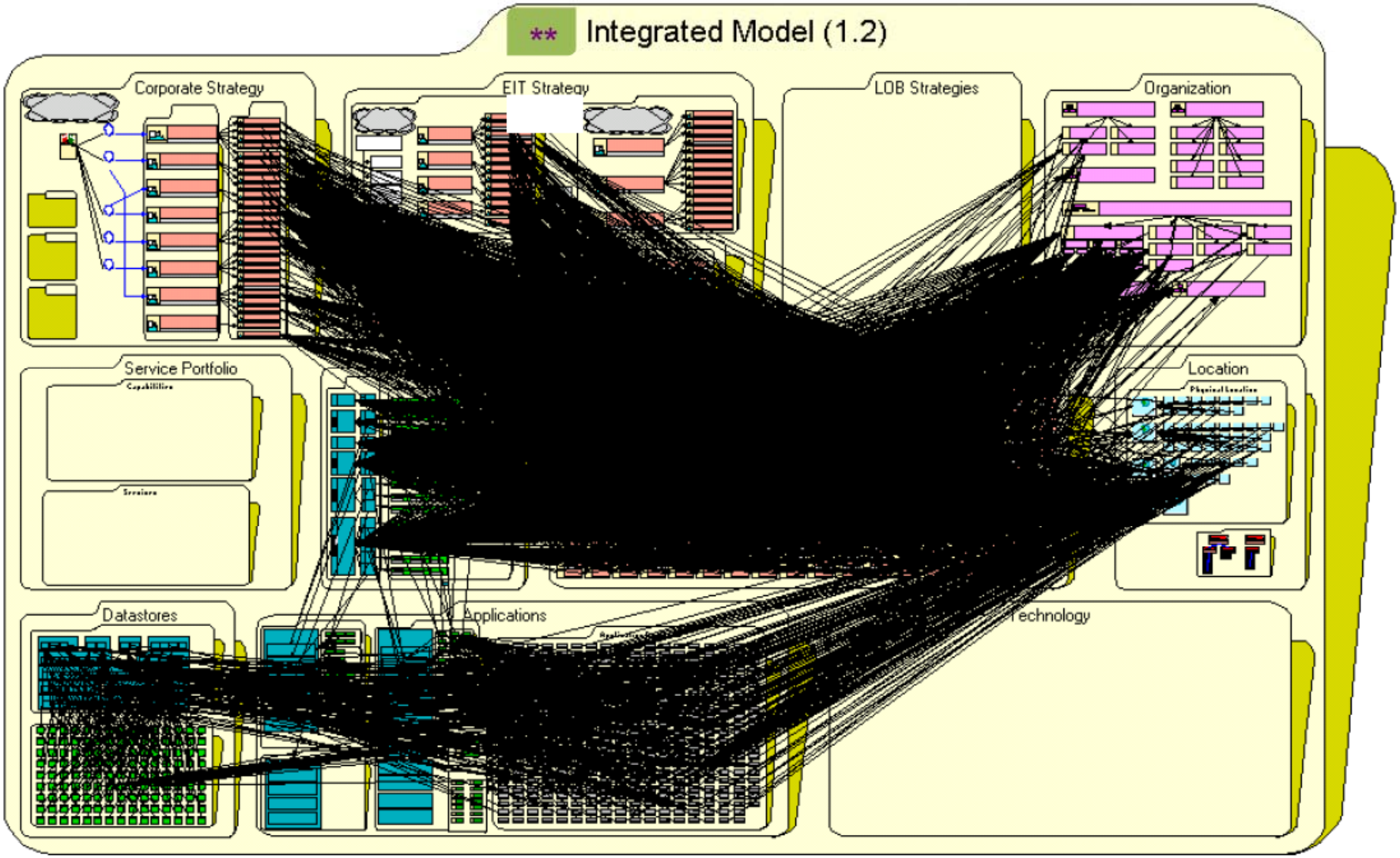



** Name of company withheld by request.

**“The act of discovery consists not in finding new lands but in seeing with new eyes.”**

***– Marcel Proust***

# What's the "Information Age"?

## *4 Key Characteristics of the Information Age*

Four key trends have driven the evolution of the technologies that are central to the Information Age. These forces characterize these e-times and affect the organizations and industries in which we work, as well as the social and economic milieus in which we live. Understand and anticipate the effects of these four forces, if only a little, and you're likely to succeed. Ignore or overlook their influence only at your peril. The four defining forces of these e-times are:

- Productivity: Doing more with less.
- Velocity: Increasing the pace of almost everything.
- Convergence: Blurring boundaries of all kinds.
- Brains: Managing data, information, & knowledge, as well as change.

**“It is not the strongest of the species that survives, nor the most intelligent, but the one that is most responsive to change.”**

***– Charles Darwin***

**US Federal Reserve Board Chairman Bernanke** said in June 2006 commencement speech @ MIT …

- "In the case of information and communication technologies, new economic research suggests that the investments in associated **intangible capital -- figuring out what to do with the computer once it's out of the box** -- are quite important indeed."
- **"Important investments in intangible capital remain to be made, as much still remains to be learned about how to harness these technologies most effectively … as the full economic benefits of recent technological changes have not yet been completely realized."**

**He's talking about the need to invent some of the unique intellectual capital of the Information Age, just like quality and productivity were to the Industrial Age.** "Bridging the Chasm" in The *SIM Guide to Enterprise Architecture,* 2010, edited by Leon A. Kappelman, CRC Press, NYC, (www.crcpress.com).

