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The Role of the Enterprise Architect

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Abstract:

The emergence of enterprise architecture (EA) as a mechanism for addressing increased complexity has resulted in a newly evolving profession of enterprise architect. This paper summarizes the results of a study that explored the role of the enterprise architect as viewed by subject matter experts within the executive branch of the United States (U.S.) Federal Government. The results of the research study identified several functional roles of the enterprise architect and described the interfaces with other functional roles. The study determined the unique value that the role provides to the enterprise and the impact of not filling this role. The study examined the optimal organizational positioning and the competencies needed to maximize effectiveness in the role. The insights gained from this study are the first step in defining the role of the enterprise architect. This theory forms the foundation needed to support a recognized profession of enterprise architect and provides several recommendations for further research.

Keywords: enterprise architect, functional roles, competencies, definition

INTRODUCTION

As enterprise architecture (EA) takes on an increasingly significant role in business management, there are new responsibilities emerging within the organizational structure. One such role is the enterprise architect (Strano & Rehmani, 2005). This study explores the role of the enterprise architect as defined by practicing United States (U.S.) Federal Government enterprise architects. By exploring the role of the enterprise architect in the United States (U.S.) federal government, this research is intended to provide a deeper level of understanding of the specific value that the enterprise architect brings to the enterprise that is different from existing management, analysis, and engineering roles. This knowledge should enable better interaction among each of the different roles as well as provide a basis for formulating the competencies required to perform the duties associated with the position. This information would lead to a better understanding of the education, training, and experience necessary to acquire entry level qualifications into the profession. Better understanding of the role is the first step to improving the competence level of enterprise architects. As the competence level of enterprise architects increases, it is speculated that enterprise architecture will provide a greater impact on improving organizational performance and achievement of the strategic vision.

BACKGROUND AND SUMMARY OF EXISTING RESEARCH

Relevant literature to provide a theoretical basis for the study included a review of the evolving role of the enterprise architect and its relationships to other roles such as business management, systems engineering, and architecting. Rapid advances in information technology have created increasing amounts of information. One study estimated that print, film, magnetic, and optical storage media produced about 5 exabytes

of new information in 2002, of which 92% was mostly stored in hard disks; it also estimated that new stored information grew about 30% a year between 1999 and 2002 (How Much Information?, 2003). This has led to an emphasis on creating and exchanging knowledge that requires a new organizational model to replace the obsolete structures of the industrial age (Bryan, 2005). The U.S. federal government has recognized the need to address these challenges as a means to improve services and accountability to its citizens.

21st century challenges are transforming government to meet the current and emerging challenges. Policy makers need to confront a host of emerging forces and trends such as changing security threats, increasing global interconnectedness and a changing economy. Agencies need to respond to these challenges by changing cultures and creating the capacity to become high-performing organizations by implementing a more results-oriented and performance-based way of doing business (United States Government Accountability Office, 2005).

The increased complexity that has resulted from these new challenges has prompted the need to better understand all of the interrelationships within the federal government. "Enterprise architecture provides an important foundation for high-performing organizations. There are simply too many moving pieces within and across the federal government's myriad of programs, policies and services to manage without having enterprise architecture in place" (McClure, 2004, p.2).

Although there is evidence that many are performing work that is considered to be enterprise architecture, there is a self-perceived need for expert agreement on the methods and processes that should be mastered by practicing architects (Dillon, 2001). In the absence of clear definitions for the roles that influence architecture success, architects

may be viewed as providing no specific value (Carbone, 2004). Staffing architecture teams requires defining the architecture roles and job descriptions to enable human resource management to determine the performance evaluation criteria, compensation plans, career paths, training requirements, and career progression criteria. Inconsistency in the definition of EA, however, prevails in the literature, which further complicates the challenge of defining the role of the enterprise architect. EA is often used to refer to the technology architecture that spans the enterprise. In this context, the role of the enterprise architect may be basically the same as that of the systems architect except that the system is scoped to span the entire enterprise.

