Understanding of Enterprise Architecture
- Essences and Framework

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MBA 2007

April 28, 2007

BADM590: IT Governance, Information Trust, and Risk Management
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ABSTRACT

As the sizes and scopes of business entities are expanding, the IT governance becomes much more complicated and important than before. Because controlling IT governance became the most critical part of business activities especially for companies whose organizations are decentralized or have many sub-divisions, Enterprise Architecture is emerging in many business entities. The more business functions are, the more difficult the IT governance works. Because each business unit has its own agenda of the unit’s business goals with own IT infrastructure, each business unit might be out of line from the whole business strategy. Organizational sub-units’ efficiency might not result in the best efficiency of the aggregate whole business entity. It is necessary to higher the efficiency of each sub-unit and that of the whole business entity at the same time.

Enterprise Architecture is not a part of IT governance but it is a critical system to help IT governance work efficiently in terms of Effectiveness, Transparency and Accountability. I would like to define Enterprise Architecture as the structure of management and control for IT governance as a whole. To understand the concept of Enterprise Architecture through this paper, I am going to describe essential features of EA(Enterprise Architecture) and the framework of it in general.
1. Definition of Enterprise Architecture

**Enterprise Architecture (EA)** is the practice of applying a comprehensive and rigorous method for describing a current and/or future structure and behavior for an organization's processes, information systems, personnel and organizational sub-units, so that they align with the organization's core goals and strategic direction. Although often associated strictly with information technology, it relates more broadly to the practice of business optimization in that it addresses business architecture, performance management, organizational structure and process architecture as well.

Enterprise Architecture is becoming a common practice within the U.S. Federal Government to inform the Capital Planning and Investment Control (CPIC) process. The Federal Enterprise Architecture (FEA) reference models serve as a framework to guide Federal Agencies in the development of their architectures. The primary purpose of creating an Enterprise Architecture is to ensure that business strategy and IT investments are aligned. As such, enterprise architecture allows traceability from the business strategy down to the underlying technology.
Because Enterprise Architecture is closely related with IT Governance, I would like point out some basic things about IT governance first before we get into more about Enterprise Architecture. **Information Technology Governance**, IT Governance or ICT Governance, is a subset discipline of Corporate Governance focused on information technology systems and their performance and risk management. The rising interest in IT governance is partly due to compliance initiatives (e.g. Sarbanes-Oxley (USA) and Basel II (Europe)), as well as the acknowledgement that IT projects can easily get out of control and profoundly affect the performance of an organization.

A characteristic theme of IT governance discussions is that the IT capability can no longer be a black box. The traditional handling of IT management by board-level executives is that due to limited technical experience and IT complexity, key decisions are deferred to IT professionals. IT governance implies a system in which all stakeholders, including the board, internal customers and related areas such as finance, have the necessary input into the decision making process. This prevents a single stakeholder, typically IT, being blamed for poor decisions. It also prevents users from later complaining that the system does not behave or perform as expected:
2. **Essences of Enterprise Architecture**

Today’s corporate information system is being full of complexity. Even in a form of system, there are centralized systems and distributed system altogether. Building infrastructures and purchasing hardware and software are done by different subjects. Sometimes parties which lead building systems have initiatives while sometimes user parties take initiatives.

However, standards for using IT system are usually made in case by case in fact. As a result of this trend, there are in chaos of platforms, networks and data base in many companies. It has eventually made those companies inefficient in its system and even in business itself.

Percentage of IT investment in business entities has increased. Effective and efficient IT investments have been critical to management under this severely competitive business condition. On the other hand, technological innovation keep evolving, but it is not easy to catch up with the fast evolution of IT with existing information systems. If it fails to do so, there will be a lot of problems in IT management. To solve this kind of problems,
EA (Enterprise Architecture) has been emerging in business circumstances. From the end of 1990’s, the number of companies to introduce EA has been increasing. Although there are many ways to interpret EA, I am going to define the term of EA in terms of “the framework of supporting management decisions about IT investment and structure to meet the requirements to achieve business purpose”.

