

Enterprise Architectures

Executive Summary:

In this issue of BPTrends, we discuss how the term Enterprise Architecture is being used. Confusion results from its being used in two different ways, to describe a process-centric architecture and to describe an IT-centric architecture.

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Over the course of 2003, we published several papers that discussed the role or the nature of an enterprise architecture. In addition to what was published on BPTrends, there were books and conferences on enterprise architectures, and, during the same period, it was hard to find a business or computer magazine without a story that described an enterprise architecture in one way or another.

In spite of all the attention, there doesn't seem too much agreement on what is meant by an enterprise architecture. A casual examination of a few reputed examples will only increase your sense of confusion. We've heard of vendors being asked to bid on the creation of an enterprise architecture only to be told later that their proposal is completely unresponsive. Similarly, we've heard of companies that asked for assistance in the creation of an enterprise architecture only to have consultants talk about issues that were not relevant for that company. Clearly, we have a communication problem. Hopefully, BPTrends can help clarify things. We propose to explain what an enterprise architecture is all about. Actually, as you will see, we will argue that the term *enterprise architecture* is being used in two rather different ways. Users must learn to discriminate between the two different types of enterprise architecture.

The Two Uses of Enterprise Architecture

In several issues of *BPTrends Newsletter*, we've used a pyramid diagram, like the one shown in Figure 1, which we usually refer to as a Business Process Architecture. In fact, however, we associate an organization's business process architecture with only a portion of the pyramid. Thus, it would be more accurate to refer to our pyramid as an Enterprise Architecture. It shows how all of the elements within an organization are related.

At the top of the pyramid are all the executive functions of the organization. This is where goals are set, strategy is determined, competitors are monitored, and major new opportunities are identified.

The second level of the organization, in an older conception of the organization, would have focused on divisions and departments. In the process-centric company, the second level is focused on value chains and business processes that draw in supplies and deliver products and services to customers. This is the primary focus of the business manager. If the company is to change, its processes must change. From an architectural perspective, we can subdivide the Business Process Level into two subsections. The more abstract section focuses on how the various processes are associated with value chains, and how they are managed. The lower section focuses on specific processes and defines exactly how a specific process works. From the business manager's perspective, a business process includes both automated and manual elements. The business manager is concerned with

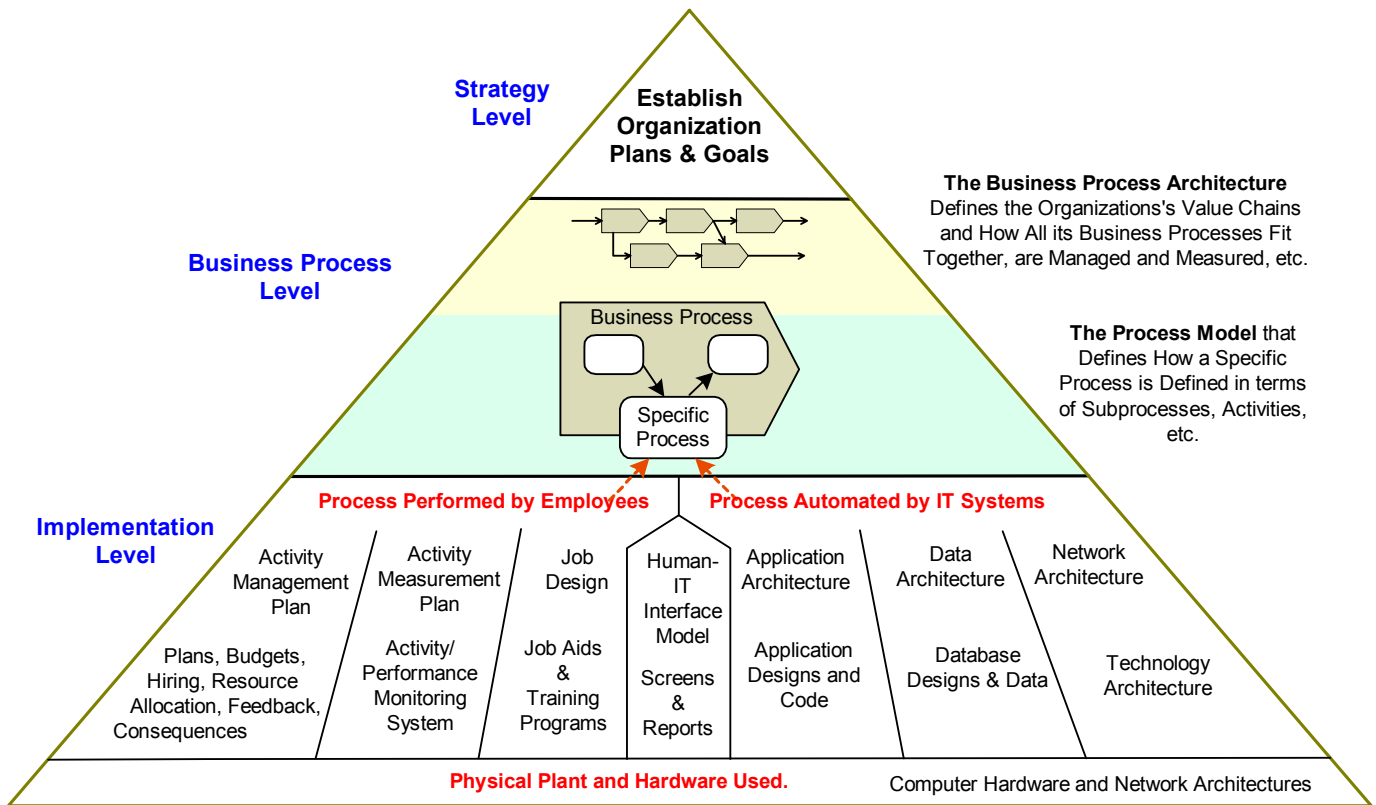


Figure 1. The BPTrends Enterprise Architecture Pyramid

the whole process, including the flow of materials from suppliers, through each step of the process, until the final product is delivered to the customer. They are also interested in the design of new products, marketing, the sale of the products, and customer support following the delivery of the product.

The base of the pyramid is divided and focuses on implementation details. If one considers a specific sub-process or activity, one finds that it is implemented by employees, by software systems, or by a combination of both. Employees are primarily the concern of operations managers and activity supervisors, and they are supported by the Human Resources function of the organization. If employees are to implement an activity, then they must be hired and trained. Their jobs must be defined, and their motivation must be assured. Similarly, their work must be evaluated, and activity outputs must be checked to assure that quality is maintained.

If the sub-process or activity is implemented by software systems, either created to perform the entire activity or to support employees in the performance of the activity, then

the software applications need to be created or acquired and supported by databases, networks, and hardware. Measurements must be taken to assure the systems work as required. The development and maintenance of the various software elements needed to implement a given activity is usually the responsibility of an IT group, sometimes supported by a corporate database group or a network group.