# What is Enterprise Architecture?

- The current name given to creating and utilizing some of that intangible capital.
- "The holistic set of descriptions about the enterprise over time." – SIM EA Working Group
- Modeling the enterprise in order to know and communicate about it (and its requirements).

***EA is about the creation of a shared language to communicate about, think about, and manage the enterprise.***

**If the people in the enterprise can't communicate well enough to align their ideas and thoughts about the enterprise (e.g., strategy, goals, objectives, purpose),**

**then they can't coordinate and align the things they manage (e.g., applications, data, projects, goods and services, jobs, vehicles).**

***EA gets to the essence of what IS people do – knowing, communicating, and delivering on requirements.***

# Why do we need enterprise requirements?

Requirements failure is a plan for total failure.

**“We shape our buildings — thereafter they shape us.”**

***— Sir Winston Churchill***

**“We shape our enterprises and their systems — thereafter they shape us.”**

***— Leon Kappelman***

## Information Age Organization ≋ Learning Organization

### Peter Senge: "*Learning Organization*" – *The Fifth Discipline,* 1990

"Where people **continually expand their capacity to create the results** they truly desire, where new and expansive patterns of thinking are nurtured, …**where people are continually learning to see the whole together**."

**Characterized by the mastery of five basic disciplines** or 'component technologies'. They are:

- **Personal mastery**
- **Systems thinking**
- **Mental models**
- **Building shared vision**
- **Team learning**

- **EA is** about **learning to see the whole enterprise together through system thinking & modeling** the enterprise in order to understand, communicate about, change, adapt, and manage it.
- **EA is about at least 4 of Senge's 5:**
  - **Systems thinking**
  - **Mental models**
  - **Building shared vision**
  - **Team learning**

*EA is about creating the Information Age Organization.*

***Requirements?***
***We know how to***
***do that, don't we?***

# *Fred Brooks on the difficulties of software development…*

"To see what rate of progress one can expect in software technology, let us examine the difficulties of that technology. Following Aristotle, I divide them into **essence**, ***the difficulties inherent in the nature of software***, and **accidents**, ***those difficulties that today attend its production but are not inherent***."

"**No Silver Bullet - Essence & Accidents of Software Engineering**" 1986 in Information *Processing 86*. H.J. Kugler, ed., Elsevier, 1069-1076. (Invited paper, IFIP Congress '86, Dublin) Reprinted in *The Mythical Man-Month, 20th Anniversary Edition*, Frederick P. Brooks, Jr., Addison-Wesley, 1995.

# *Fred Brooks on the difficulties of software development…*

"The hardest single part of building a software system is deciding precisely what to build. No other part of the conceptual work is as difficult as establishing the detailed technical requirements…. No other part of the work so cripples the system if done wrong. No other part is more difficult to rectify later."

"**No Silver Bullet - Essence & Accidents of Software Engineering**" 1986 in Information *Processing 86*. H.J. Kugler, ed., Elsevier, 1069-1076. (Invited paper, IFIP Congress '86, Dublin) Reprinted in *The Mythical Man-Month, 20th Anniversary Edition*, Frederick P. Brooks, Jr., Addison-Wesley, 1995.

# SIMEAWG
# IT Management Practices Study
## Averages (Scale: 1[=awful] to 5 [=superior])

- **3.67 Overall average** (64 questions)

- **3.92 Purpose / function of EA** (7 questions)
- **3.90 Potential benefits of EA** (20 questions)
- **3.68 ISD CMM practices and capabilities** (12 questions)
- **3.53 Use of requirements artifacts** (10 questions)
- **3.33 Requirements practices & capabilities** (15 questions)

*The SIM Guide to Enterprise Architecture: Creating the Information Age Enterprise,* 2010, edited by Leon A. Kappelman, CRC Press, Taylor and Francis Group, NYC, (www.crcpress.com).

# INDUSTRY DATA ON DEFECT ORIGINS

Because defect removal is such a major cost element, studying defect origins is a valuable undertaking.

| IBM Corporation (MVS) | |
|---|---|
| 45% | Design errors |
| 25% | Coding errors |
| 20% | Bad fixes |
| 5% | Documentation errors |
| 5% | Administrative errors |
| 100% | |

| SPR Corporation (client studies) | |
|---|---|
| 20% | Requirements errors |
| 30% | Design errors |
| 35% | Coding errors |
| 10% | Bad fixes |
| 5% | Documentation errors |
| 100% | |

| TRW Corporation | |
|---|---|
| 60% | Design errors |
| 40% | Coding errors |
| 100% | |

| Mitre Corporation | |
|---|---|
| 64% | Design errors |
| 36% | Coding errors |
| 100% | |

| Nippon Electric Corp. | |
|---|---|
| 60% | Design errors |
| 40% | Coding errors |
| 100% | |

# What is an Organization?

“know thyself”!

– Socrates

Organization,
"know thyself"!

– Socrates Consulting

# Ontology

The metaphysical study of the nature of being and existence.

## Ontology applied to enterprises:

- Study of the nature of their existence.
- Answers questions like:
  - What is an enterprise?
  - What does it mean to be an enterprise?
  - What do I need to know about an organization if I want to know it?

