

A Study on EA based IT Governance

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Abstract - In this paper, we propose the Enterprise Architecture (EA) based IT governance. Because of huge size of government organizations, and complexity and many various kinds of tasks, services, and businesses, the architectural design work method for their information systems is too complicated to understand. Thus, so many misunderstandings and problems occur naturally like interoperability problem, duplicate development, waste time and budget, security, etc. To solve this problem, we raise up the EA based IT governance, and probe it systematically. we show down the clear concept definition of EA perspectives of all stakeholders involving digital Government, and EA views of performance architecture, business architecture, application architecture, data architecture, technology infrastructure, and security architecture together with analysing EA Functionality, EA framework, reference models of leading countries EA deployment strategy, EA development work method, artifacts of EA development, and IT governance.

Keywords - EA, JEA, FEAF, IT Governance

I. INTRODUCTION

The definition of EA is slightly different from country to country, and organization to organization, but the main content is to prevent duplicate development of information systems. Thoroughly design and manage systems to ensure interoperability, and the goal is to continuously improve the overall performance. Specifically, structuring relationships between architectures such as business architecture, application architecture, data architecture, technology architecture, and security architecture. This is the core content of EA.

USA OMB M97-16: Obtain the requirements of the information system to support the objectives of the organization. Ensure the security, redundancy and interoperability of information systems. To maintain standards for acquiring and evaluating new systems and to support applications, information technology, management processes, business processes.[5][6]

USA Federal CIO council: Information and skills required to achieve mission or mission of an enterprise or organization. Strategic information assets that define change processes, including the application of new technologies to respond to institutional mission changes.[3]

Korea MOIS: EA explicitly describes current architecture and future architecture defined by documents of the current and future goals of the relationship between the organization's work, management processes, and information technology for enhancing the e-Government.[14]

Korea NIA: EA as an Information Technology Architecture (ITA) is a system that organizes the relationship between the information components of the whole organization such as business architecture, application architecture, data architecture, technology architecture, and security architecture according to certain standards and procedures. Based on this, it describes a method for efficiently constructing information systems.[15]

In next chapter we will analyse EA functional capabilities, important concepts of EA, architectural modelling the EA, EA frame work, EA reference models. In chapter III surveying the experimental of EA efficiency in advancing countries and EA deployment strategy. In the chapter IV describing the EA development methodology with important artifacts for all the stakeholders. In the last chapter, we propose the EA based IT governance to achieve the sustainable development Government as our study purpose.

II. ANALYSING EA FUNCTIONALITY

EA stands for Enterprise Architecture, as you can see, architecture is a term derived from building construction design field. If we compare EA to the building architecture, it is similar to urban planning. In other words, it is to achieve by individual intuition when building a very simple African aboriginal house, but in order to build a large building, many people need to collaborate and design and drawings needed to achieve it

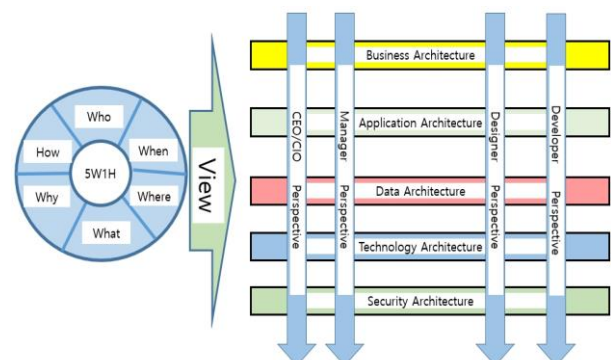


Figure 1. EA Architecture Conceptual Model

In terms of IT systems, it is like doing modelling work using the unified modelling language (UML), entity relationship diagram (ERD), business process management (BPM), workflow, etc. Designing the EA is like a city plan to optimize individually optimized systems in the perspective of all, including these IT modelling works.