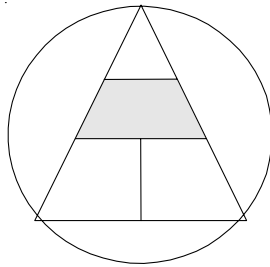
At the very bottom of the pyramid are the physical infrastructure of the organization, its land and buildings, and the desks and machines that are needed to support the managers, the employees, and the software systems.

A Process-Centric Enterprise Architecture

The BPTrends Enterprise Architecture describes a process-centric enterprise architecture. Business managers create and use this kind of architecture. The architecture is designed to emphasize how work is actually done, and, only secondarily, how software systems are used to implement specific portions of the work. The approach is usually based on an effort to subdivide all of the work of the organization into value chains that produce products for customers.

Those value chains, in turn, are subdivided into major business processes. Those who rely on this type of enterprise architecture are just as interested in the processes performed by employees as they are in automated functions. They are interested in assuring that entire processes function as efficiently as possible and that the people and system work together to manufacture products that satisfy customers. The process-centric approach puts a major emphasis on good measures of process success, on process management, and on the analysis of costs that identify which processes are profitable and which are not. The emphasis is on providing models that allow business managers to understand how their organization is doing and to make decisions about changes that will then lead to appropriate modification in supporting human and software systems.

We use the little figure below to illustrate a process-centric enterprise architecture. Everything in our pyramid is in scope, but a special emphasis is placed on the Business Process Architecture that is defined at level 2.



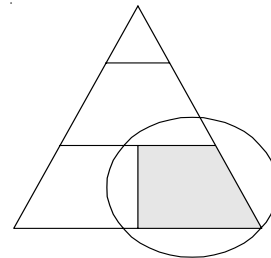
An IT-Centric Enterprise Architecture

The alternative to the process-centric conception of an enterprise architecture [here, the general use of the term, so not capitalized] is an IT-centric enterprise architecture [here a specific term so, capitalized]. In this case, the primary function of the architecture is to provide an overview of how all of the various IT models and resources in the organization work together. This architecture is created by and for IT professionals. The CIO may show it to line business managers, but it usually doesn't tell the line manager much. It simply demonstrates that there are lots of software applications, lots of databases, and that they are all held together by a complex infrastructure of middleware and network protocols.

Most people who use the term "enterprise architecture" today, are probably from the IT world, and they tend to use the term as we have just described it. Depending on the individual, they might insist that their concept of an enterprise architecture includes business process elements and even

strategy elements, but if you look at their actual models and their practices, you will see that they chiefly look at processes as a source of system requirements that can drive software development. A real test is to ask if line managers have been involved in the development of the enterprise architecture. Or, ask if the architecture models manual activities or employee processes that aren't automated, or are about to be automated.

We would represent the typical IT-centric enterprise architecture as in the small figure below. In this case, the emphasis is on the IT implementation segment of our pyramid and only extends into other areas of the enterprise as necessary to support IT aims.



Please don't imagine we are complaining about the idea of a comprehensive IT-centric enterprise architecture. Comprehensive IT architectures are important, and they are needed. A problem arises, however, when people fail to discriminate between an enterprise architecture that describes IT resources, and an enterprise architecture that focuses on how all of the resources of the company are integrated by business processes.

The Zachman Framework

Stepping back from the current concerns with enterprise architectures, it is only fair to say that the IT people really began what has evolved into the current interest in architectures of all kinds. The earliest systematic use of the term "architecture" that we know of was in an article written by John Zachman, an IBM researcher, that appeared in the *IBM Journal* in 1987[1]. The article was entitled, "A Framework for Information Systems Architecture," and described how one could apply the concepts that building architects used to arrive at a number of perspectives that would help software engineers understand their own constructs. A key idea was that an overall architecture was made up of a number of other architectures that were focused on different, specific areas of concern. Thus, the building architect created one diagram that he or she showed to the prospective buyers to give them an overview of what

the finished product would look like. Another blueprint was more detailed and described the rooms within the structure, showing where the doors and windows would be, and so forth. Still more detailed views were created for the people who would actually build the infrastructure, while others were created for electricians, plumbers, and those who would finish the interior.

Zachman created a matrix that has six rows and three columns. The top row describes the Scope or overall context and is concerned with things a planner might consider. The second row describes a Business Model and is focused on things that might concern a business manager. The third row is focused on the System Model and is concerned with the logical elements that might interest a software designer. The original Zachman framework was focused on Data, Functions, and Networks, and was properly identified as an Information Systems Architecture. In the past decade, Zachman has continued to expand his matrix. He has added three columns, People, Time, and Motivation, and has started calling it an Enterprise Architecture. (See Figure 2.)

IT folks have a long tradition of using the term *enterprise* to refer to company-wide systems. Thus, Enterprise Applications originally referred to systems like accounting, payroll, and bookkeeping that were run on mainframes, maintained in central locations, and used to maintain a company's accounts and generate all the paychecks. Similarly, large companies have used layered diagrams to represent how their products can be arranged into a comprehensive IT solution, and, in the past few years, they have frequently referred to these comprehensive collections of products as an *architecture*.

If you look at the Zachman framework, you'll see that some of the cells within the matrix are described as architectures. There are Application Architectures, Data Architectures, Human Interface Architectures and Network Architectures, among others. By the time Zachman completed the current version of this framework, he was convinced that he had identified all of the kinds of data that a company needed to keep track of, and, thus, the framework describes a kind of

The Zachman Framework	DATA <i>What</i>	FUNCTION <i>How</i>	NETWORK <i>Where</i>	PEOPLE <i>Who</i>	TIME <i>When</i>	MOTIVATION <i>Why</i>
SCOPE (Contextual) <i>Planner</i>	List of Things Important to the Business	List of Processes the Business Performs	List of Locations in Which the Business Operates	List of Organizations Important to the Business	List of Events Significant to the Business	List of Business Goals/Strategies
ENTERPRISE MODEL (Conceptual) <i>Owner</i>	Semantic Model	Business Process Model	Business Logistics System	Work Flow Model	Master Schedule	Business Plan
SYSTEM MODEL (Logical) <i>Designer</i>	Logical Data Model	Application Architecture	Distributed System Architecture	Human Interface Architecture	Processing Structure	Business Rule Model
TECHNOLOGICAL MODEL (Physical) <i>Builder</i>	Physical Data Model	System Design	Technology Architecture	Presentation Architecture	Control Structure	Rule Design
DETAILED REPRESENTATIONS (Out-of-Context) <i>Sub-Contractor</i>	Data Definition	Program	Network Architecture	Security Architecture	Timing Definition	Rule Specification
FUNCTIONING ENTERPRISE	Actual Business Data	Actual Application Code	Actual Physical Networks	Actual Business Organization	Actual Business Schedule	Actual Business Strategy

Figure 2. The Zachman Framework.

architecture of architectures. At the same time, the term “enterprise architecture” had become popular as a way of talking about all of architectures a company might need, and thus, the latest version of Zachman’s Framework has been termed an Enterprise Architecture.