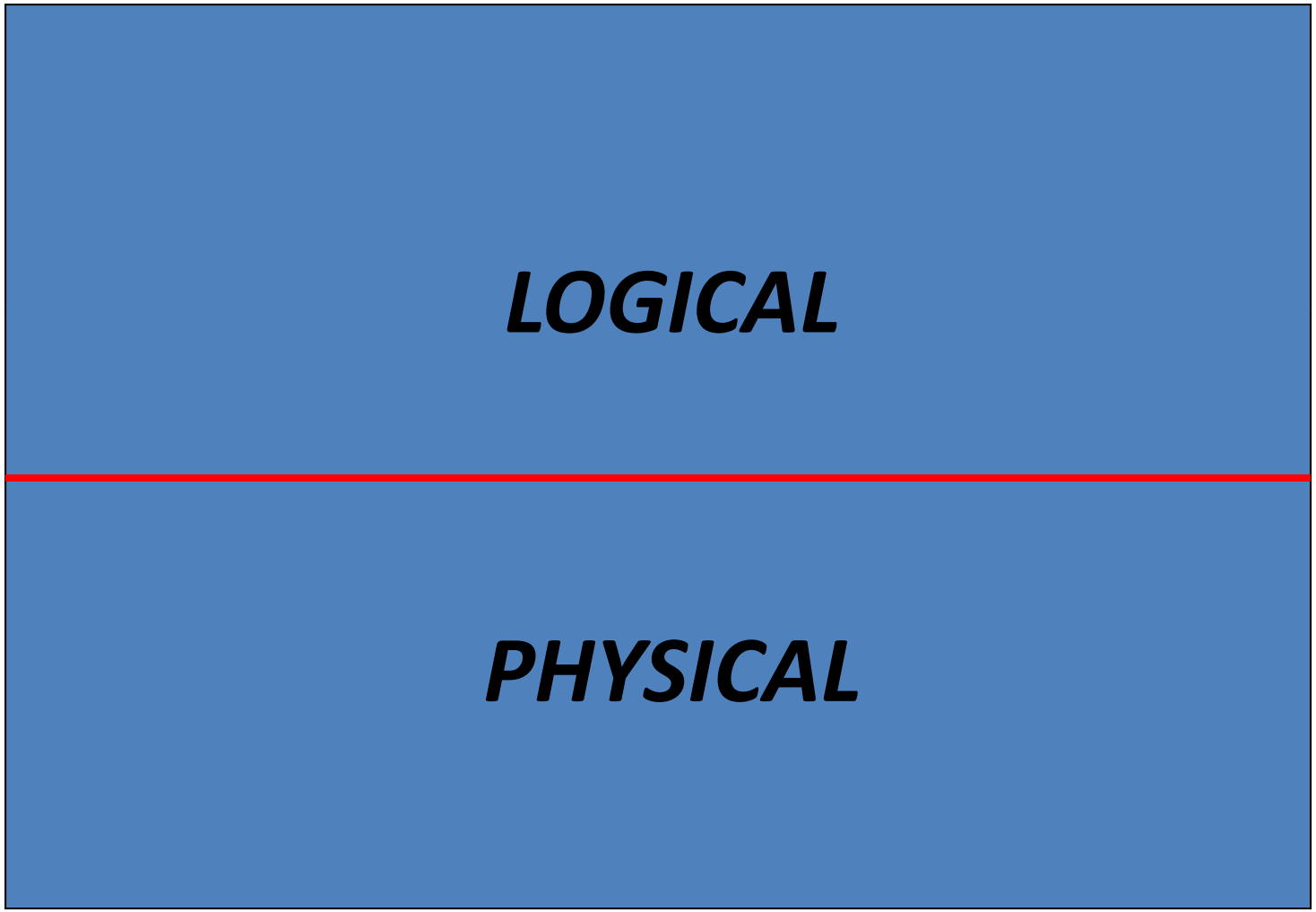
**The practice of Enterprise Architecture is the ontological examination of a particular enterprise in order to know its nature, essential properties, and the relationships among them.**