There are opinions expressed in the literature that systems and enterprise architecture are similar enough disciplines that there need not be differentiation between them (Pavlak, 2005a, 2005b). However, this position is not supported in the work of Dick, et al. (2004) who make the point that the skills required to practice systems architecture may be very different than those required to practice enterprise architecture. Their view is that enterprise architectures are normally designed by user organizations; while systems architectures are developed and sold by vendors. By creating the blueprints for business models, one defines the framework for technology related work (Dick, Simmons, Vavra, & Zoppi, 2004). Another viewpoint is that system architecture is normally a high level design for a specified need while EA provides flexible solutions to address ad hoc situations (Chorafas, 2002). Traditional architectures are driven by cause-effect linear relationships, while modern day needs require nonlinear, complex adaptive systems. Many critical factors must be considered in defining the best architecture for the

enterprise. At the core is the business strategy, surrounded by factors such as products, costs, stakeholders, performance outcomes, opportunities, and risks.

Research by Cutter Consortium analysts (Bredemeyer & Malan, 2004) identified several core roles of enterprise architects and categorized the competencies required for each.

An enterprise architect must seek to understand and articulate the capabilities the organization has as well as the capabilities required to implement the business strategy. They need to construct models and arguments, motivating and examining the capabilities, how they relate to one another and to the objectives of the organization, and what they mean in terms of what must be done to build them (Bredemeyer & Malan, 2004, p. 6). The findings of this research could enable prospective enterprise architects to plan a career path based upon a progressive set of identified competencies. This model implies that the skills required to perform enterprise architecture are sufficiently similar to those required to perform systems architecture that they are refined through experience such that the architect is able to assume responsibility for a broader scope through experience with smaller scoped efforts.

Managing EA requires establishing the roles and responsibilities of the EA team members (Bernard, 2004). Identifying roles in this manner places the emphasis on the functional activities performed by the members of the EA team. "The EA responsibilities identified for the chief architect are managing the EA program and documentation process, selecting and implementing the framework and documentation methodology, identifying the EA standards and managing EA configuration management sub-process" (Bernard, 2005, p. 179). This set of responsibilities suggests that the primary role of the

chief architect is EA program manager. Salary information for a chief architect obtained from an informal survey conducted in 2003 (Bernard, 2005) indicate that a chief architect earns about $200 per hour, while mid-level EA professionals earn about $125 - $175 per hour and junior level EA professionals earn $55 - $85 per hour, which would imply a significant difference in competencies and experience level of the individuals filling each of the various roles.

Architecting the enterprise requires establishing a strategy, formulating a conceptual approach to achieving the strategy, and directing the execution of the concept to fulfill the strategic plan. The role of the enterprise architect changes with each of these stages (Theuerkorn, 2005). The effort required for each stage varies dependent upon the organizational type and skill sets of the architects. With the strategic architecture, the role of the enterprise architect is mostly interpreter, with the role shifting to owner for the conceptual architecture and mentor for the execution architecture. The architect style changes in response to the different phases of the architecture and the interaction required to support a particular audience or stakeholder.

Enterprise architects are increasing their roles within the enterprise beyond that of advising the CIO on IT related issues. While the CIO is typically attempting to ensure the return on investment for an IT investment, the enterprise architect is uniquely positioned to identify investment opportunities that support the business goals of the enterprise (Polmer, 2004). This knowledge is used by the CIO to assess the return on investment and total cost of ownership details that best serve the capability requirement identified by the architect.

Given the interdisciplinary nature of enterprise architecture, the enterprise architect must have a general knowledge of various disciplines such as business strategy, financial management, organizational dynamics, business process design, and information technology (Arseniev, 2001). "A good enterprise architect needs not only excellent technical skills, but business and behavioral competencies as well" (James, 2002, p. 2). Each of three specific roles of lead, business, and technical architects requires four different levels of competence.

O'Rourke, Fishman & Selkow (2003, p. 186) discuss three distinct roles of the enterprise architect, (called the designer in this reference), as that of advisor, agent, and arbitrator. The architect advises the owner on how best to solve business problems, address business opportunities, and allocate budget or invest capital. The agent deals with others on behalf of the owner when selecting methods and tools. The arbitrator remains impartial while enforcing the needs and requirements of both the builder and owner. These roles require several skills, traits, and attributes, including leadership, management, a sense of urgency, and an understanding of psychology. "The designer's most important function is balancing the disparate needs of people, management, and business requirements" (O'Rourke, Fishman, & Selkow, p. 186).

A study was conducted to identify issues being faced by chief enterprise architects in the private sector, which analyzed a framework of four models to define the role of chief architect. The roles were described as standards enabler, project architect, middleware believer, and emerging technologist. Four themes emerged in the job description: support business processes, prepare for outsourcing, put in place the capability to manage performance, and measure the impact of the architecture group

(Akella & Barlow, 2004). No comparable study has been conducted in the public sector, although there is a need to study these same types of questions in the interests of maturing the enterprise architecture discipline so that the expected benefits can be better realized.