The architecture from an EA perspective is divided into business, applications, data, technology, security, and so on, depending on the perspective of the enterprise IT systems and works. It structured by the perspective that the CEO looks at broadly, and the level of perspective managers and developers view.[1][2]

The point of seeing IT architecture called View. This categorized in several ways. In the early days, Jackman classified viewpoints according to Who-When-Where-What-Why-How (5W1H). However, recent trends largely classified into Business, Application, Data, and Technology view & perspective architectures, similar to the architecture of the US Department of the Treasury. In Korea, the Security architecture has added on the Government Meta-Architecture.[14]

Moreover, the point of seeing all the views called perspective. It divided into CEO / CIO level, manager, designer, developer level, and whole picture divided into detailed contents in terms of the conceptual, logical, physical, etc

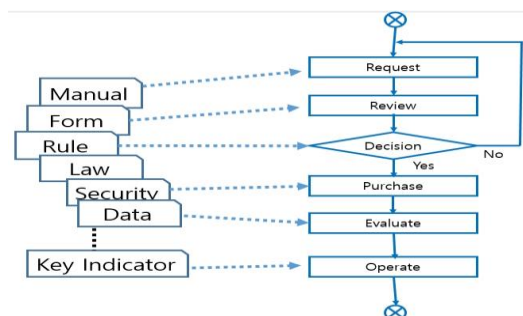


Figure 2. Architectural modeling

The models that make up the architecture actually consist of graphical flow diagram and each activity's attribute information, and association information between each models. Architectural modelling information is that abstracts and expresses IT resources. It is usually easier to understand if you imagine about designing the ERD or UML models that we usually know. The model using diagrams is easy to understand, even those who are not familiar with IT or individual tasks. The reason for relational information is that the architecture implemented in terms of overall optimization, not optimization of individual systems.

It also referred to as a model in which the IT resources expressed in a graphical flow diagram form for easy understanding. Each small box in the diagram referred to as a 'symbol'. Each 'symbol' has attribute information, which is a 'document'. According to the architectural perspective, it divided into 'definition / description / design' document, list,

manual, etc. Each 'document' created to look at the detailed specification of the artifacts defined in 'drawing'.

The EA framework defines two types of architectural information in the conceptual and matrix. At the conceptual level, it defines the current and target architecture, its implementation plan, and management system. At the matrix level, the contents of the detailed deliverable by each perspectives and viewpoints defined.

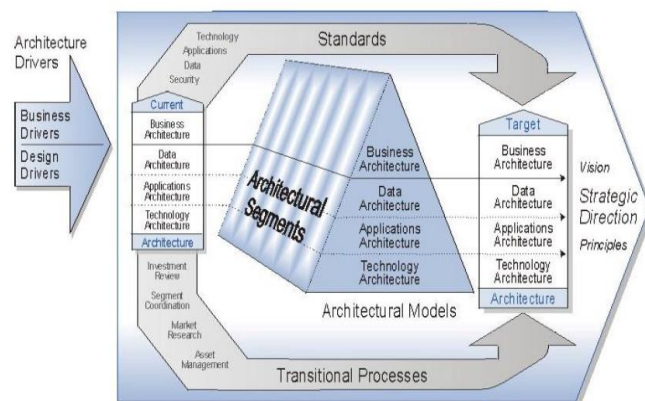


Figure 3. Federal Enterprise Architecture Framework[4]

When thinking of the EA framework, it usually reminds us the Zachman Framework (ZEF), who is the founder of EA. The Jachman framework is a matrix type framework. Another framework called the conceptual level framework that expresses information such as current and target architecture, implementation plan, and management system. Recent trend is to define both of these frameworks. The Zachman framework in the form of a matrix often simply called an architecture matrix.[9][10]