The term “Architecture” has been used in corporate information systems for a long time, but the application of the term was quite limited. However, EA is structured to cover the whole enterprise units. EA could describe architectures of all IT related resources and architecture of business itself. EA can be like a role of City Planning, which is the long-term plan to make a city to be healthy, full of culture and well-functioning. City planning covers setting up vision, zoning and infrastructure of the city. EA clarifies the direction of management for the success of the business entity. Also, EA makes guideline to use IT for the success. We have to make sure that the vision should not be off the track of guidelines. Eventually, it can be expected for EA to lead the best optimal point of IT investment.

Optimization of IT investment and expenditure is not the only merit of introducing EA. Promotion of combining management and IT is additional and ultimate goal of EA. EA
considers “Architecture Governance” very important. Architecture Governance is a management structure to manage IT architecture to meet the business goal.

3. The framework of EA

EA is a structure to manage and control IT in enterprises. The Standard, norms and systems of managing IT is called “Framework”.

[1. EA Framework]

Architecture Model is the core outcome of EA. It is described with Business Architecture and IT Architecture. There are two main points in Architecture model. One is for stakeholders including management, users and IT parts to understand the concept of EA. The other is to describe the present situation and expected situation. By taking these two main points, we can figure out the gap between the present and the future for all stakeholders. If we define the gap, it becomes easy to draw ways of improvement.
3.1. Business Architecture

IT is the basic and the most important tool to support business activities. To run this function well, we need the standard to check the level of combination of the business and the supporting IT. This standard must be EA which shows business strategies and business operation directly and indirectly with the IT strategy. Business Architecture is the model of business structure to achieve business strategy effectively.

Companies that introduce EA clarify the target level of business architecture first. Then, they facilitate systems and make investments of IT. In doing modeling EA, it is better to use general business terms rather than use some specific terms which only some IT people can understand.

Business architecture consists of four sub-models, which are (1) business model, (2) enterprise information model, (3) role and location model, and (4) business event list. First, what is business model? It describes business activities of the business entity. For instance, sales activity is a business activity of banking industry. The sales activity of banks can be broken down as following sub-activities.
A. Sales activity

A.1. Preparation of Sales activity

A.2. Choice of Product to sell

A.3. Figuring out the risk level of potential customers.

A.4. Getting orders from customers.

A.5. Offering the service to customers.

As shown above, we have to specify the model as the company level. More examples are shown in the Appendix.

What (2) Enterprise information model is the classifying of information for business activity of the entity as a whole. It is usually described in E-R chart (Entity-Relationship Diagram). It also analyzes the relationship between business activities and information systems. (3) Role and location model shows where each business activity is held. Usually, it is a tool to analyze an organization structure. (4) Business event list shows events that trigger business activities such as customer orders, excessive inventory levels, customer complaints, periodic change in sales volume and so on. It is classified into three levels which are events from inside of the entity, events from outside of the entity and periodic events.
Business Architecture of EA is a literature to describe business activities using these sub-models. Once making Business Architecture is completed, all stakeholders will be able to understand problems of the business at present. Also, it leads implementing the action plans for business strategy including IT’s action plans.

**3.2. IT architecture**

IT Architecture is the description of components of IT systems. Examples of those components are application functions, data, technology, infrastructures and so on. To achieve targeted business architecture, ideal level of IT architecture and present level of IT architecture should be prepared. This preparation is for all stakeholders to understand the functions of systems to analyze problems. It is very critical for all stakeholders to understand them. It is usually described in E-R chart and Data flow diagram. The explanation of IT architecture should be done in concretely rather than abstractly. Easy understanding is the key factor for all stakeholders including IT people and none IT people to communicate with each other efficiently.
3.3. Architecture Governance

To match corporate information systems with the business strategy and to maximize the efficiency of IT investment, there must be a certain level of management and control mechanism. This mechanism is the Architecture Governance. It is critically necessary to optimize IT function of the entity. In Enterprise Architecture, there are four types of standards, which are Principle, Standard, Evaluation criteria and Architecture management process. The relationships among these four standards are shown in the following diagram.