In summary, a review of the literature raised more questions that it answered. Most of the information on the role of the enterprise architect was anecdotal and was not supported by details of analytical studies. There was a rich source of literature on leadership and management roles including information and technology management. However, theory that defined the role of the enterprise architect was sparse and inconsistent. It raised questions about whether the role of enterprise architect is an extension of the systems architect role or a unique discipline, if the role is mostly technical or managerial, and what competencies are required to perform the daily tasks of practicing architects. The lack of information found in the review indicated a need for research to define the role of enterprise architect, which formed the basis for the study of the U.S. federal enterprise architect. The methodology for the research is presented in the next section.

METHODOLOGY

The research used qualitative analysis to provide a deeper level of understanding about the enterprise architect role than was currently available in the literature by providing descriptive and interpretative results (Creswell, 1994). A grounded theory method of data analysis provided the structure needed to identify recurrent patterns that resulted in a definition of the functional roles and their interfaces with other

organizational roles, as well as a description of properties and factors that added clarity to the definition (Strauss & Corbin, 1990, 1998).

Data was collected using three methods. Textual data from existing documentation such as position descriptions, vacancy notices, governance plans, and any other similar types of documents were reviewed. Selected observations were conducted to gain insights through actually monitoring the activities performed by enterprise architects. Selected individual interviews were conducted to gain insights and specific details about the perceptions and views of subject matter experts. Triangulation of data sources added confidence to the reliability, validity, and credibility of the study. Using interviews, document reviews, and observations added rigor by reducing the impact of bias that may have resulted from a single source of data collection (Patton, 2002). This method was effective in a case study of a state enterprise architecture, in which data were collected using a survey instrument, document reviews, interviews, and observation. "Use of these methods aided in building a broad description of the context and the actions and perceptions of the people involved in the study" (Miller, 2003, p. 34).

All interviews were recorded using audio-visual technology, which provided the capability of reviewing the content repeatedly during data analysis. Extensive field notes were taken during the observations. Protocols were used for structuring the recording of information during the interviews and observations (Creswell, 2003). The initial set of questions asked during the interview was determined based upon the research question for the study, insights obtained from a review of the literature, and the researcher's professional experience. The questions were peer reviewed prior to the first interview occurrence and the same set of questions was used for each interview. The questions

asked during the interviews are found in appendix A. The researcher interjected additional questions only for clarification purposes.

The participants were purposefully, rather than randomly, selected and are listed in Appendix B. This sampling technique is best suited for studying attitudes with the intent of formulating a theory or concept (Creswell, 2002). The criteria for selecting participants were based primarily on their professional experience with the EA discipline and their association with the organizations that had received recognition for achievement. The researcher prescreened each candidate participant to establish a fit with the prescribed subject matter expertise criteria. The rigorous criteria were intended to identify the most knowledgeable and experienced individuals, whose insights would add rigor to the study. The organizations, from which the participants were selected, represented a mix of various different types in terms of size, complexity, and homogeneity. The participants included the federal chief enterprise architect and several department chief enterprise architects.

Each document was reviewed several times with a focus on each research question during each review. A total of thirty-six documents were initially reviewed and analyzed, including fourteen vacancy notices, fourteen position descriptions, four governance plans and a few additional documents such as staffing plans and criteria for selecting enterprise architects.

Eleven interviews and four observations were conducted between December 16, 2005 and January 25, 2006. The interviews, observations and, document reviews were conducted in a consistent manner following a pre-established protocol that was peer reviewed to assess structure and adeptness in adding rigor to the data collection process.

The study examined the following attributes:

1.   Key functions performed by the enterprise architect

2.   The benefit provided by the unique role of enterprise architect

3.   The impact to the enterprise if the role did not exist

4.   The competencies most needed to be effective in the role

5.   How the architect interfaces with other roles

6.   Where the role is most effective within the organizational structure

Initially, each source of data was analyzed for each of these attributes. Key words, phrases, and statements were captured. This identified a set of concepts. Next, each of the sources of data was analyzed again to abstract categories and, in some cases, broad categories of concepts. The next analysis of the data linked the source data to the categories of concepts. The next iteration of data analysis ensured that each concept mapped to one or more of the abstracted categories of concepts. Lastly, the data were studied to identify a central theme that integrated all categories, explaining the interrelationships of each to the evolved theory. Extensive use of memos and notes were used during the entire process to help evolve a theory that was completely driven by the data. Once the theory was evolved, selective sampling was used to validate the data. Additional data was not collected but rather selected documents, interviews and observations were once again analyzed to ensure that the data were adequately represented by the abstractions and supported the theory integrating the categories.