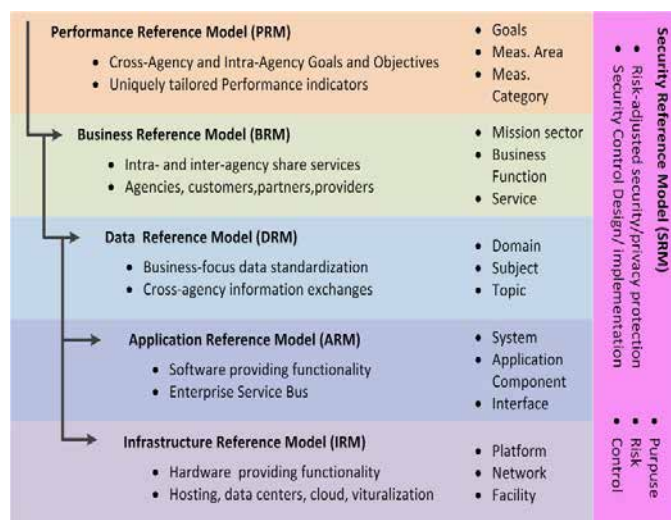


Figure 4. Federal Reference Model[4]

The federal reference model defines common criteria for EA configuration for each architecture in individual and central government, and is a tool to ensure consistency, uniformity, and interoperability of EA.

In the United States, the federal government has established performance reference model (PRM), business reference model (BRM), data reference model (DRM), application reference model (ARM), infrastructure reference model (IRM), and security reference model (SRM) to refer to when establishing the architecture of individual organizations. In Korea, also they have defined a common Government EA reference models like as USA.[7][8]

Performance Reference Model (PRM) is a systematic summary of performance indicators for each business area, and it is a very important trend in recent years to achieve the sustainable development goals (SDGs) defined by UN and the key performance indicators (KPIs) of the sustainable smart city (SSC) defined by ITU.[16][17]

In the case of the United States, the Gulf War, although it won, but to resolve the fact that the electronic weapons systems between the land and sea forces did not work together. Thus, the US department of defence is the first trying to begin an effort similar to EA. It has been working on EA since 1992; it means it has been already pursuing EA for 20 years.

In particular, in the case of the US government, the federal office of management and budget (OMB) actively led EA initiatives to play a major role in the introduction of EA to all public institutions, and by introducing capital planning and investment control processes called CPIC. It has contributed greatly to budget saving through this EA initiatives.

III. Experimental of EA Efficiencies

In the case of the US government, it has reported that it has already achieved cost savings of over US \$ 5 billion because of steadily promoting EA for nearly 20 years. In particular, since 2005, through constant efforts to evolve into performance-oriented EA.[7] It is striving to maximize the effectiveness of EA utilization in throughout the government. Through the acquisition of IT mappings of ministries, various ministries provide the basis for cooperating with common terms in information-oriented business for creating services.

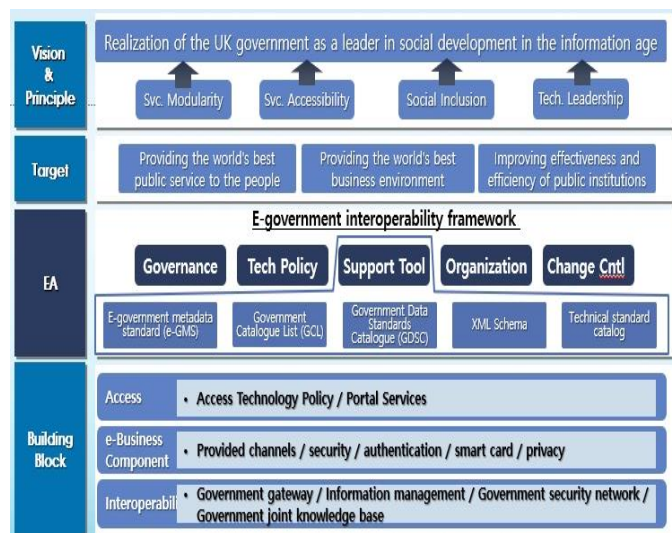


Figure 5. UK eGovernment EA

In the UK government too, it is starting with the concept of the IT infrastructure library (ITIL) and using it as a tool to enhance interoperability through EA. It describes the framework for establishing and operating IT service management. Represents best practices and conforms to the IT Process Framework (ITPF). In long term, the United Kingdom is promoting informatization in order to achieve public service linkage between central government, local government, UK federal government, and other European governments through comprehensive government innovation, and EA utilized as a tool for enhancing interoperability of government services to achieve this goals.[11]