*“Enterprise” Architecture?*

*What in the world are enterprise-wide requirements?*

# What is an Organization?

# An Organization is …



# An Organization is …

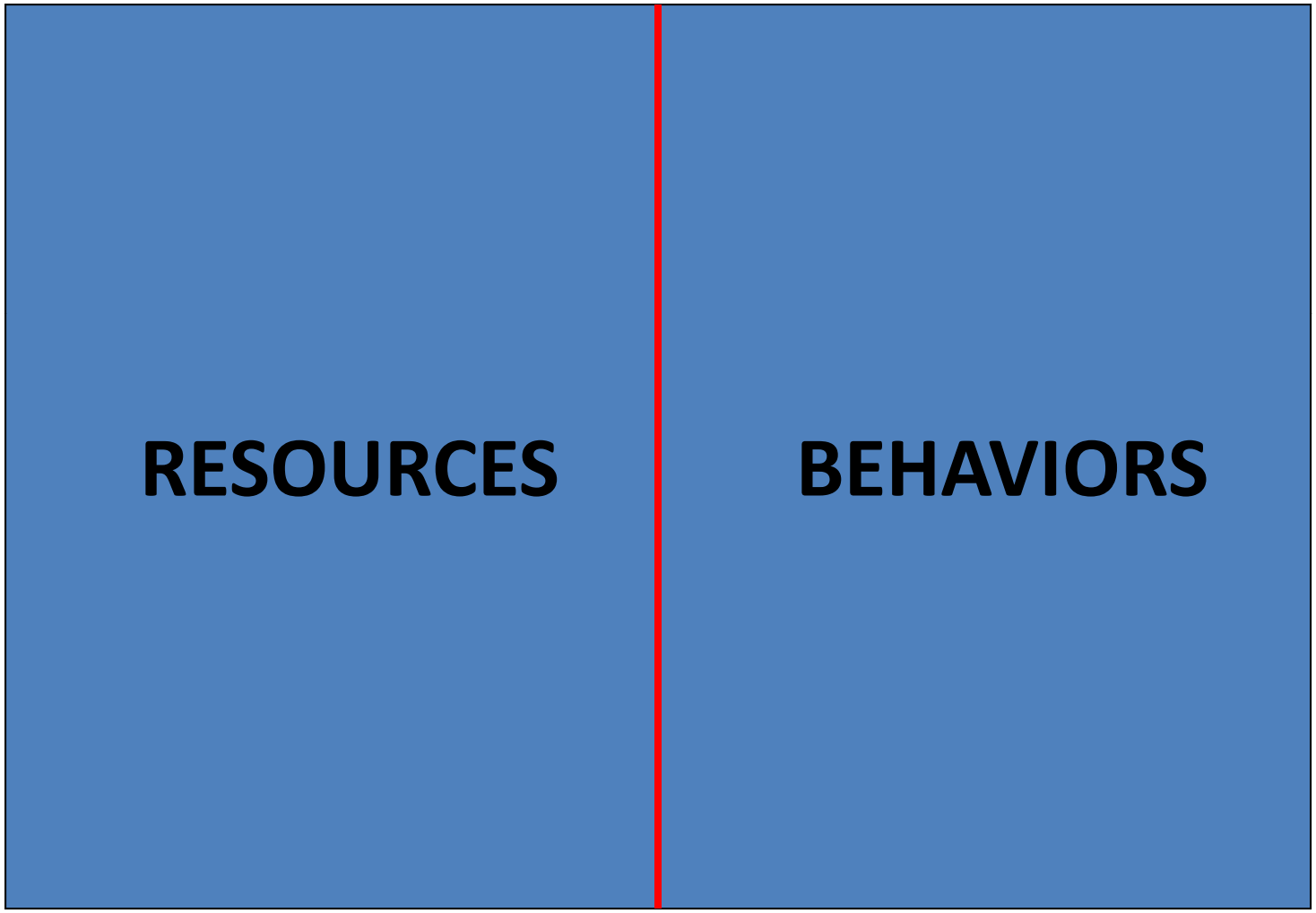
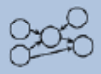
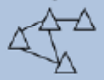
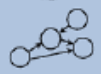
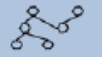
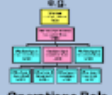
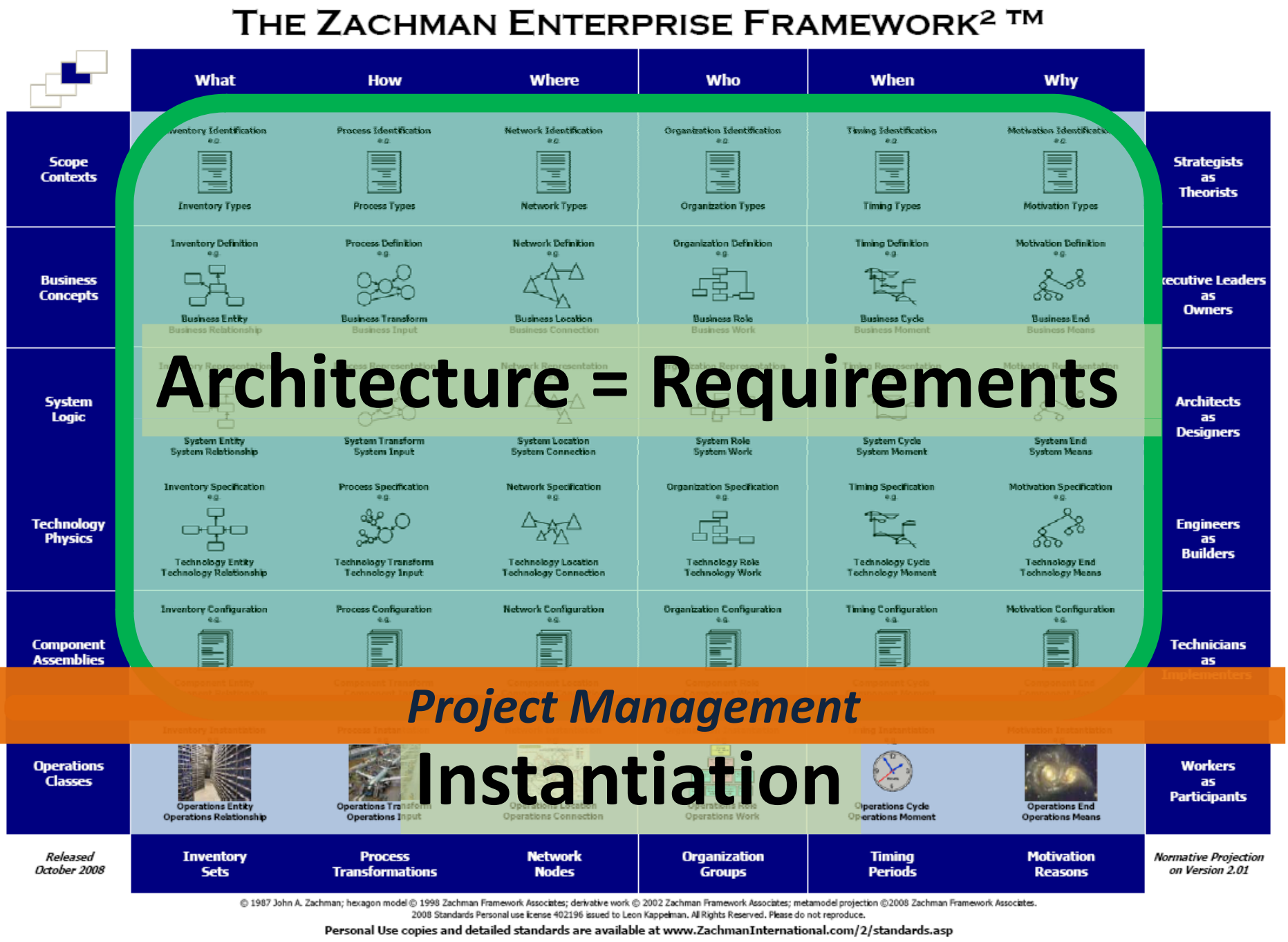