FINDINGS

The data analysis revealed that the role of the enterprise architect is multi-dimensional and that there is no single role but, rather, there are many roles. These roles

were abstracted into five broad categories of change agent, communicator, leader, manager, and modeler. The combination of these functional activities that are performed while interfacing with many different functional interfaces provides a shared picture of the enterprise as it exists today and as it is envisioned tomorrow, as well as an explicit plan for transitioning between the two. The additional details that were analyzed (unique value, impact of not filling the role, organizational positioning, and, competencies) provide a deeper level of understanding of the role and its value to the enterprise.

As a change agent, the enterprise architect supports enterprise leaders in establishing and promoting the best strategy to accomplish business goals and objectives. As a communicator, he assists managers, analysts, systems architects, and engineers in understanding the details of the strategy sufficiently well to make decisions and execute the plan that leads to realization of the shared vision. As a leader, the enterprise architect participates in creating a shared vision, motivating members of the enterprise to aspire to achieving the vision, and providing clear direction regarding what is required to execute a strategy to accomplish goals and objectives that result in performance improvements. As a manager, he organizes the architecture team and ensures that adequate resources are secured to perform the architecture process. As a modeler, the enterprise architect provides a representation of the relationships of enterprise components with sufficient detail and in the format needed to enable making necessary decisions to execute the strategic plan.

The enterprise architect is a valuable part of the leadership team. "What differentiates great business leaders is their ability to see the future and create a path from here to there" (Sanford & Taylor, 2006, p. 129). The enterprise architect creates the path

from the present to the future for the enterprise by taking a holistic view of the enterprise

and integrating the business plans with the technical capabilities. To do this, the

enterprise architect must be sufficiently aware of the capabilities that exist and the

challenges that the business is addressing to make the linkage needed to achieve optimal

results. For example, enterprise architects recognize the potential for such capabilities as

data warehouses and data mining to enable better integration and utilization of enterprise

information for analysis, forecasting, identifying patterns, and helping to formulate

strategic direction. They are aware of the cultural, political, technical, and economic

issues and are able to match the potential of system applications to address the issues.

The enterprise architect has the maestro view of the enterprise. Just as the

symphony orchestra conductor understands how each family of instruments adds value to

the complete symphony sound and how each musician contributes to the composition, the

enterprise architect understands how each capability supports the organizational goals

and objectives and how each of the processes, roles, and technologies must be integrated

to achieve the desired results. The importance of the role increases as the level of

complexity and rate of change increase, making it necessary to understand complex

relationships. This is illustrated in Figures 1, 2 and 3. There are different levels of

enterprise architects. Figure 1 depicts the different vertical layers of enterprise architects

within each of the departments of the federal government. Figure 2 depicts the functional

layers of enterprise architects within an enterprise. Figure 3 depicts the cross-

departmental enterprises. As the scope of the enterprise changes, the role of the enterprise

architect is impacted. The extent to which this changes the role is yet to be determined

and is a topic for further research.

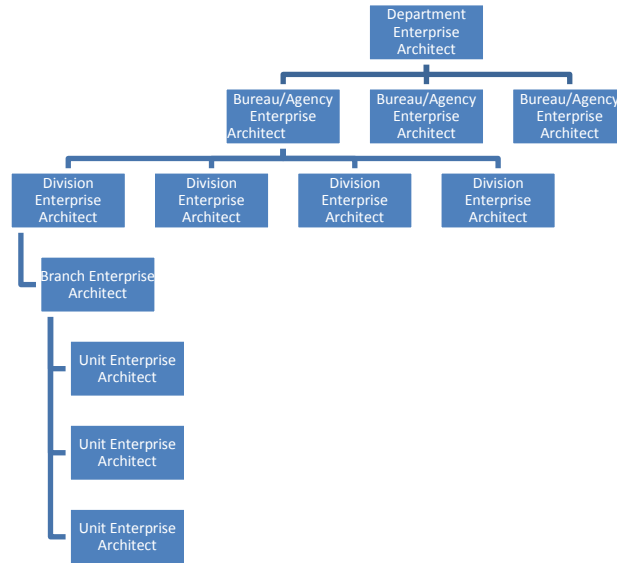*Figure 1*. Vertical layers of enterprise architects in U.S federal government departments