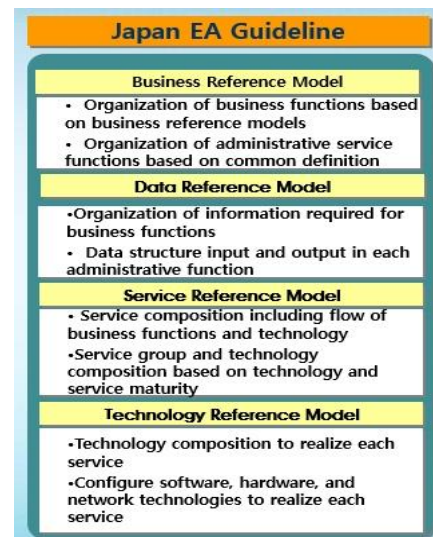


Figure 6. Japan EA Guideline

The Japanese government in the e-government building plan has set "Work System Optimization" as one of the important promotion measures, and the EA used as the unification work of the system management technique over the whole government. Especially, unlike the US, which has a goal of performance-oriented EA, the goal of "full optimization" is the most important. Benchmarking the 2002 US ITA, the Japanese government officially launched ITA. Pilot project centred on Ministry of Economy, Trade and Industry. Establishment of "Guidelines for listing business systems" as a technique and activity standard for status analysis. Systematically organize government-wide business systems. Establishment of 'ITA Guide Manual' as a standard method for business system optimization. Optimization planning of each department's common business system is in progress.[12][13]

The EA promotion of Korea Government is the ITA legislation of the public sector. In December 2005, the "Act on the Effective Implementation and Operation of Information Systems", i.e. the EA/ITA Act, was enacted on June 30, 2006, requiring government agencies and public organizations to introduce EA/ITA mandatory. Many projects have implemented since 2006, including the opening of next-generation EA services by Telcos and financial companies,

and efforts to comply with global standards. Public institutions that use more than 2 million USD IT budget per year are obliged to adopt EA.

In particular, the content of the EA/ITA legislation of public institutions includes not only the introduction of EA/ITA to public institutions, but also the recommendation of EA/ITA to private sector related to public institutions.[14][15]

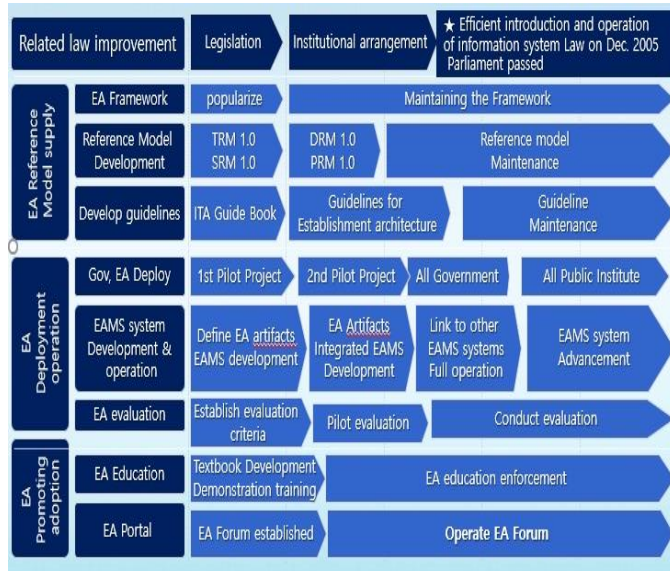


Figure 7. Korea EA/ITA deployment strategy

IV. Methodology: EA Development

EA usually promoted as a stage of establishing the infrastructure, building the current architecture, and establishing the implementation plan of the target architecture. At the same time, EA Management System (EAMS) is under construction referring the EA development work method.