Some would argue that Zachman’s Framework provides a comprehensive description equivalent to our use of the term Process-Centric Enterprise Architecture. A quick examination of the Zachman Framework, however, will suggest that business processes are not central to Zachman’s conception. Business Processes are simply one box among many. The Zachman Framework could just as well support a company that was primarily organized around departments. In a similar vein, look at how Zachman describes the kinds of data one might maintain about employees. The boxes are concerned with workflow, with computer-interfaces, and with security issues. This is not an architecture that would appeal to a business manager who wanted a balanced view of the resources that support processes. Equally important, the Zachman’s Framework doesn’t suggest how resources are aligned to support corporate goals and strategies. Goals are represented on the framework, but they seem to have the same value as everything else. In other words, a matrix doesn’t suggest a top-down alignment. In fact, the Zachman Framework represents a reasonably comprehensive list of concerns, generated by someone who began with an IT perspective. Significantly, the Zachman Framework is mostly used by IT people who are interested in gaining an overview of the kinds of IT architectures a company might want to support.

There is a lot of interest currently in the Zachman Framework. Some companies claim to use the Framework to organize their corporate data, and it is often cited as an example of an enterprise architecture. In reality, however, but its probably better to think of the Zachman Framework as a historical artifact, an early and important step toward the idea that companies ought to organize information about their various concerns and document them by means of a number of different architectures. In the end, the Zachman Framework is too concerned with classifying types of data and not really very useful in helping either business managers or IT architects understand how a specific change in a business process might lead to a change in employee functions or in supporting software applications.

Let’s consider some other Enterprise Architecture candidates and see how they compare.

Spewak’s Enterprise Architecture Planning

One slight variation on the Zachman approach is the Enterprise Architecture Planning approach described by Stephen Spewak in his book, *Enterprise Architecture Planning: Developing a Blueprint for Data, Applications and Technology* [2]. As the title suggests, Spewak, like Zachman, is focused on an IT-centric approach to architecture. Spewak goes beyond Zachman by including information about Michael Porter’s Value Chains and makes it clear that business processes should be modeled in their own right. Unfortunately, in spite of his bow to Porter, Spewak often seems to mix processes and departmental functions, blurring any clear Process-centric message he was trying to convey. Where Zachman focuses on a classification scheme, Spewak put more effort into defining the steps one might follow to create the various IT architectures and integrate them. Overall, Spewak’s approach is a significant step toward a process-centric enterprise architecture, but it falls short. It’s probably best to regard Spewak, along with Zachman, as another historical precursor to a more modern conception of an enterprise architecture.

The Federal Enterprise Architecture Framework (FEAF)

In 1996 the United States Congress passed a law widely known as the Clinger-Cohen Act. As a result of hearings on government software application development failures, Congress was convinced that US government agencies lacked an overview that allowed them to coordinate and manage their development efforts, both to achieve government mandates and to assure efficient software development. The Clinger-Cohen Act required every US government agency to develop an enterprise architecture. [Stet!] The assumption was that these enterprise architectures would assure that agency programs were aligned with agency goals, as assigned by Congress and specified by agency executives, and that software systems would be developed to support those same programs. In other words, Congress believes that enterprise architectures will provide an improved basis for organizational decisions.

In 1999, the CIO Council, made up of CIOs of major government departments and agencies, published a benchmark framework, the Federal Enterprise Architecture Framework (FEAF), to provide various agencies with a generic approach. In 2001, the CIO Council published a document, *A Practical Guide to Federal Enterprise Architecture*, to help departments and agencies comply with the Clinger-Cohen Act.[3] During the same period, several



Federal departments published their own enterprise architecture guidelines. Among the most widely cited are the Department of the Treasury's Treasury Enterprise Architecture Framework (TEAF), the National Institute of Standards and Technology's Enterprise Architecture Model, and the enterprise architecture of the Department of Defense (DOD Architecture Framework).

The architectures actually developed by the various agencies of the U.S. government vary widely, but, overall, they have become a major source of information on enterprise architecture development. The preface of the CIO Council's *Guide* begins with the following explanation:

"An enterprise architecture (EA) establishes the Agency-wide roadmap to achieve an Agency's mission through optimal performance of its core business processes within an efficient information technology (IT) environment. Simply

stated, enterprise architectures are "blueprints" for systematically and completely defining an organization's current (baseline) or desired (target) environment. Enterprise architectures are essential for evolving information systems and developing new systems that optimize their mission value. This is accomplished in logical or business terms (e.g., mission, business functions, information flows, and systems environments) and technical terms (e.g., software, hardware, communications), and includes a Sequencing Plan for transitioning from the baseline environment to the target environment.

"If defined, maintained, and implemented effectively, these institutional blueprints assist in optimizing the interdependencies and interrelationships among an organization's business operations and the underlying IT that support operations. The experience of the Office of Management and Budget (OMB) and General Accounting