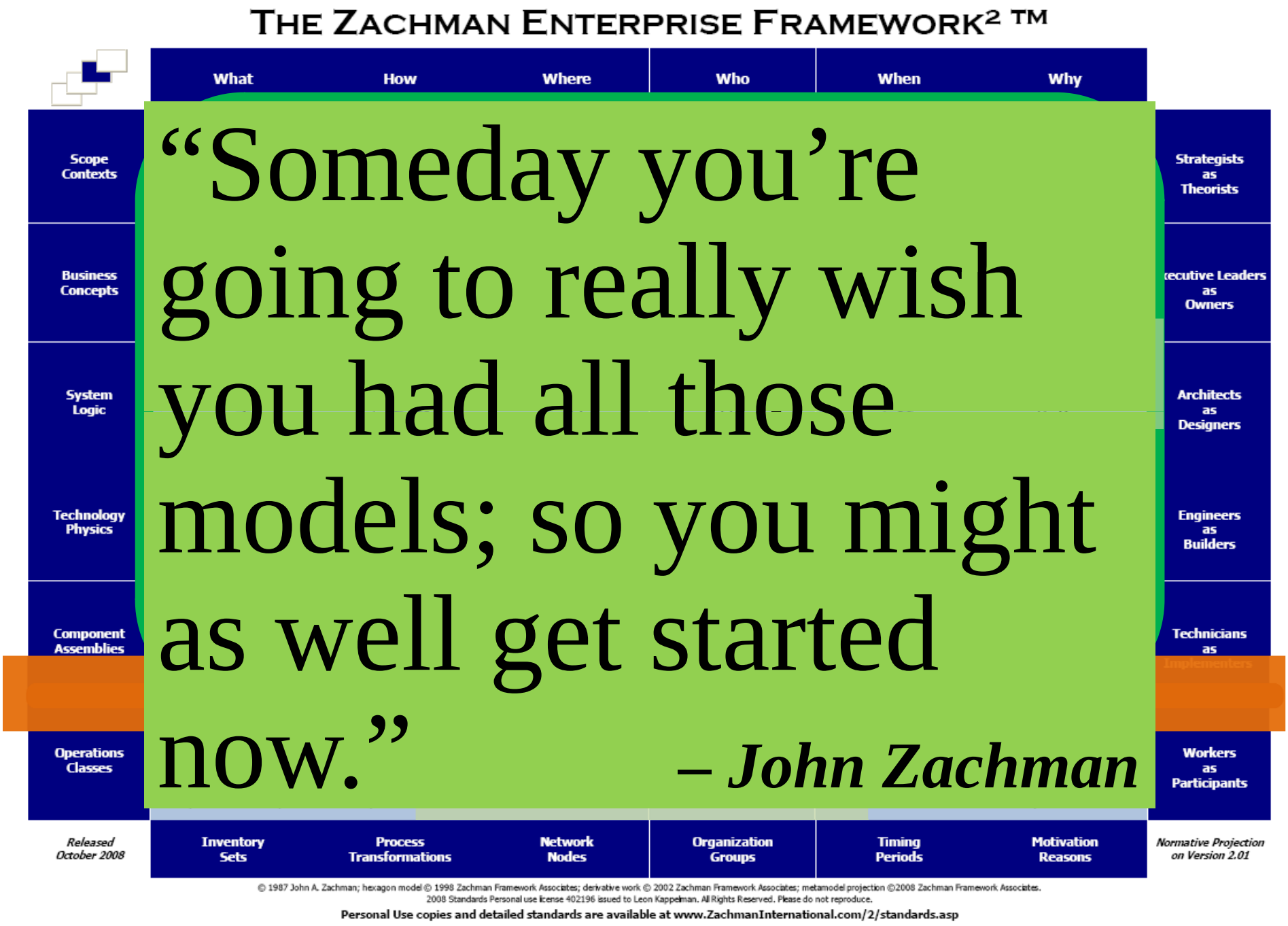
**Figure 4. The Zachman Quadrant phrase structures**

| | What | How | Where | Who | When | Why | |
|---|---|---|---|---|---|---|---|
| Strategists interpreting the theorists | Resource Ideas | | | Behaviour Ideas | | | Identify the Scope Boundaries |
| Executive Leaders for the owners | | | | | | | define the Business Concepts |
| Architects as the designers | | | | | | | represent the System Logic |
| Engineers as the builders | Resource Reality | | | Behaviour Reality | | | specify the Technology Physics |
| Technicians as the contractors | | | | | | | configure the Component Elements |
| Workers as the participants | | | | | | | operate the Enterprise |
| | of Inventory Sets | of Process Functions | of Network Positioning | of People Organizations | of the Timing | of Motivation Reasons | |