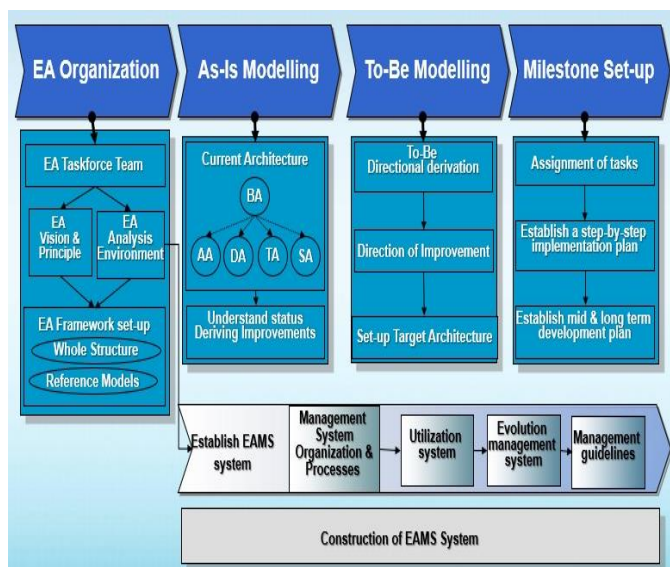


Figure 8. EA development work method

The EA framework defines EA vision, principles, reference models, management schemes, a list of each artifact through the architecture matrix, and a configuration for an EA artifact management system as shown in details of artifacts.

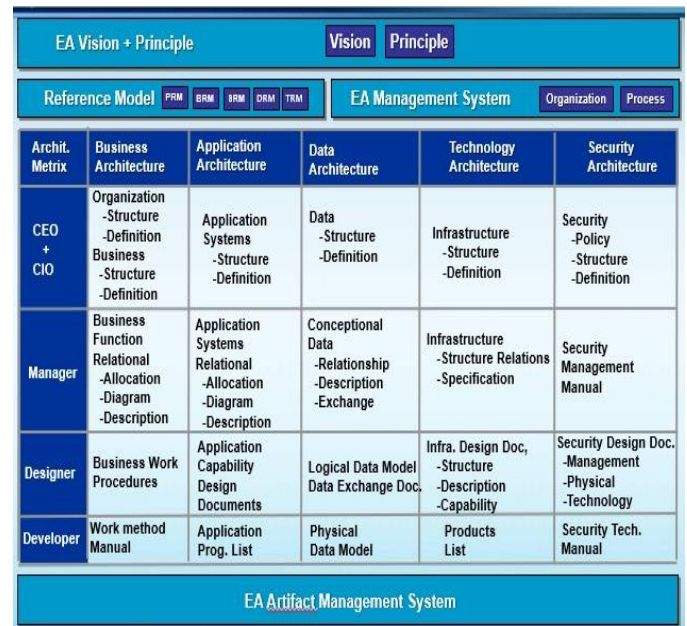


Figure 9. EA Framework & Artifacts

We defined all the artifacts along the architecture matrix of the current and target architectures in terms of business architecture, application architecture, data architecture, technology architecture, and security architecture respectively based on the Korea pan-Government reference model.

Mainly performance reference model (PRM), in conjunction with the evaluation indicators established by the Balanced Score Card (BSC), establishes evaluation indicators for evaluating business and information performance.

For the TRM, a standard profile established with reference models. The TRM standard profile is a collection of information about the various standards in the technical field including, for example, standard information from standards bodies for example HTTP protocol, HTML 4.0, etc., and specific applications of global IT industries as de-facto standards.

So far, we have been looking at the concept of EA and the actual implementation, and now we are going to talk about that the EA based IT governance will take

V. EVALUATION: EA BASED IT GOVERNANCE

Define the improvement tasks derived from the current and target architectures, formulate detailed implementation tasks, establish a systematic implementation plan, and calculate the respective resources required.

In deriving improvement tasks, we analyze the gaps between the current and target architectures and pull out a list

of required tasks. This is in fact similar to a typical ISP project, but it is a bit longer project in EA, and presents an empirical performance challenge through architectural analysis.

The EA management system (EAMS) is an IT system for continuously managing information technology processes in accordance with the standardized structure of the established architecture. It designed systematically to utilize the architecture, and to respond to continuous change control and management.

Specifically, the EAMS system consists of an EA management organization, EA management guidelines, EA management personnel, and EA management processes. In addition to the change control system for change management, and defines a system for continuous use of EA.