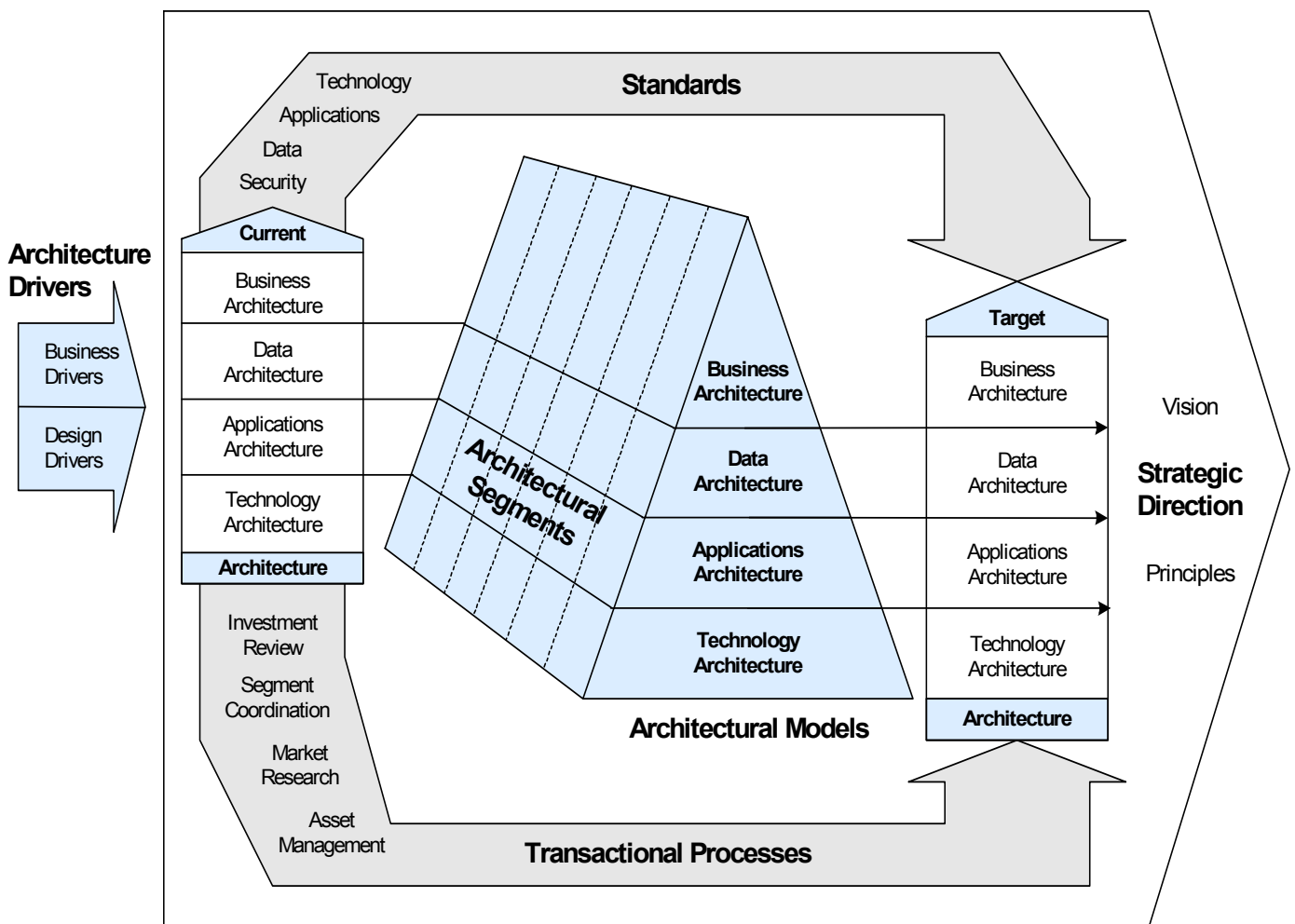


Figure 3. The Structure of the FEA Architecture.

Office (GOA) has shown that without a complete and enforced EA, federal agencies run the risk of buying and building systems that are duplicative, incompatible, and unnecessarily costly to maintain and integrate.”

The overall structure of the FEAF recommended architecture is pictured in Figure 3. The CIO *Guide* credits Zachman with several ideas, but, as you can see, this Enterprise Architecture doesn't owe too much to Zachman. To begin with, the core overview emphasizes a pyramid with a business architecture on the top and IT architectures below. Notice the concerns listed on the left side of the lower arrow. The basic idea here is that programs being undertaken by the government agency ought to establish goals and constraints that will guide those considering the development of software. In a true process-centric architecture, business managers would create and plan business processes, and then, subsequently, decide what elements within each process might benefit from automation. In reality, of course, most government processes, like most business processes, are already in existence, and an IT managed architecture development effort often simply becomes an exercise that assigns requirements to processes that justify the software to be developed. In many cases, the architecture represents a set of categories for which documentation is created and saved in a project repository.

The two “towers” represent an effort to suggest the initial or Current stack of architectures, and a revised or Target set of architectures. In other words, the FEAF diagram is attempting to suggest a process or methodology that uses the architectural approach. There are no references to employees or jobs in the FEAF diagram, unless one assumes they are somehow included in the Business Process Architecture. One assumes that business processes are defined at the top of the pyramid and that they constrain what is done below. This is a step toward a process-centric architecture.

From what we've heard, most government agencies are only making a cursory effort to define processes, and are focusing more on the technical architectures. Thus, in spite of defining a process-centric approach, the FEAF architecture, and most of the government efforts derived from it are, in reality, IT-centric in their use and execution. This was probably inevitable when the job of developing the enterprise architecture was assigned to the CIOs and not to business managers.

A number of government architectures, including the US Department of Defense's C4ISR framework and the Treasury Department's Treasury Enterprise Architecture Framework

(TEAF), are variations on the FEAF. They make a nod to linking IT architectures to a business architecture, which in turn is driven by departmental goals and strategies, but they focus primarily on IT architectures. In effect, they are IT-centric enterprise architectures that are trying to become process-centric enterprise architectures.

The OMG's Model Driven Architecture (MDA)

Another example of an IT-centric enterprise architecture that is striving to become more than IT-centric is the Object Management Group's MDA initiative. The OMG is focused on creating a technical modeling system that will facilitate moving information from one model to another and moving modeling artifacts from one software tool to another. Thus, MDA does not propose an enterprise architecture, as such. Instead, it is concerned with enlisting modelers in an effort to define metamodels that all conform to a very abstract modeling language, the Meta Object Facility (MOF). The closest that MDA comes to an overall architecture is when it defines four layers or types of models. (See Figure 4.)

The OMG does not limit the models that can be used at each layer. Clearly, however, the top-level models are to be developed by business managers or business analysts and are to drive the development of logical models (PIM) and, subsequently, physical models (PSM). The very name, Computation-Independent Models, that MDA uses for business models is sufficient to suggest that this is an IT-centric approach that only looks at business issues in order to determine what software to develop. There's nothing in MDA that would support the creation of CIM models of manual processes that did not need to be automated.[4]

In a similar way, the International Standards Organization's (ISO) Reference Model for Open Distributed Processing (RM-ODP) makes some bows toward including a business process layer (which it terms the Enterprise Viewpoint), but it is, in essence, an IT-centric model that examines the Enterprise Viewpoint to determine the requirements for software development.[5]

At this point, one might be justified in thinking that perhaps all enterprise architectures are, in fact, IT-centric. To disabuse the reader of this, we'll consider an example of an enterprise architecture that is truly a process-centric enterprise architecture.