# The Zachman Enterprise Framework² ™

| | What | How | Where | Who | When | Why | |
|---|---|---|---|---|---|---|---|
| **Scope Contexts** | Inventory Identification e.g.  Inventory Types | Process Identification e.g.  Process Types | Network Identification e.g.  Network Types | Organization Identification e.g.  Organization Types | Timing Identification e.g.  Timing Types | Motivation Identification e.g.  Motivation Types | **Strategists as Theorists** |
| **Business Concepts** | Inventory Definition e.g.  Business Entity Business Relationship | Process Definition e.g.  Business Transform Business Input | Network Definition e.g.  Business Location Business Connection | Organization Definition e.g.  Business Role Business Work | Timing Definition e.g.  Business Cycle Business Moment | Motivation Definition e.g.  Business End Business Means | **Executive Leaders as Owners** |
| **System Logic** | Inventory Representation e.g.  System Entity System Relationship | Process Representation e.g.  System Transform System Input | Network Representation e.g.  System Location System Connection | Organization Representation e.g.  System Role System Work | Timing Representation e.g.  System Cycle System Moment | Motivation Representation e.g.  System End System Means | **Architects as Designers** |
| **Technology Physics** | Inventory Specification e.g.  Technology Entity Technology Relationship | Process Specification e.g.  Technology Transform Technology Input | Network Specification e.g.  Technology Location Technology Connection | Organization Specification e.g.  Technology Role Technology Work | Timing Specification e.g.  Technology Cycle Technology Moment | Motivation Specification e.g.  Technology End Technology Means | **Engineers as Builders** |
| **Component Assemblies** | Inventory Configuration e.g.  Component Entity Component Relationship | Process Configuration e.g.  Component Transform Component Input | Network Configuration e.g.  Component Location Component Connection | Organization Configuration e.g.  Component Role Component Work | Timing Configuration e.g.  Component Cycle Component Moment | Motivation Configuration e.g.  Component End Component Means | **Technicians as Implementers** |
| **Operations Classes** | Inventory Instantiation e.g.  Operations Entity Operations Relationship | Process Instantiation e.g.  Operations Transform Operations Input | Network Instantiation e.g.  Operations Location Operations Connection | Organization Instantiation e.g.  Operations Role Operations Work | Timing Instantiation e.g.  Operations Cycle Operations Moment | Motivation Instantiation e.g.  Operations End Operations Means | **Workers as Participants** |
| *Released October 2008* | **Inventory Sets** | **Process Transformations** | **Network Nodes** | **Organization Groups** | **Timing Periods** | **Motivation Reasons** | *Normative Projection on Version 2.01* |




THE ZACHMAN ENTERPRISE FRAMEWORK² ™
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Inventory Sets
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Timing Periods
Motivation Reasons
Normative Projection on Version 2.01
"Someday you're going to really wish you had all those models; so you might as well get started now."
– John Zachman
© 1987 John A. Zachman; hexagon model © 1998 Zachman Framework Associates; derivative work © 2002 Zachman Framework Associates; metamodel projection ©2008 Zachman Framework Associates.
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# *Zachman's Enterprise Framework*

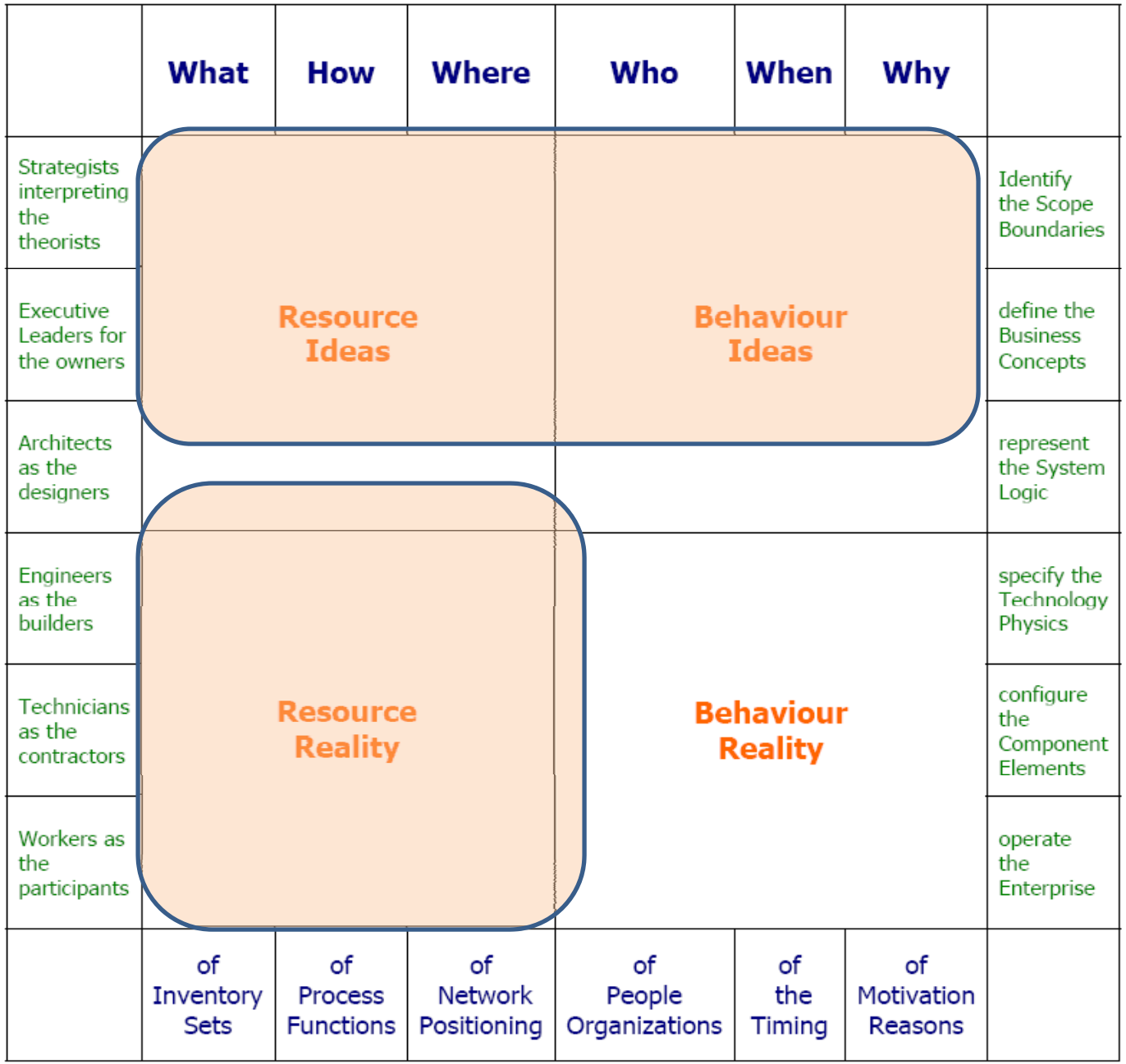
… is an ***ontology***, a data model (*schema*) for all the knowledge about the enterprise.