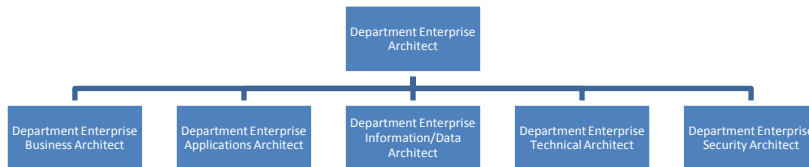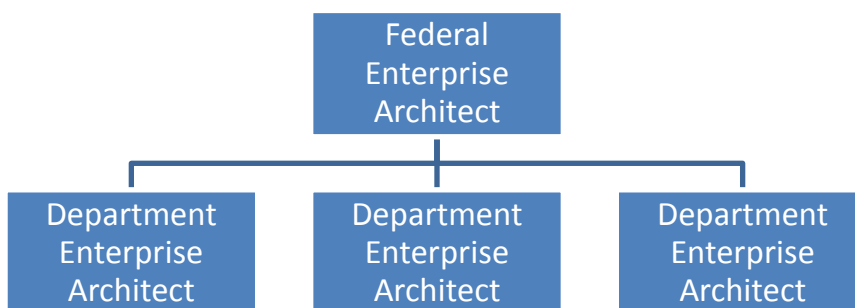*Figure 2*. Functional layers of enterprise architects within an enterprise

Figure 3. Cross-departmental enterprise architects

The unique role that the enterprise architect provides is aligning technology with the business goals and objectives by managing the complex set of interdependencies to communicate a common or shared vision of the strategic direction of the enterprise. The impact of not having the role filled is the increased potential for chaos and confusion, inadequate information to support key decisions, increased complexity, local versus enterprise optimization, reduced efficiency and effectiveness, and increased risk of finding the wrong solution.

The competencies that are most needed to be effective in the role of enterprise architect are analytical change management, communication, interpersonal, leadership, management, modeling and problem solving skills as well as business acumen and technical acumen. Analytical and problem solving skills are needed to identify problems and break them down into manageable pieces that can be studied and assessed to work out strategies to overcome the barriers. Business acumen was referenced in two different ways. In some cases, it referred to managerial qualities such as experience with preparing business cases that show a clear return on investment. In other instances, it referred to having an acute understanding of what the enterprise was trying to accomplish within a particular context. Both are important to being able to perform the functional roles described previously. For example, managing the EA process and procuring resources requires business managerial skills and aligning the infrastructure with the operational mission needs, requires accurate and detailed knowledge of the business mission. Particularly in large organizations with multiple mission areas, the enterprise architect

must know the entire business mission or he will loose credibility with the business owners and operations staff.

Similarly, technical acumen is needed to enable the architect to consider different capabilities that might be the best alternatives to solving the challenges in moving the enterprise toward its target vision. This is acquired through a broad knowledge of technical disciplines such as telecommunications, security, database design, computers, management information systems, and IT program management.

Change management is needed to be able to facilitate the implementation of the target enterprise architecture. Once a detailed plan or blueprint of a targeted state is described, it may meet with resistance from those who are not convinced that there is need to change. The architect needs to be able to instill a level of confidence to begin making change while still working out some of the lower level details that will come from the design details. Coupled with change management are interpersonal skills. The architect needs to project an image of helping rather hindering.

Communication skills are a critical competence to be an effective enterprise architect who must communicate concepts to people who are generally pragmatic in their thinking and struggle with understanding and expressing concepts. The enterprise architect needs highly developed speaking skills to bridge the communications gap between various disciplines. He needs to be able to articulate the details of the strategic plan from various perspectives and different foci as described in the Zachman framework (Zachman, 1987). He serves as an advocate for the evolving discipline within non-architecture communities.

Leadership is needed to be able to help create a vision that everyone is motivated to achieve and provide the guidance needed to make the vision achievable. Management skills are needed to run the architecture program and manage the process. It entails acquiring the resources, setting schedules, establishing priorities, and scoping the effort so that the architecture can provide utility without becoming a burden.

