

## The Framework for Enterprise Architecture Cell Definitions

### Column 1: The “What,” or “Data” Column

#### **Row 1: “List of Things Important to the Business”**

This is simply a list of things (or objects, or assets) that the Enterprise is interested in - the “universe of discourse” relative to things. It is probably adequate that this list is at a fairly high level of aggregation. It defines the scope, or boundaries, of the Rows 2 - 5 models of things that are significant to the Enterprise.

#### **Row 2: e.g. “Semantic Model”**

This is a model of the actual Enterprise things (objects, assets) that are significant to the Enterprise. It typically would be represented as an “E/R”-type model and would be at a level of definition that it would express concepts (terms and facts) used in the significant business objectives/strategies that would later be implemented as “Business Rules.”

#### **Row 3: e.g. “Logical Data Model”**

This is a model of the logical (implementation - technology neutral) representation of the things of the Enterprise about which it records information (in either automated or non-automated form). It would be represented as a fully attributed, keyed, normalized E/R-type model reflecting the intent of the Semantic Model.

#### **Row 4: e.g. “Physical Data Model”**

This is a technology constrained, or physical representation of the things of the Enterprise. The representation style of this model would depend on the technology chosen for implementation. If relational technology is chosen, this would be a model of the table structure required to support the Logical Data Model in a relational-style model. In an Object-Oriented notation, this would be the class-hierarchy/association style models.

#### **Row 5: e.g. “Data Definition”**

This would be the definition of all the data objects specified by the Physical Data Model and would include all the data definition language required for implementation.

### Column 2: The “How,” or “Process” Column

#### **Row 1: “List of Processes the Business Performs”**

This is simply a list of processes (or functions) that the Enterprise performs - the “universe of discourse” relative to process, the “transformation” of Enterprise “inputs” into “outputs.” It is probably adequate that this list is at a fairly high

level of aggregation. It defines the scope, or boundaries, of the Rows 2 - 5 models of processes that the Enterprise performs.

**Row 2: e.g. “The Business Process Model”**

This is a model of the actual Business Processes that the Enterprise performs, quite independent of any “system” or implementation considerations and any organizational constraints. It can be represented as a “structured methods”-style model expressing the business transformations (processes) and their inputs and outputs.

**Row 3: e.g. “Application Architecture”**

This is a model of the logical (implementation - technology neutral) “systems” implementation (manual and/or automated) supporting the Business processes and would express the “human/machine” boundaries. It would likely include the “controls and mechanisms” as well as the “inputs and outputs” to the logical systems representations of the systems functions/processes.

**Row 4: e.g. “Systems Design”**

Technically, this would not be considered a “model” but a “design” as you would no longer be able to see the Enterprise in the representation. At a high level of abstraction, it would be a “structure chart” and in its detail, “action diagram”-style expressions that would constitute the implementation of the logical systems, or “application architecture.” In “Object-Oriented” notation, this would be the methods and their realization.

**Row 5: e.g. “Programs”**

These would be the programs that derive from the “Action Diagram”-style or Object-style specifications for the implementation. Given the appropriate engineering design, these could become the pre-fabricated “components” that could be “assembled” into more than one implementation.

**Column 3: The “Where” or “Network” Column**

**Row 1: e.g. “List of Locations in which the Business Operates”**

This is simply a list of locations in which the Enterprise operates, or relates to - the “universe of discourse” relative to location. It is probably adequate that this list is at a fairly high level of aggregation. It defines the scope, or boundaries, of the models of locations that are connected by the Enterprise and are found in Rows 2 - 4.

**Row 2: e.g. “The Business Logistics System”**

This is a model of the locations of the Enterprise and their connections whether the connections are voice, data, post or truck, rail, ship. It would include identification of the types of facilities at the nodes like branches, headquarters, warehouses, etc.

**Row 3: e.g. “The Distributed Systems Architecture”**

This is a logical (technology neutral) model of the system implementation of the Business Logistics System depicting the types of systems facilities and controlling software at the nodes and lines (processors/operating systems, storage devices/DBMS’, peripherals/drivers, lines/line operation systems, etc.)

**Row 4: e.g. “Technology Architecture”**

This is the physical depiction of the technology environment for the Enterprise showing the actual hardware and systems software at the nodes and the lines and their “systems” software system software including operation systems and middleware.