… is ***process and method agnostic***. It doesn't care how you do it.

… posits that ***this is the data/information/knowledge you must capture & use to effectively & efficiently …***

- ***achieve & maintain your enterprise objectives*** (e.g., aligned, agile, optimized, lean, green, or whatever).
- ***manage change and complexity***.
- ***create and manage organizations*** (and their resources, including technologies) ***that will survive and thrive in the Information Age***.

**Figure 4. The Zachman Quadrant phrase structures**



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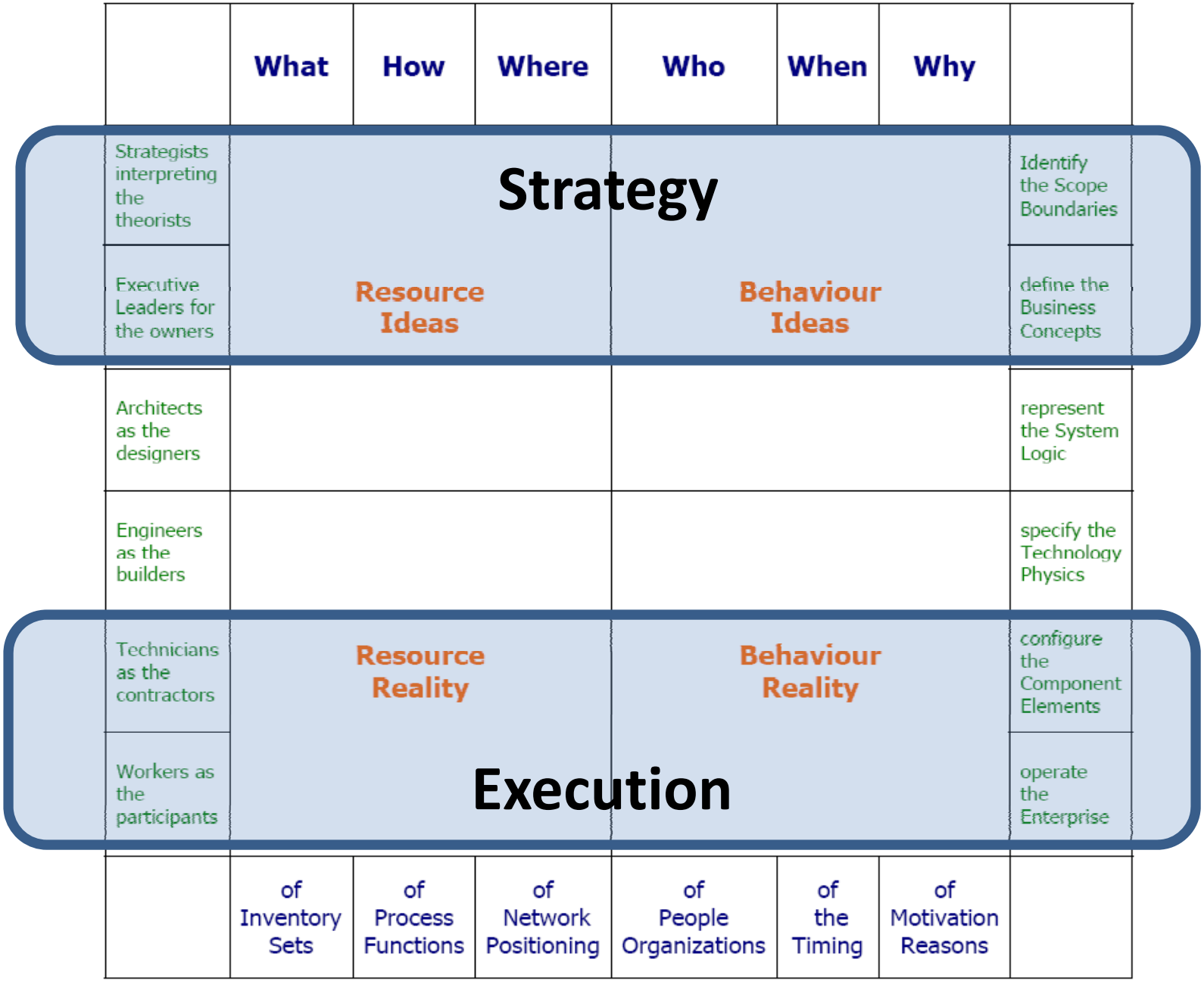