[2. Components of Architecture Governance]
1) Principle is the basic rule of structuring IT investment and system. We can say that Principle is the logic behind the Architecture. Principle is composed of several items according to the types of business. The following diagram shows an example of Structured Principle for your understanding.

[3.Example of a Structure of Principle]

Guiding principle is the highest level of rule of whole IT management system. While the guiding principle is relatively general, sub-principle are more concrete. Therefore, sub-principles cover pretty specific ways of business in detail.

2) Standard is a technological guideline to follow. In specific, there are products to choose, vendors, technology, protocol, data models in this category. If each system
chooses each department’s product, vendor, technology, protocol and so on, there must be a lot of overlapping in those choices and eventually will be like a chaos. If we introduce Standard, we can avoid this kind of chaos and can save time and money. Defining Standard should also be specific. Therefore, it should be made by someone who has in-depth knowledge and experience about the business.

3) Evaluation criteria is also important in EA. If an individual efficiency hurt the aggregate efficiency of the entity, the specific way of improving the individual efficiency should be removed or changed, because the aggregate efficiency is much more important than the individual efficiency. It means that we have to focus more on optimization of the total business than the optimization of some individual units of business. This kind of trap can be come from the obscure criteria of evaluation. To avoid this kind of trap, there must be specific and undeniable criteria of evaluation.

4) The key role of the Architecture management process is done by Architecture Review Board. The following description shows more about it.

Architecture Review Board is the highest and the most powerful decision making unit in a business entity. Members of the board are management, users, developers and IT partners. Sometimes partners from strategic alliances join the board, too. They are reviewing new projects, specifying action plans based on EA criteria using the architecture model, Principle, Standard, Evaluation criteria and so on. Also, the board checks the business circumstance and technological changes in annual base. In addition, the board has a duty to make the whole organization to support its EA by explaining the performance of EA and the merits of EA. Therefore, the board is the very team to manage EA of a business entity and makes direct report to CIO in most of business entities in U.S.
3.4. Implementation of Architecture

Objectives of corporate information systems are always evolving. All best architecture must be obsolescent as time goes by. In other words, a business entity should focus on developing its system with its own information system if possible. Once the business entity figures out its business needs for its strategy, they will be able to know what kind of EA is necessary for itself. Business entities which can anticipate and catch up with those needs in proper manner and time will be successful.

4. Critical Success Factors

To make EA to be successful, following factors are very critical.

(1) Management level should have positive view and show support for EA.

(2) Observance of standards of Architecture

(3) Continuance and maintenance of Architecture by strengthening the authority of EA management team

(4) Structuring of feasible EA

(5) All stakeholders should have comprehensive understandings about the objective, the role and function, responsibility and the structure of EA.
(6) Active communication among stakeholders about EA.

(7) Fair and reasonable distribution of resources according to the implementation of EA.

CONCLUSION & FINDINGS

Because the concept and application of Enterprise Architecture is too broad to cover in such a short paper like this, I mentioned essences and simple framework of Enterprise Architecture. Main components of the framework are business architecture, IT architecture, architecture governance and implementation of the architecture. In addition, there are several key factors for the success of Enterprise Architecture.

As a conclusion, I would like to mention final tips for better understanding of Enterprise Architecture. (1) It is not a technology project. (2) It is a consideration of planning strategies. (3) It helps the change of organization. (4) It is a tool to build consents among stakeholders. (5) Not all stakeholders fully understand EA until it is actively used in the business entity.
[APPENDIX 1] Example of EA Planning

Enterprise Architecture Planning

Technology + Technology Market Trends

Business Context

Enterprise Business Strategies

Business Architecture

Business Model

Business Processes & Information Value Chain

Corporate Organization

Technical Architecture

Domain

Domain

Domain

Domain

Data Architecture

Application Portfolio

Governance

IT Resources

IT Steering Committee

Program Management Office

Staff & Organization

Governance Process
### [APPENDIX 2] Planning Business Architecture

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REFERENCE

1. National Computerization Agency, Korea, “EA for IT Governance”, May 2005