**Row 5: e.g. “Network Architecture”**

This is the specific definition of the node addresses and the line identification.

***Notes for Column 3***

**Note 1:** Although it is significant for every column to map its relationship with the other columns, it is particularly noteworthy for the “Network Column” because which nodes the data (Column 1) resides in, which nodes the processing (Column 2) resides in and which nodes the presentation logic (Column 4) resides in determines the implemented system performance and therefore, the structure of the network (Column 3) models.

**Note 2:** There is no commonly accepted notation for the Column 3 models as of November 1998. However, this month, Bernie Boar has published a book, “Constructing Blueprints for Enterprise IT Architectures,” John Wiley and Sons, proposing such a notation. The notation includes a logical depiction (Row 3) and a physical depiction (Row 4) of the nodes and lines, their operating systems and middleware along with a mapping of Columns 1 (data) and column 2 (processing).

***Note for Columns 1, 2 and 3.***

**Note A:** *The state of the art is well-advanced in Columns 1 and 2 and in Column 3, there is considerable interest as a result of the dramatic increase in complexity managing a distributed (“client/server”) environment as opposed to a uni-location (“mainframe”) environment. Formalisms could be expected to grow rapidly in Column 3 as the costs and constraints to Enterprise change that the information technology presents are perceived to be a significant problem*

***Note for Columns 4, 5 and 6.***

**Note B:** *The state of the art is still somewhat limited in Column 4, 5 and 6. However, the initial impressions of the dramatic changes that are taking place as the “Information Age” actually begins to materialize are forcing attention on all the descriptive representations of the Enterprise. The dramatic increases in Enterprise complexity and the continued escalation of the rate of change are beginning to drive the state of the art*

*relentlessly. Although there are not commonly acknowledged and embraced notations for many (if any) of the models at present, there are substantive proposals to the information community at large in almost every case.*

#### **Column 4: The “Who” or “People” Column**

##### **Row 1: “List of Organizations Important to the Business”**

This is simply a list of organizations to which the Enterprise assigns responsibility for work - the “universe of discourse” relative to people. It is probably adequate that this list is at a fairly high level of aggregation. It defines the scope, or boundaries, of the models of organization that are responsible to the Enterprise and depicted on Rows 2 - 5.

##### **Row 2: e.g. “Work Flow Model”**

This is the model of the actual Enterprise allocation of responsibilities and specification of work products. Typically, an organization chart expresses the allocation of responsibilities but other supporting documents describe the work products. To be complete, the organization chart would have to be supplemented with work products (control work, coordination work and operational work) and identification of the originating and receiving organization units.

##### **Row 3: e.g. “Human Interface Architecture”**

This is the logical “systems” expression of work flow which would include the specification of the “roles” of the responsible parties including management, administration, knowledge-worker, engineering, marketing, etc. as well as the logical specification of the work products like, voice, text, graphics, video, etc.

##### **Row 4: e.g. “Presentation Architecture”**

This is the physical expression of work flow of the Enterprise including the specific individual and their ergonomic requirements and the presentation format of the work product.

##### **Row 5: e.g. “Security Architecture”**

The “out-of-context” specification of work flow would be the identification of the individual accessing the system and the specification of the work or job they were authorized to initiate.

#### ***Notes for Column 4***

**Note:** In November 1998, there appears to be no commonly accepted notation within the information processing community for the Column 4 models outside of organization charts. However, there may be some other disciplines that have defined notation for example, within the organizational behavior community there is a specialization, “transaction costing” that has studied work flow. There may

be standard notation there, or maybe some notation can be found in the publishing community.

## **Column 5: The “When” or “Time” Column**

### **Row 1: List of Events Significant to the Business**

This is simply a list of events to which the Enterprise responds - the “universe of discourse” relative to time. It is probably adequate that this list is at a fairly high level of aggregation. It defines the scope, or boundaries of the models of time that are significant to the Enterprise and found in Rows 2 - 5.

### **Row 2: e.g. “Master Schedule”**

This is a model of the business cycles that is comprised of an initiating event and an elapsed time (“cycle”). There are two typical notations for expressing points in time and lengths of time, P.E.R.T. - type charts and the Senge, “Systems Thinking” models, although the Senge models are not definitive regarding the length of the cycle time. They only identify sequence, or “relative” time.