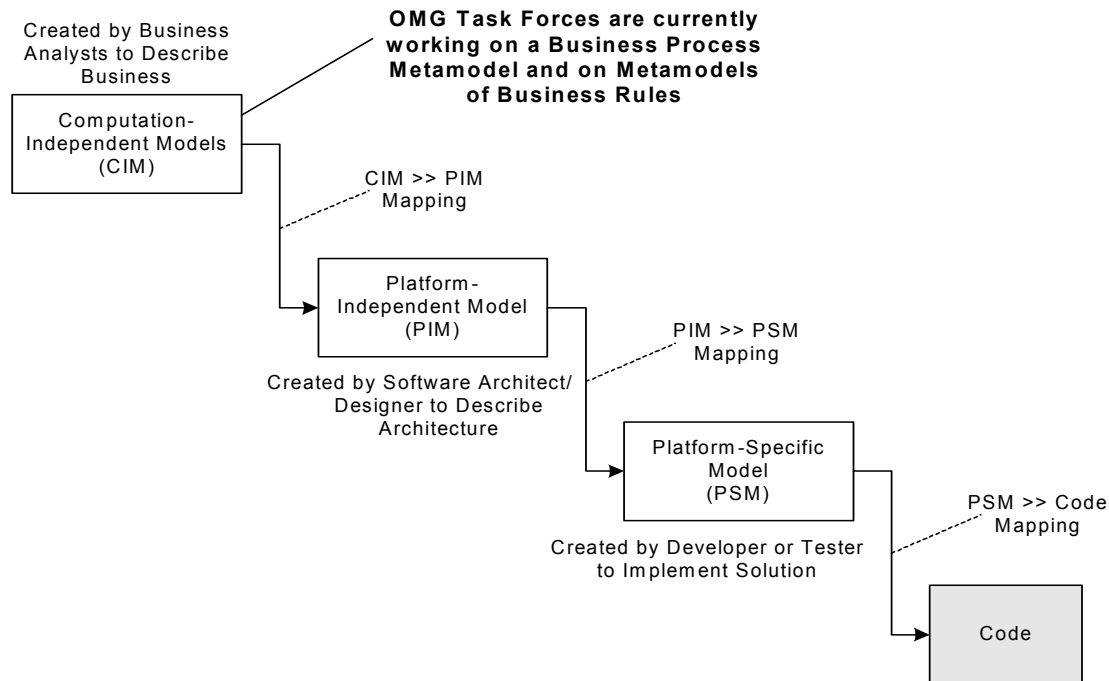


Figure 4. The Object Management Group's Model Driven Architecture.

The TeleManagement Forum's eTOM and NOGAF Architectures

The TeleManagement Forum is an organization made up of most of the major telecommunications companies in Europe and North America. One group within the TeleManagement Forum has spent several years developing an enterprise architecture for telecom companies.[6] The Forum's architecture is a reference architecture created by representatives from several companies. It is assumed that, as time passes, many members will adapt this architecture and that, during the same period, vendors will tailor products to implement many of the processes defined by the architecture.

The heart of the enterprise architecture created by the TeleManagement Forum is the eBusiness Telecom Operations Map (eTOM). The current version is the third iteration of a Telecom Business Process Architecture. Earlier designs only described the operational processes within telecom companies. As the companies began to implement e-business applications, however, they discovered that processes included in general and enterprise management had to be added to the architecture. One of the major advantages of e-business systems is that they integrate management and operations, and it is important that

everyone have a clear overview of all the processes if they are to see how integration might occur.

Figure 5 shows the eTOM framework. The TeleManagement Forum uses a slightly different model, but we rotated their graphic ninety degrees. We did this to convert the departmental structures to vertical columns and the business processes to rows that flowed across the departments from suppliers to customers. We also inserted a box for the CEO and executive committee and lines to suggest departmental linkages on the EA diagram. Finally, we rounded the corners of the rectangles representing processes or activities to conform to the latest notation used in the UML Activity Diagram and BPMN specifications.

Figure 5 provides an idea of how a telecommunications company is organized. In essence, a telecom sells time on its network to customers. Since the time is sold and monitored by means of computers that track phone access, Service and Resource are important functions. Since almost all long distance phone calls cross multiple networks, arrangements with other telecom companies – partners – are very important. We suspect that actual phone companies might subdivide their departments somewhat differently, placing marketing and service in separate departments, but remember that most phone sales and service requests come in through a common call center, so this high-level grouping

works reasonably well. In any case, Figure 5 provides an idea of how a group of telecom managers felt they could represent their organizations.

The three shaded blocks are groups of business processes. Within each group, there are sub-processes. By splitting up the processes in the way they have, it's unclear if Operations represents a value chain or not. The key would be if one could add the costs of all of the processes within the Operations box to determine the total cost and the profit margin on a product line – in this case, phone service. If you could, that would mean that everything in the lower two shaded boxes could be grouped together as overhead and assigned to a single value chain – Phone Operations.

Every business process architecture committee needs something like this figure if they are to have a standard way to describe their company's processes and identify processes that require changes when new strategies and goals are announced.

In fact, a process architecture committee would probably want something a bit more detailed. Figure 6 shows the next level of detail provided by the TeleManagement Forum's eTOM model. Once again, we've transposed the sub-processes defined on the more detailed eTOM model to our preferred format. In this case, to simplify things, no sub-processes are shown within the Enterprise Management Processes box or the Strategy, Infrastructure & Product Processes box. What is shown are the sub-processes that make up the Fulfillment Process, the Assurance Process, the Billing Process, and the Operations Support and Readiness Core Process. In each case, the sub-processes have been placed so that you can see which functional area is responsible for the sub-process. Thus the sub-process Order Handling is a sub-process of the Fulfillment Process. Order Handling is administered by the Market, Product and Customer Relationship Management function. Similarly, Supplier/Partner Settlements and Billing Management is a sub-process occurring within the Billing Process, and is administered by the Supplier/Partner Relationship Management department or function.

Notice that some sub-processes occur within multiple processes. These sub-processes are marked with an asterisk to highlight the fact. Thus, the Customer Interface Management – presumably a set of customer portal management activities – is shared by the Fulfillment, Assurance and Billing processes. Similarly, these same processes share a Supplier/Partner Interface Management sub-process.

If you are not a Telecom executive, you might not be familiar with some of the terms used to describe the various sub-processes. The key thing is that this business process architecture illustrates a framework that is detailed enough that a telecom process architecture committee familiar with its own organization could be reasonably efficient in determining just which processes or sub-processes would need to be changed to achieve specific changes in company strategy and goals. One could easily imagine an accompanying document that provided short, written descriptions of each of the sub-processes.

If the TeleManagement Forum had stopped with eTOM, they would have had the equivalent of the Supply Chain's SCOR Framework, a business process architecture that did not extend to implementation specifics. In other words, eTOM, like SCOR, provides a process-centric model for business managers, but it doesn't make the alignment between processes and supporting IT resources explicit. In fact, the TeleManagement Forum has extended eTOM with its New Generation Operations Systems and Software (NGOSS) framework. In essence, NGOSS is an enterprise architectural framework that organizes, integrates, and implements telecom systems. Figure 7 provides an overview of NGOSS.

Figure 7 illustrates four perspectives or sources of the growing NGOSS knowledge base of standards, tools, and best practices. Once again, we have rotated the version of this figure that the Forum normally uses, to place the Business Process Analysis at the top of the figure.

eTOM. Starting at the top, a business process analysis has resulted in a business process architecture of high-level telecom processes. eTOM provides a graphical overview of the business processes used by all telecoms and a common vocabulary that all telecoms can use. In addition, process flow plans are provided for a growing number of key processes.

SID. Continuing, clockwise, we come to the Shared Information/Data Model (SID). SID provides a common language for software providers and integrators when they seek to describe management information and establish elements or entities to be stored in databases.