# *What is EA?*

- **EA is a different way of seeing, communicating about, & managing the enterprise & all of its assets, including IT.**
- **EA gets to essence of IT success**: To know, communicate, and deliver on the organization's requirements.
- **EA is key to:**
  - **achieving & keeping business-IT alignment & other objectives.**
  - **helping the organization create value.**
  - **achieving & maintaining balance among:**
    - **Short-term and long-term objectives**
    - **Subsystem (BU, service, process, function) and whole (organization).**
- **EA includes many things you already do such as:**
  - requirements, analysis, design, strategic planning, network design, standard setting, data architecture, knowledge management, SOA, BPR, etc.
  - **BUT EA is much, much more than that. So build on what you do.**
- ***EA is fundamental to creating, maintaining, and managing Information Age Organizations.***

# *Implementation Guidelines: Getting Started*

- **Build on what you are already doing, including current projects.**
- **Use collaborative approaches to doing and governing EA:**
  - Organize an EA working group or EA council.
  - Learn together & work toward agreement about language, models, methods
- **Get participation & commitment from IT & business management:**
  - At all levels (but start as high as possible). Leadership counts!
- **Determine the goals, focus, scope, and priorities:**
  - Aim for completeness & comprehensiveness. Deal with day-to-day needs.
- **Embrace continuous change, learning, and communication:**
  - Remember, it's a journey and a process.
  - Evangelize. Have an "elevator speech". Get your "converters" one at a time.
- **Start small and show early success:**
  - Identify EA initiatives of most value to organization.
  - Help the value creators, it creates champions and wins hearts and minds.
- **Monitor, evaluate, and improve on a continuous basis:**
  - Quantify the benefits and the value created.
  - Regularly take a hard look at EA cost-value proposition, and make it better.
- **Use EA in IT for CONTINUOUS IMPROVEMENT OF IT ALL and to COMMUNICATE WITH YOUR CUSTOMERS & STAKEHOLDERS.**

# *Road to the Future: Institutionalizing EA*

- **This is a new way of life**: There is no quick fix; no silver bullet.
- **This will take time and determination, as well as vision, courage and commitment:** Do not underestimate the difficulty and complexity of changing culture and architecting and engineering one of humankind's most complex objects – the Enterprise.
- **Do not get discouraged**: This is a revolution in thinking, a discipline, an engineering process. **Change of this magnitude takes time and perseverance.**
- **Set realistic expectations**: Things have to be implemented and modified periodically so you have to accept some risk of "scrap and rework." **Progress trumps perfection.**
- **Don't assume anything**: Make executive education and technical training a continuous process. It is easy to forget long-term issues in the short-term stress of daily life.
- **Learn!**: The state of the art is only about 25 years old and the "playing field" still pretty level – there is still much to learn and discover, and many opportunities to create advantage and value.

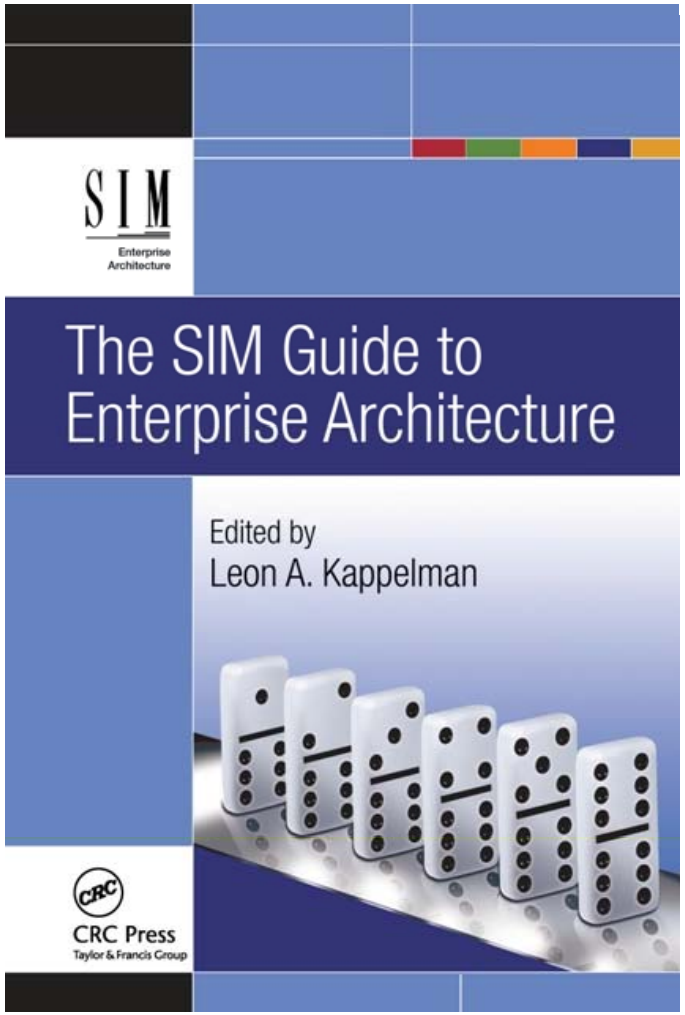
# “No one has to change. Survival is optional.”

*– Dr. W. Edwards Deming*

# *The SIM Guide to Enterprise Architecture*

## *Creating the Information Age Enterprise*

**542KA = 40% off**
www.crcpress.com

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