### **Row 3: e.g. “Processing Structure”**

This is the logical (implementation - technology neutral) systems specification of points in time (systems events) and lengths of time (processing cycles.) This model describes the system events that trigger the state to transition from one valid state (point in time) to another, and the dynamics of that transition cycle. This style of model is represented in the notation of an entity life history diagram (from the SSADM methodology that originated in the U.K.) or in the notation of a Harel state chart (in an Object-Oriented approach). Petri Nets are also used to express at least the relative time (sequence) aspects of time.

### **Row 4: e.g. “Control Structure”**

This is the physical expression of system events and physical processing cycles, expressed as control structure, passing “control” from one to another processing module.

### **Row 5: e.g. “Timing Definition”**

This is the definition of interrupts and machine cycles.

### *Notes for Column 5*

**Note:** By November 1998, the information processing community has not seen the value of factoring time out of the system implementation and treating it as an independent variable. Although there are some notations for time including Petri Nets and Entity Life History, they are not widely employed by current practitioners, in general. For the time being, “time” tends to be imbedded in the process specification as sequence (relative time), for example in IDEF0 notation.

## **Column 6: The “Why” or “Motivation Column”**

**Row 1: “List of Business Goals/Strategies”**

This is simply a list of major business Goals (or Objectives, or Strategies, or Critical Success Factors) that are significant to the Enterprise and defines the “universe of discourse” relative to motivation. It is probably adequate that this list is at a fairly high level of aggregation. It defines the scope, or boundaries, of the models of Goals (etc.) that are embraced by the Enterprise and found in the constructs of Rows 2 - 5.

**Row 2: “Business Plan”**

This is a model of the business objectives and strategies (the “ends” and “means”) of the Enterprise that constitute the motivation behind Enterprise operations and decisions. Although there has been considerable focus on management theory in academia, there is no commonly accepted notation for the motivation concepts at the present time.

**Row 3: “Business Rules”**

This is a logical model of the business rules of the enterprise in terms of their intent (“ends”) and the constraints (“means”). Although no commonly accepted notation exists at the present time for Business Rules, several notations have been defined and proposed including Ron Ross’ Business Rules Models, Terry Halpin’s Object Rule Language and Bob Brown’s Rule and Constraint Language (see note 1 below).

**Row 4: “Rule Design”**

This is a physical specification of the Business Rules. The rules are not presently factored out from their implementations and therefore are found as cardinality and optionality in the data models (Column 1), as procedural code (Column 2) or as policy specification (Column 4). However, historically, there have been “inference engine”-style technologies that allow expression of rules quite independent from data and logic, and the tools in which these ideas persist may influence the general marketplace with their formalisms.

**Row 5: “Rule Specification”**

This will be the “out-of-context” specification of the business rules.

**Note 1:** By November 1998, considerable interest is being shown to the concept of Business Rules by the information community. Historically, the rules have been imbedded in the data structure (Column 1), processing specifications (Column 2) or the administrative policies (Column 4). We are now beginning to perceive the value of factoring the Business Rules out and treating them as an independent variable because of their implications for effecting change to the behavioral characteristics of the Enterprise. There is no commonly accepted notation for Business Rules at present although Ron Ross has proposed a notation in his book, “The Business Rule Book: Classifying, Defining and Modeling Rules” Second Edition 1997, Database Research Group, Inc. Bob Brown’s

notation has been published as an IEEE standard as Object IDEF and although Terry Halpin's notation has been published, the reference is unavailable at the time of this writing.

**Note 2:** There is significant research work being done presently by the Business Rules Group, an independent study group, defining a meta-model for Column 6, Row 2, the business objectives and strategies model.

***Note for the Framework as a whole.***

*Under the auspices of ZIFA (the Zachman Institute for Framework Advancement) there presently is an open proposal to assemble an industry task force for identifying a meta-model (a model of the model) of each cell in the Framework. The intent is to aggressively advance the state of the art in Enterprise Architecture and enable enterprises to make considered decisions about making architectural models explicit, improving alignment, quality, ability to change and reduction of "time to market" for Enterprise systems implementations. Furthermore, a comprehensive meta-model of all the cells of the Framework should stimulate vendor and consultant activity in developing formalisms, methodologies and tools.*