 Lastly, modeling was identified as a competency needed by the enterprise architect. The enterprise architect needs to be able to model reality in a naturally graphic manner with detailed drawings illustrating complex relationships.

The broad categories of functional interfaces for the enterprise architect are business strategists, capital investment planners, external stakeholders, functional groups, other architects, oversight officials, program/project managers, and senior executives. Basically, the enterprise architect must interface with everyone in the enterprise who needs to have a clear understanding of strategic direction of the enterprise and the plan of execution to move the enterprise in that direction and anyone outside of the enterprise who has a stake in the enterprise's outcomes.

The enterprise architect interfaces with business strategists including strategic planners, business analysts, mission communities, and members of executive steering committees in order to help formulate and better understand the strategic vision. Table 1 indicates which functional roles predominant with each interface. For instance, he helps members of the capital investment review boards to establish priorities by gaining an understanding of the interdependencies of the infrastructure to the mission goals. Enterprise architects interface with external stakeholders including citizens, businesses, and other government organizations to ensure that their interests are adequately

represented in the enterprise architecture and to collaborate on optimizing the architecture to best serve their collective needs. Decisions are made through the governance structure.

Enterprise architects interface with functional groups such as engineers and human resource specialists to better understand constraints or requirements that must be factored into the EA, assist the functional groups in understanding the complexities of the architecture so that the architecture is properly implemented to achieve the desired performance outcomes and help ensure that each group is collaborating with the appropriate other groups. These interfaces are critical for ensuring that everyone understands and is aligned with the strategic goals that will result in realization of a shared vision.

Table 1

Roles with Interfaces

Roles/Interfaces	Change agent	Communicator	Leader	Manager	Modeler
Business strategist	X	X	X		
Capital investment planner	X	X	X		
External stakeholders			X		
Functional groups	X	X	X		X
Other architects					X
Oversight officials		X			
Program/project mangers				X	X
Senior executives	X	X	X		

The enterprise architect interfaces with other enterprise architects at different levels of the enterprise in order to ensure concordance of the architectures and oversees

the quality of the EA. Enterprise architects are accountable to several oversight groups such as the Unites States Congress, GAO, the agency Inspector General, and OMB, which requires continual coordination and collaboration with staff and members of these oversight groups and committees to ensure compliance with laws, policies and directives.

Enterprise architects interface with senior executives to seek and give advice. They interface with chief executive officers such as department/cabinet level secretaries to ensure that they fully understand the vision of the enterprise leaders. They also help to ensure that senior executives are cognizant of the level of commitment in terms of resources needed to execute the different architectural options so that practical choices are made that can be realized. This is perhaps one of the most critical interfaces with the enterprise architect because unless the senior leaders are fully committed to the enterprise-wide strategic plan, there is little possibility that it will succeed.

The categories of organizational positioning of the role of enterprise architect include administrative board of directors, financial management, information technology, operations management, and strategic planning offices. The data indicated some variation between where the architect is normally positioned currently and where it is believed the architect should be positioned. Generally, there was a feeling that architects should be positioned where they can impact the strategic planning of the business operations and not just IT strategic planning. However, it was believed that in many cases they are still considered to be IT rather than business strategists which may be a consequence of where they are currently positioned within the organizational structure. The data found that the majority of enterprise architects are currently located in the information technology office.

The collective analysis of these six factors has resulted in the formulation of a theory that defines the role of the enterprise architect in the U.S. federal government tempered by an additional set of factors that impact the role. These include the EA evolutionary stage, the level of EA capability maturity, the governance structure, the purpose or intended use of the EA, and the size and complexity of the enterprise. These factors are considered to have an impact on the degree to which each of the defined roles is effective within an enterprise; however, they do not change the definition of the role.

LIMITATIONS

One limitation of the study is that it addressed only the executive branch of the U.S. Federal Government. As such, it is impossible to ascertain how relevant the findings would be in a more global population. Additionally, the data that was analyzed was obtained from federal organizations that are the pioneers in the enterprise architecture discipline. Their collective views and perspectives may vary significantly from others who are not as familiar with the discipline.

Another limitation involves the criteria that were used for selecting the data. The data were selected only from organizations that had received recognition for achieving higher levels of performance than other federal government organizations. However, the rigor of the assessments that distinguished organizations is somewhat questionable because the methods used to obtain the data were not necessarily consistent or repeatable. It was based upon self reporting, which could potentially result in significant variation in the data which could potentially impact the results of the assessments. However, there was a requirement to provide supporting details which should mitigate such risk.