Interfaces and an Architecture. At the bottom of the figure we are concerned with defining how software components can be constructed to implement business processes. An overall, platform-neutral architecture and an interface (API) model define the principles that allow developers to create



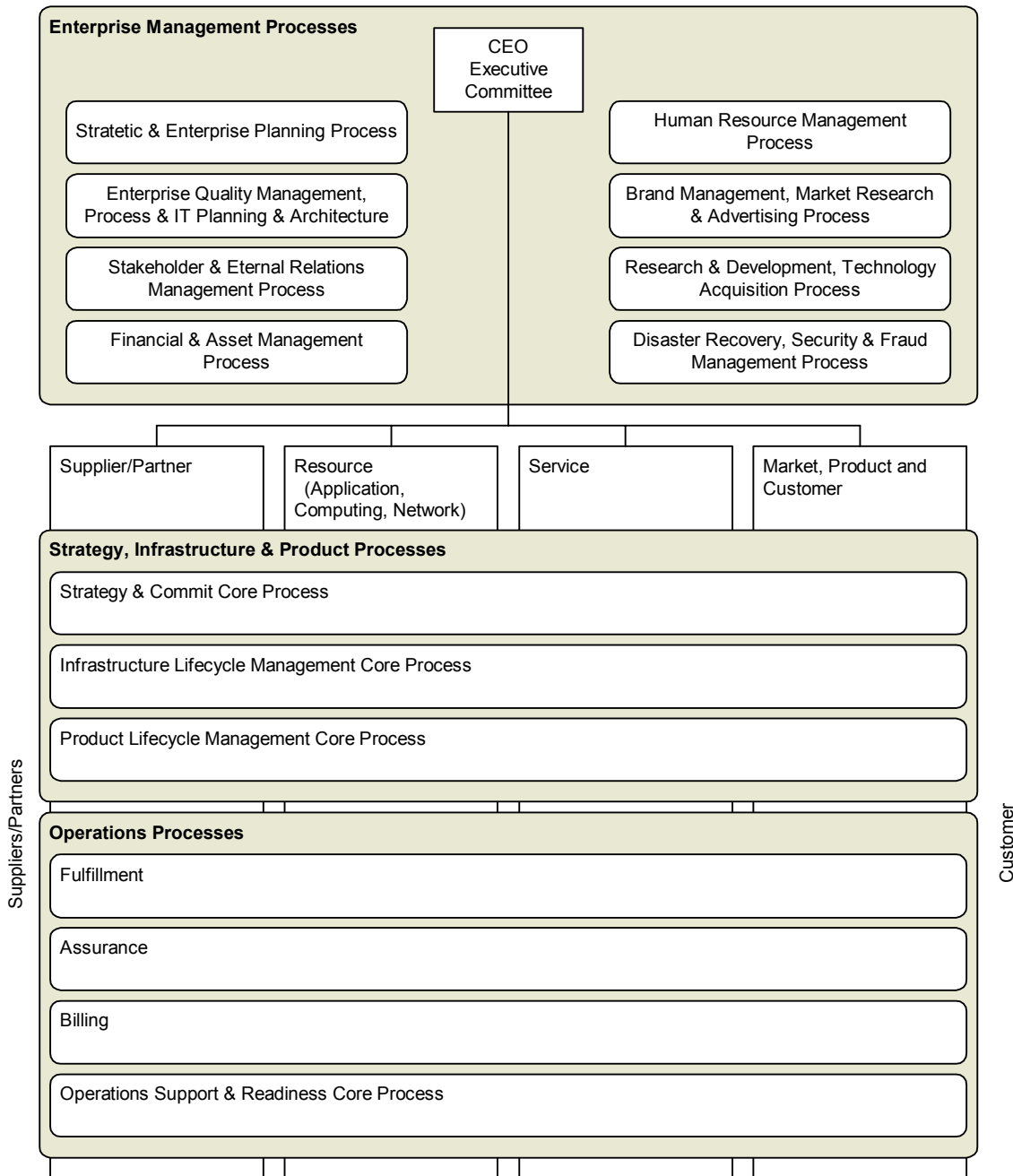


Figure 5. Executive Level Version of eTOM Business Process Architecture.

OSS components that can be used in distributed telecom environments.

Compliance Tests. Finally, a suite of tests assures that products conform to eTOM, SID, and NGOSS architectural and interface specifications. The tests allow vendors to achieve certification for complying with one or multiple NGOSS standards.

All of the elements in Figure 7, taken together, could be said to form an enterprise architecture.

The NGOSS team is currently working on a methodology that will combine the strengths of the Zachman Framework, RM-ODP, USDP, and the OMG's Model Driven Architecture (MDA). In essence, the methodology describes an approach for analyzing, designing, and generating component-based

