

## Improving Enterprise Management through a Data Driven Enterprise Architecture

Enterprise<sup>1</sup> Management uses knowledge about the relationships between an enterprise's people, processes, and technologies to better achieve strategic and operational objectives.

In small organizations this is relatively easy and can be accomplished in an informal manner. Information as to how an organization is performing (metrics) and knowledge as to how functions are performed, by whom they are accomplished, and tools, or technology, required to complete the task is easy to obtain and is generally understood by the decision makers. As organizations grow, processes become more complex, layers deepen, and functions expand and the enterprise's ability to quickly do the requisite analysis and develop the best alternatives is greatly reduced.

To alleviate the problem, organizations, whether commercial, Federal, other governmental, or non-profit, seek paradigms that better describe their organizational structure, their business functions, activities, and processes, and the information that must be communicated both internally and externally in order to actualize those processes. Typically, the description also includes the IT components (systems, networks, hardware, software, communication devices, and technical standards) that support the execution of processes. Descriptive material capturing information about these basic operational components of the organization and the relationships between them is generally referred to as "enterprise architecture."

"If the enterprise architecture is documented in sufficient detail, managers are in a position to ask about the implications of specific changes. In effect, one can "grab hold" of a specific item on a process diagram, "pull it" and see what's attached to it. Similarly, if the repository contains data on employees and costs, one can determine the specific costs and implications of changing the item and doing it in a different way. In other words, a good enterprise modeling tool will allow managers to run simulations that can show what would happen if different scenarios were to be implemented." *Paul Harmon, Executive Editor, Business Process Trends, January 2003*

This view of enterprise architecture was originally articulated by John Zachman in the late 1980's, and subsequently adopted by Federal agencies as a standard and benchmark for informing their investment decisions and system acquisition processes and documentation. In this formulation, the understanding and articulation of relationships is particularly vital, since the operating environment is dependent on the operation of automated (information technology-based) systems and the successful interaction between systems and human resources operating those systems.

"Zachman originally proposed his framework in 1987 in an article published in the *IBM Systems Journal*. The article created quite a bit of interest when it was published, but was generally dismissed as too comprehensive for IS developers. Over the years, however, as business managers have become more concerned with business processes and with linking strategic goals to business process goals, and both to IS applications and databases, the Zachman framework has become the most popular approach to describing an enterprise architecture." *Paul Harmon, Executive Editor, Business Process Trends, January 2003*

Only by making these relationships visible, together with representations of the relationships between human factors, systems, information, and data exchanges, can an organization effectively evaluate the potential returns on investment in various alternative system designs or measure the degree to which business goals and objectives are met by investment in system acquisition or maintenance.

Stated in this manner, it is clearly desirable for an organization to develop, maintain, and construct architectures that expose the mechanisms through which it conducts its business operations. Since Federal organizations have been mandated by OMB, GAO, and their respective governance authorities to incorporate enterprise architecture into their capital planning/investment control (CPIC) processes, there

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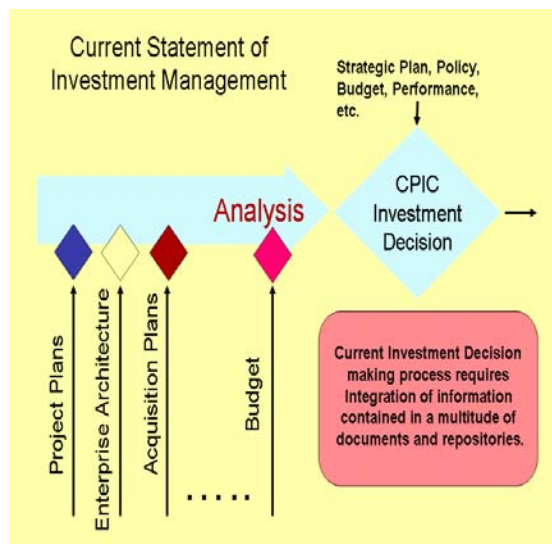
<sup>1</sup> Enterprise in this context is used to describe a large organization that uses information systems.

is no question about whether agencies must develop and use architecture. The question is how to do this effectively, accurately, and at a manageable level of cost, develop and maintain the relevancy of the architecture over time.

## The “As-Is” State of Architecture

Most current efforts at constructing and using architecture focus on the inputs (models, as defined by a framework such as DOD Architectural Framework (DODAF) or Federal Enterprise Architecture Framework (FEAF), or one of their variants), and the outputs (Exhibit 300s, Analysis of Alternatives, Cost Benefit Analysis, gap and overlap analyses, change management plans, risk management plans, and documentation supporting the System Acquisition Life Cycle). Typically, an agency will take one of two approaches: develop models that support the immediate documentation or budgetary justification need, or develop those models that are specified by a compliance (governance) authority.