RECOMMENDATIONS FOR FUTURE RESEARCH

This study is only a beginning at defining the role of the enterprise architect. With enterprise architecture still at a very low level of capability and continuously evolving, there is continued interest in understanding the role of the enterprise architect. This provides many opportunities for further research. Following are a few such possibilities:

1. This study should be replicated and expanded using data from organizations at lower levels of EA capability maturity to gain additional insights into the consistency of the definition within the architecture community.

2. This study should be replicated and expanded using data from the functional interfaces with the enterprise architect functional role to gain additional insights into the consistency of the definition external to the architecture community.

3. The study should be replicated and expanded using data from non-federal organizations, such as other levels of the executive government and non-U.S. public organizations as well as private industry.

4. Quantitative analysis of the qualitative findings should be conducted to determine the degree of consistency of the findings in a more generalized population.

5. A follow-on study should be conducted to determine the degree of impact of the factors impacting the role that were identified from this study.

6. A follow-on study should be conducted to validate and further define the functional categories that were identified and to determine if the role of enterprise architect should be an autonomous profession or a specialty within another profession.

7. Research should be performed to determine what factors differentiate highly successful from less successful practicing enterprise architects.

8. A follow-on study should examine what percentage of time is spent in each of the functional roles identified from this study.

9. A follow-on study should be conducted to identify metrics for measuring the performance of the enterprise architect.

SIGNIFICANCE OF THE STUDY

The rigor of this study provided validity to some of the anecdotal data that existed in the literature, as well as provided new insights to the body of knowledge upon which to build a foundation for future research. By gaining a deeper level of understanding of this newly evolving role, there is a much greater potential for institutionalizing the role within the organizational structure in a productive manner. There is likely to be greater consistency among different organizations in defining the responsibilities associated with the role. Practicing enterprise architects will have a keener sense of identity and purpose. Expectations of those interacting with enterprise architects are more likely to be met because they should be more consistent.

With a more consistent definition of the role, human resource management personnel should be better prepared to map the role to position descriptions, which will result in better recruitment and retention of personnel to fill the role. Clarity of purpose will aid in ensuring that the right set of competencies are described to support the functional activities of the role. Understanding the competencies is the first step towards being able to determine a career path for those interested in pursuing a position that performs the role. Potential enterprise architects will be better able to develop a plan for

acquiring the experience and education to meet the competencies required of the position. Managers will be better able to plan for the necessary skill mix to meet the needs of the organization. Educators and trainers will be better able to develop programs to provide the aspiring enterprise architect with the necessary competencies to perform the role successfully. Certification requirements can be established to ensure that persons applying for positions to perform the role have met the minimum requirements necessary.

CONCLUSIONS

This study provides new knowledge about the enterprise architect role that was acquired through analysis of data collected from persons leading the effort to establish the role in the U.S. federal government. The theory was formulated using a rigorous methodology and resulted in a definition as a multi-dimensional set of functional roles for the federal government enterprise architect. This theory is intended to be the basis for further studies that will test the theory within different environments and expand on the knowledge presented in these findings.

The quantity of information continues to grow exponentially (How Much Information?, 2003) and yet our capacity to process information is limited by our span of absolute judgment and immediate memory (Miller, 1956). To benefit from the increase in information, there is a need to present the information in a meaningful manner for decision makers. The role of the enterprise architect is one of making order out of chaos by taking the overwhelming amount of information available and presenting it in a manner that enables effective decision-making. The enterprise architect must be able to clearly communicate the relationships among technology, people and processes to enable greater efficiency and effectiveness across the span of the enterprise.

The role of the enterprise architect is evolving. In the past, the focus of the enterprise architect was largely on technology and how it could be applied to improve the efficiency and effectiveness of existing processes. Today the role includes defining the processes while applying technical capabilities to increase operational effectiveness and efficiency. In the future, the enterprise architect is likely to have a stronger role in strategic planning and policy-making by explaining clearly the linkage of technology to applications and capabilities, to enhance the processes which provide opportunities for performance improvements to the enterprise. The enterprise architect can identify and leverage patterns in business processes, applications, data and technology as well as determine when uniqueness requires specification of the more global pattern.