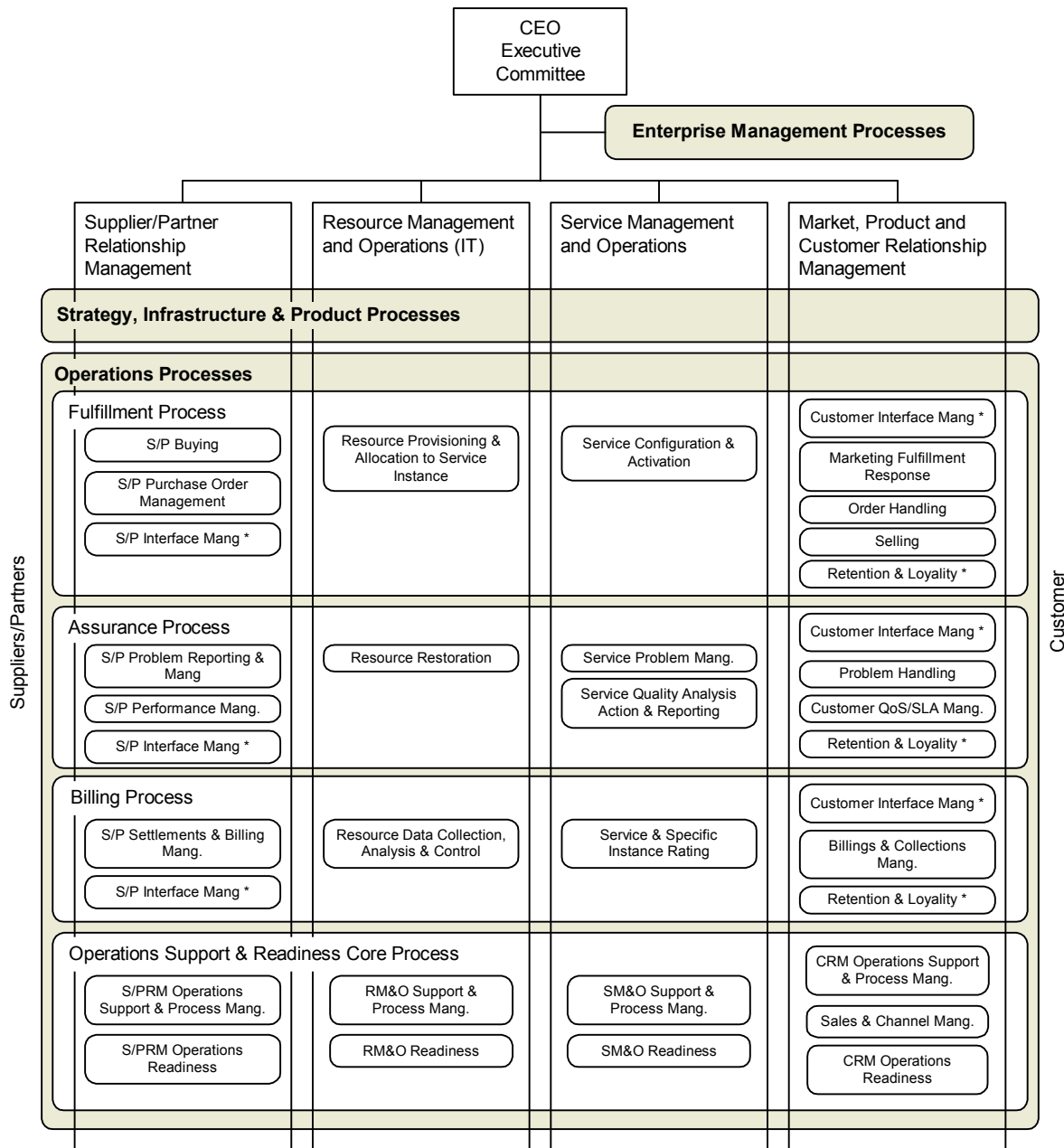


Figure 6. A more detailed version of the eTOM Business Process Architecture.

applications that are vertically aligned. Figure 8 suggests how the NGOSS methodology relates to Zachman and MDA.^[7]

The key thing to consider, when examining Figure 8, is the huge difference in the importance of the business process architecture in NGOSS, as compared with Zachman or MDA. Both Zachman and MDA provide a layer that is equivalent to the role that eTOM provides in NGOSS. In

most cases, however, users of architectures derived from Zachman or MDA only undertake a modest business process analysis effort. The TeleManagement Forum, however, began with eTOM and developed an extensive and detailed process architecture to describe how Telecoms worked before considering how that Business Process Architecture could be supported by an IT Architecture. It's the emphasis on eTOM within NGOSS that leads us to term it a true process-centric enterprise architecture.

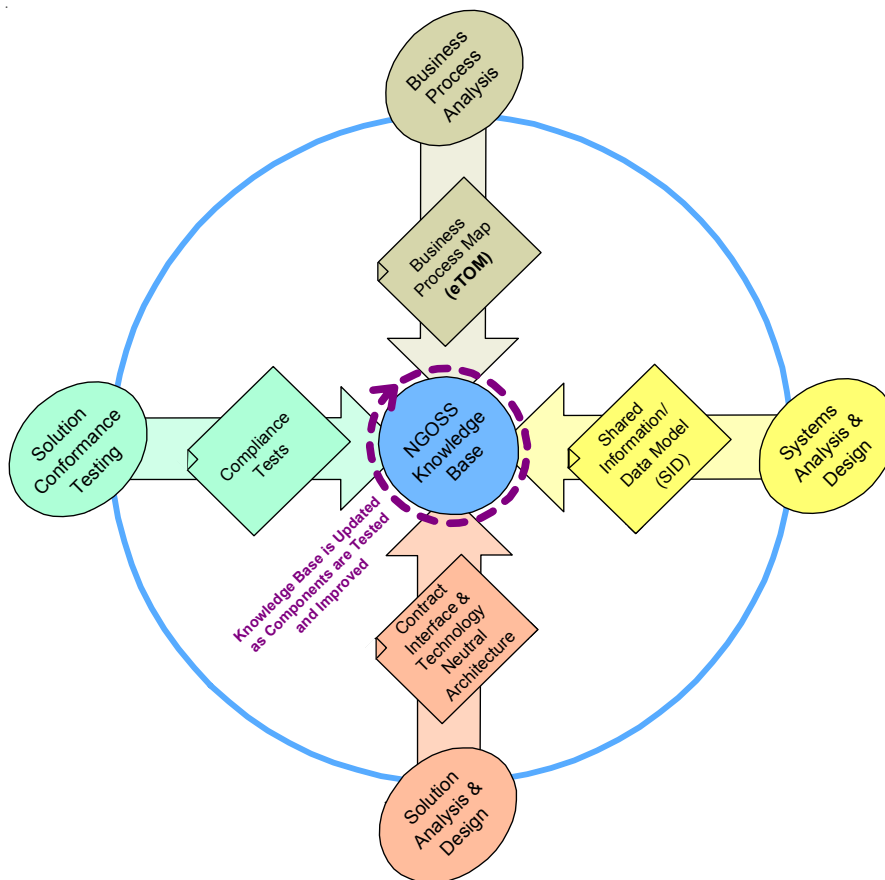


Figure 7. An overview of the TeleManagement Forum's NGOSS Framework.

Hewlett Packard's SCOR-Derived Enterprise Architecture

The Hewlett Packard Enterprise Architecture that we considered in the last issue of *BPTrends Newsletter* illustrates how SCOR could be extended into a complete business process architecture, or even into a complete process-centric enterprise architecture. The main emphasis of SCOR is on the process architecture, and not on implementation; but SCOR does provide information on best practices, which tend to be associated with organizing employees and motivation the SCOR information extends, in some cases, to packaged software applications that can be used to implement specific sub-processes or activities.

HP has extended SCOR by creating three other business process models—a Design Process for the development of new products, a Development Process that describes marketing, and a Customer Process that describes sales processes. Taken together with enabling processes, HP has developed a very detailed business process architecture.

.In addition, HP has related its business process architecture with its IT architecture, and is currently undertaking projects to align its various IT architectures with its business process architecture. In other words, Hewlett Packard has a true process-centric enterprise architecture. HP's Joe Francis, who is currently the chair of the Supply Chain Council, is promoting the establishment of a Design Chain Council and a Customer Chain Council. Assuming these organizations become active in 2004, we might eventually see a public process-centric enterprise architecture that combines SCOR, a Design Chain and a Customer Chain into a coordinated framework that other companies can use to create their own process-centric enterprise architectures.[8]

Enterprise Architecture Tools

We don't have space to survey the software tools available for enterprise modeling. We'll try to return to this in the months ahead. Suffice it to say that the tools tend to divide into two broad groups that reflect the distinction we have been describing. Some are true process-

centric enterprise alignment tools that are designed for use by business managers and to support extensive business process analysis [or "analyses"?], as well as providing links to IT analysis products. Other tools, which are also called enterprise architecture tools, are, in fact, tools to design IT-centric enterprise architectures. They are not really intended for business managers and provide only minimal support for business process analysis. Most simply treat business process analysis as an activity that generates requirements for software development.

Summary

Early in the last century, Ludwig Wittgenstein convinced most Anglo-American philosophers that the meaning of a word lay in its use. He argued that it was not too helpful to try to come up with precise definitions of words, because different groups of people used the same word to mean different things. This is certainly the case with *enterprise architecture*.