The EAMS system usually introduces a system architect as a EA modeling tool, to easily model the architecture, and consists of a web application server (WAS) system for all stakeholders to access via the web and to provide various strong functional capabilities.

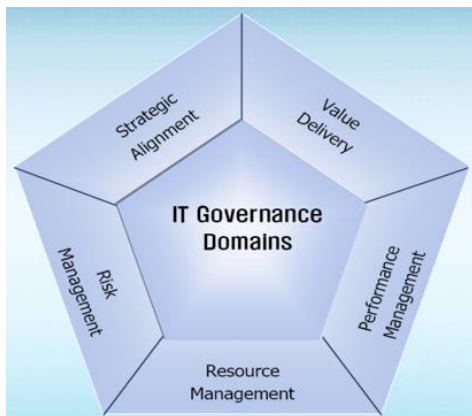


Figure10. IT Governance

IT governance is largely determined from the perspective of enterprise governance, whether it contributes to the achievement of organizational and enterprise goals, whether IT activities are carried out in accordance with principles and standards, norms, organization, and procedures.

In particular, the transparency of IT is still very limited. This is because IT itself is technological, and most managing executives or business executives are ignorant of IT trying to identify it. Vice versa, most of the people in the IT field are often ignorant about business or management.

According to data published by IT Governance Institute (ITGI), IT governance activities consist of domains such as strategic alignment, value delivery, performance measurement, risk management, and resource management.[18]

EA's architectural information directly related to strategic alignment and can use as an indicator of value delivery and performance measurement by managing information gathered for risk management and resource management on EA's framework. In this way, EA's architectural information can play the pivot role of integrated repository and integrated view at the center of each governance activity.

IT operations carried out through very complicated and technical procedures, but they can be viewed as a life cycle of planning, development and introduction, operation and maintenance, and evaluation.

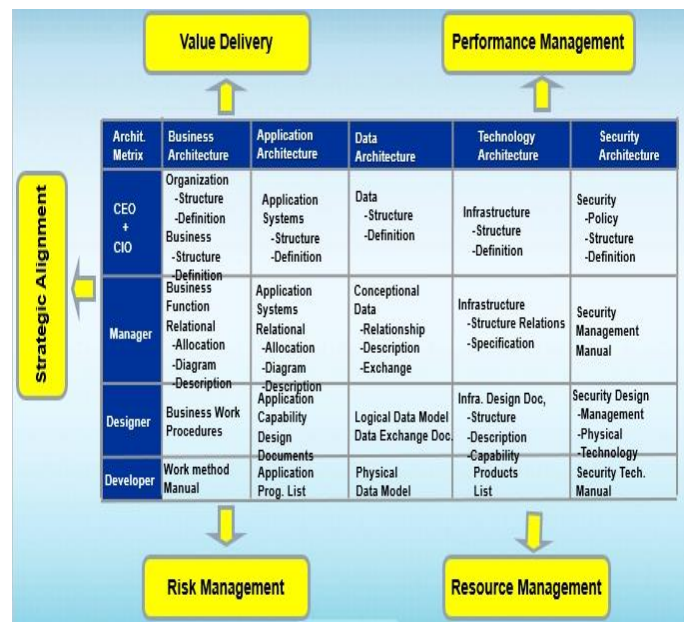


Figure11. EA based IT Governance

Planning and evaluation through EA throughout the entire IT management. Prioritization of each project through project investment management and project management. Through information resource management, it can manage the life cycle of the resources that introduced and discarded during development and operation. Finally, it supports performance evaluation. All these functions should be integrated management based on EA, which called EA based IT governance.

VI. CONCLUSIONS

To fulfill this EA-based IT governance properly, an enterprise-wide IT integration management framework based on EA is required. Looking at the issues from UN-SDGs for Government and ITU-SSC KPIs for smart city that are emerging in recent years, the implementation of IT integration management system through EAMS, Project Portfolio Management, IT service management, IT resource management, and IT performance management seems to be the future of EA.

ACKNOWLEDGMENT

All authors give many thanks to WFK NIPA (World Friend Korea, National IT Promotion Agency), Republic of Korea.

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