Models are often developed using a specific process or data modeling tool, thus imposing *a priori* methodological assumptions (implicit in the manner in which the tool handles and depicts data) that may not be well understood by the architect. There is a tendency to a one-to-one relationship between the models and the products derived from them: thus, the models may not be mutually consistent with one another, and various documentation derived from the “enterprise architecture” may also be incomplete or inconsistent. We describe this as model-driven-data.



Since models are produced per a schedule typically determined either by the phasing of the Acquisition Life Cycle or by compliance authority requirements, the production, review, validation and approval process for these models will often be ad hoc, rather than standardized, repeatable, and well-documented. A Capability Maturity Model Integration (CMMI) evaluation of this process is likely to suggest non-conformity to these standards, indicating a lack of quality control and effective configuration management of the architecture products. Most significantly, developing these architecture artifacts, and then using them to produce Capital Planning/Investment Control (CPIC) and related documentation is labor-intensive (thus costly) and time-consuming (thus generally out of date by the time the modeling is validated and deemed ready for use).

In short, today’s state of enterprise management is still very much in its infancy. Information is typically in a variety of places and may or may not be up-to-date thus making it very difficult to do broad (enterprise level) analysis and reporting.

## Changing the Paradigm

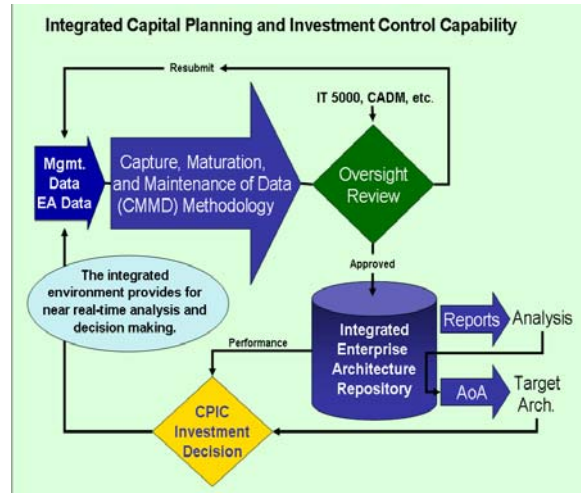
The current paradigm requires the entire enterprise to be modeled in order to produce the data repository necessary to better enable analysis and enhance decision support. Typically this involves a labor intensive, time consuming, intrusive effort that produces a snapshot of a single point in time. There are a number of modeling tools on the market to support such efforts (Popkin, METIS, ARIS, and others) however maturation and maintenance of the models (and hence the information repository) is often not fully articulated, nor implemented. For this reason architecture very quickly loses its value.

- “As-is” enterprise architecture efforts are generally chaotic and unlikely to lead to development of products that reinforce and support investment decisions, business process improvement, system engineering, project management, or the other critical functions that the organization must perform. When products are produced, they are likely to be inconsistent with each other, and

because they are based on the contents of a relatively static architecture repository, likely to be out of date and therefore inaccurate. The products are expensive to produce, and of limited usefulness – this represents a low return on investment.

Cherokee recognized that the full benefit of Enterprise Architecture could not easily, nor cost effectively, be realized without significant change in the manner in which it is developed, maintained, and used. By recognizing the solution was not in the development of the architectural models, but in the capture of data that can produce architectural models, the cost, accuracy, and maintenance of EA type information is greatly improved. By shifting the focus to data, not models, it also makes EA more useable earlier. It allows only the data required necessary to support level of analysis required (or available) at that time. This is a significant improvement over the current approach in that it empowers, and supports, the decision making process *before* an architecture is fully articulated.

- “To-be” enterprise management is based on CMMI compliant processes, and enables the development of consistent, accurate, and timely products that fully support CPIC, system engineering efforts, and vital AoAs and identification of best solution target enterprise architectures. Products are easy and relatively inexpensive to develop, review, and validate, and the organization reduces its exposure to risk by being able to readily create and update its documentation of investment decisions and other critical management products.



We call this the **Capture, Maturation, and Maintenance of Data (CMMD) Methodology**.

### Capture, Maturation, and Maintenance of Data (CMMD) Methodology

The purpose of CMMD is to support the transition from the current as-is state of architecture and investment decision documentation (as reflected in typical repositories, structured as static libraries) to a dynamic enterprise management solution, an integrated Enterprise Management Repository. CMMD is a structured, repeatable, and documented process that provides visibility into the status of development of architecture for an enterprise, and enables monitoring and control of the development process.

Enabling the architecture development process through the application of CMMD provides the organization with a capability to perform continual update and maintenance of its architecture, and to create “real-time” investment decision products on demand by querying the architecture database and generating products as reports. All products, whether visualizations of architecture models as specified in a framework document, or CPIC-related reports, are based on a common set of data elements contained in a structured relational database. This capability provides “just-in-time” architecture, with information fully current, fully validated, internally consistent and coordinated, and arrayed according to the needs of the user.