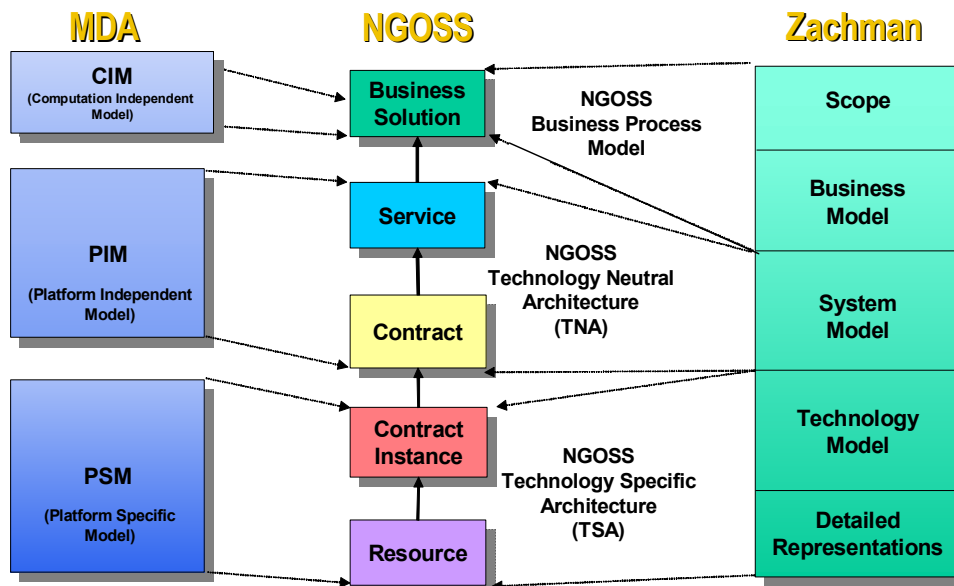


Figure 8. The NGOSS methodology, currently in development, showing its relationships to the OMG's MDA and the Zachman Framework. [7]

“enterprise architecture” to refer to all of the computing hardware and software the business relied upon. The “enterprise architecture” would extend to processes that were automated and to software requirements, but it wouldn't really include business processes as managers perceive them. Instead, “enterprise architecture” would primarily serve as a blanket term for a whole collection of more specific IT architectures, including an application architecture that described all the organization's software applications, a data architecture that described all the data the organization maintained, and a network architecture that described the infrastructure and middleware and, perhaps, even the hardware used to link software, data, and hardware devices together.

If you apply Wittgenstein's advice, you won't worry about the precise definition of *enterprise architecture*. Instead, you'll ask yourself, when you find yourself using the term what, in fact, you are trying to accomplish. If your organization had an *enterprise architecture*, what would it look like? How would you use one if you had one? What would you point to and say: “That's been done as a result of our ‘enterprise architecture’.”

We have suggested that those who try to answer this challenge would fall into two camps. One group would be business managers or at least process-oriented analysts, and they would be referring to a way of understanding how the business, as a whole, was organized. The key element of the enterprise architecture, for them, would be a high-level analysis of the organization's business processes. Those business processes would define the kinds of products the company produced and the customers it serves. Similarly, it would define the job titles of employees who worked within those processes, and the software and hardware systems required to implement those processes. For this group, having an enterprise architecture would mean they could see how specific tasks, people, and software were related and how a change in a process would require a change in how people did their jobs or what software or data was created or used.

The other camp would be comprised of IT managers, and IT-oriented analysts and developers. They would use the term

Some IT analysts would muddle things and even use the term “enterprise architecture” to refer to a design for an application or network that crossed organizational lines and joined two or more enterprise architectures into something larger. An example of such an architecture would be a Web Service Architecture, and we have not even touched on that issue in this newsletter.

As we argued earlier, there is no correct definition of the term “enterprise architecture.” We will continue to use it in BPTrends in both its common senses—as a description of how all the resources of an organization can be structured by the organization's business processes, and as a description of how all of the organization's computer resources are organized. In general, we'll tend to refer to architectures that focus on business processes as Process-Centric Enterprise Architectures and architectures that focus on computing resources as IT-Centric Enterprise Architectures.

We urge readers to keep the distinction in mind and mentally check yourself whenever you come across the term.

Notes

[1] John Zachman, and IBM researcher, that appeared in the *IBM Journal* in 1987[1]. The article was entitled: “A

Framework for Information Systems Architecture," the *IBM Systems Journal* (Vol. 26, No. 3, 1987).

Information on Zachman's current work can be obtained from The Zachman Institute for Framework Advancement (ZIFA) www.zifa.com Zachman has recently prepared an electronic book, *The Zachman Framework: A Primer for Enterprise Engineering and Manufacturing*, which is available at www.zachmaninternational.com

[2] Steven H. Spewak with Steven C. Hill. *Enterprise Architecture Planning: Developing a Blueprint for Data, Applications and Technology*. (John Wiley, 1992)

[3] CIO Council. *A Practical Guide to Federal Enterprise Architecture*. A U.S. Government publication prepared by the U.S. Government CIO Council and released in September 1999. This document can be accessed via the CIO council Web site: www.cio.gov

[4] For more information on the OMG Model Driven Architecture (MDA) see the OMG website: www.omg.org/mda. Also check the information on the BPTrends site under Publications/Columns: David Frankel's MDA Journal, and under Publications/White Papers.

[5] For a nice overview of the ISO's RM-ODP standard, check the paper by Professor Antonio Vallecillo of the University of Malaga which is available at: www.enterprise-architecture.info/Images/Documents/RM-ODP.pdf

[6] Information on eTOM and NGOSS is available from the TeleManagement Forum: www.telemanagementforum.com

[7] Figure 7 is derived from a presentation by Joel J. Fleck, II, Chief Architect of Hewlett Packard that describes the work of the NGOSS methodology task force.

[8] For a discussion of Hewlett Packard's SCOR-derived enterprise architecture, check BPTrends: Publications/Newsletters: *Second Generation Business Process Methodologies*, May, 2003.

For a more extended discussion of the role of a Process-Centric Enterprise Architecture we recommend our own book and a book by Roger Burlton.

Paul Harmon. *Business Process Change: A Manager's Guide to Improving, Redesigning, and Automating Processes*. (Morgan-Kaufmann, 2003).

Roger T. Burlton. *Business Process Management: Profiting from Process*. (SAMS, 2001).

There are many different books that describe IT-Centric Enterprise Architectures in depth. A recent introduction is:

Martin Fowler. *Patterns of Enterprise Application Architecture*. (Addison Wesley, 2003)

DCI sponsors conferences each year Enterprise Architectures. The DCI conferences are given in conjunction with META Group. The ambiguity we've spoken of can be detected throughout this conference. Some talks use the term in its business sense, but most use it in its narrower IT sense. For more information, check www.eaconference.com

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