For example at the federal level, there are basic services to the citizens that have been identified independent of the department that provides the service. This provides the opportunity to define an abstracted process that requires a set of capabilities that may be shared across the entire government. The enterprise architect for each department would then determine how to integrate the process within his unique domain, if the particular process were relevant within that domain. For instance each department has basic personnel and resource management processes that potentially could be improved by sharing patterns. The enterprise architect role would leverage such patterns while optimizing local departmental needs. They would also communicate the architecture to the subordinate organizations within the department and assist the architects within the bureaus and administrations as they develop their specific enterprise architectures. For example, the U.S. Environmental Protection Agency has a mission to protect the environment which requires determining standards for water and air quality. This requires

collecting and analyzing data from various sources and establishing and enforcing regulatory controls that enable meeting the quality standards. The enterprise architect for the department can help collaborate across the department to determine if there could be patterns of business processes and system capabilities and technologies that could be shared and thus enhance the performance of both while improving the efficiency at the same time. The enterprise architect can also determine if other departments may potentially have similar processes such as the Department of Agriculture which has responsibility for food quality. By clearly identifying what parts of these processes are similar enough to share a common architecture and which are specific enough to require a unique architecture, the enterprise architect establishes clear requirements for systems and technology architects to better enable design engineers to meet the needs of the enterprise. This requires understanding the mission of the department well enough to propose different approaches, working with the leaders to formulate and model the desired approach, and then guiding the functional managers in executing the chosen strategy.

The architect's role is one of arranging unstructured information in a useful manner that guides decision-makers in making choices that lead to performance improvements. A successful architect proposes business solutions that reflect the most natural and comfortable way of organizing the business of the enterprise. Without this vital role, enterprises will continue to evolve in a state of chaos.

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Appendix A

Qualitative Interview Questions

1. How do you view the role of an enterprise architect?

2. How would you describe the functions that you feel are best performed by an enterprise architect?

3. What is the unique value that you believe the enterprise architect provides to the enterprise that cannot be met by any other role?

4. What is the impact to the enterprise of not having an enterprise architect?

5. Where in the organizational structure do you feel the enterprise architect would be best positioned to add the most value to the enterprise?

6. With what positions or functional roles does the enterprise architect interface most frequently and for what purpose?

7. What do you think are the most important competencies or skills needed for an enterprise architect to be effective?

8. Do you have some closing thoughts that you'd like to share about the role of the enterprise architect in the U.S. federal government?

Note: All data derived from questions one and eight were incorporated into the appropriate categories. No additional categories were suggested.

Appendix B

Interview and Observation Listings

ID #	Interviewee	Interviewee Position	Date	Location
	Burk, Dick	Chief Federal Enterprise Architect	12/21/2005	OMB Office
*	Coggins, Colleen	DoI Chief Enterprise Architect	01/12/2006	DoI Office
	Gilligan, John	Former Co-Chair of the CIO Council Architecture and Interoperability Committee and CIO of the USAF – Currently V.P, SRA International	12/19/2005	SAE Office
	Grossman, Ira	Chief Enterprise Architect for NOAA and Chairman of the Chief Architects Forum	01/09/2006	NOAA Office
*	Hampton, Manuel	Chief Enterprise Architect for the U.S. Army Morale and Welfare Organization	01/10/2006	MWR Office
	Hite, Randolph	Director of the Information Technology Architecture and Systems Division	12/16/2005	GAO Office
*	Lucas, Tom	Chief Enterprise Architect for the IRS	12/19/2005	IRS Office
	Markovitz, Paul	Chief Enterprise Architect for the NSF	01/05/2006	NSF Office
	Nelson, Kim	Former Co-Chair of the CIO Council Architecture and Interoperability Committee and CIO of EPA – currently Executive Director of e-Government in Microsoft	01/06/2006	Microsoft Office
	Sullivan, John	Chief Enterprise Architect for EPA	01/25/2006	EPA Office
	Tieman, Mike	Former Chief Enterprise Architect for DoE and Former Chair of the Federal Architecture Working Group – currently senior consultant with Booze, Allen and Hamilton	12/20/2005	BAH Office

Note: The interview ID has been deleted to protect anonymity of those observed. The findings are reported only in the aggregate. However, the researcher retains confidential listings that include the identifiers that were used for analysis. Three of those interviewed were also observed as noted by the * in the ID column. Mr. Hampton was observed on two separate occasions under different circumstances.