Electronic Architecture Planning in Indonesian Trade (Inatrade) Portal

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Abstract. This research is to analyze the overall business needs and harmonize with the strategies found in the Ministry of Commerce to improve the quality of services to the community. Develop an information system architecture concept that is able to meet the needs of all parties who have an interest in the Ministry of Commerce and Analyzed the success rate of the old application system migration with new ones. The method used is based on the Togaf ADM Framework by preparing data and analyzing from the flow of business processes with information systems that will be stored in the application database. The results obtained are in the form of electronic system architecture design in the Directorate of Export and Import Facilitation, the Directorate General of Foreign Trade, the Ministry of Trade can be used as a guide in its development. The results of this design obtained an integrated system that produces integrated business processes in all organizational units that require data flow to Indonesia National Single Window (INSW) through the Inatrade portal. In the transition from the old system to the new system can take the old application resources, it combined functions with the new system.

1. Introduction

The Directorate of Export and Import Facilitation, the Directorate General of Trade and Foreign Affairs (Director General of Foreign Trade), the Ministry of Trade provides services to the community to submit applications for permits in the export and import trade. This service activity is centered on the One Stop Integrated Service in the Directorate of Export and Import Facilitation. This service activity requires the Directorate of Export and Import Facilitation to develop an information system for optimal service. To develop this information system, enterprise architecture is needed as a guideline in developing an integrated information system. The development of this information system must be in harmony with the organizational strategy (enterprise). In this thesis, the Enterprise Architecture Planning (EAP) approach is used to develop enterprise architecture. EAP is an architectural planning method oriented to business needs that consists of data architecture, application architecture and technology architecture and implementation plans of architecture that have been created to support business activities for the achievement of the organization's mission. This research is limited to the problem of Enterprise Architecture Planning (EAP) based on the Togaf ADM Framework in the One-Stop Integrated Service at the Directorate of Export and Import Facilitation, Director General of Foreign Affairs, Ministry of Trade. The enterprise architecture model that will be developed based on the EAP methodology includes defining data architecture, defining the application architecture and defining technology architecture.

Previous research there are several things that are used as a case for implementing the concept of strategic IS / IT plan. This is used in the development of IS / IT and in designing information technology-based infrastructure The Open Group Architecture Framework (TOGAF) and Architecture Development Method (ADM). The case is in the form of information technology infrastructure (IT)
which is managed independently including from various parts including the main server, Storage Area Network (SAN), switching distribution, access points, and other supporting devices that are spread throughout the work unit. Every year often brings physical and non-physical damage to various devices. The various types / brands used make it difficult for managers because they have to learn the characteristics of each device [1]. This is only the part of the physical device that is managed, it also applies to applications, if not managed in the form of security or coding it will affect the hardware. Old applications are analyzed and can produce new applications with improvements in both the application code and database. the user will be helped by the new application as well as the hardware will be seen whether it has to be replaced or can still be used for a certain period of time.

Not only the concept in infrastructure, but also in the business process. In other studies, attended proposed process model is given EA reengineering starts with determining the current state of the architecture and specifying new structural, behavioral, and quality requirements which reflect the views of all stakeholders. Actually, the requirements management is a continuous process that ensures any changes to the requirements are handled and reflected in other phases. One important point here is scoping the architectural activities according to the re-engineering objectives, take holder concerns, availability of people and resources. Moreover, these dimensions should be considered as well: (a) breadth (the part that re-engineering efforts will deal with); (b) depth (the level of detail that the re-engineering efforts will go); (c) time period; and (d) any or all of the architecture domains (business, data, application, technology). One issue is to know how an organization is capable of conducting the EA design and development processes, as well as the re-engineering. Capability Maturity Models (CMMs) can address this problem by providing effective and proven methods and practices. It has already been indicated that a successful EA practice needs to establish its capabilities in the management areas, such as financial, performance, service, resource, risk, stakeholder, and configuration. Another issue during the re-engineering of an EA is to specify the requirements for the quality of both current and target EAs. Several works propose different types of quality criteria for EAs; however, the literature review cannot provide a comprehensive framework or complete solution [2].

The current concept of Enterprise Architecture (EA) implies a form of view the organization in an integrated and relational way, considering each and every one of the elements that compose it. This leads to establish a business vision for business transformation that helps to align technology with the needs of the organization from a strategic perspective and customer oriented.

The organization’s ability to manage business transformation is highly necessary to stay competitive, this involves fundamental and complex organizational changes, not only within companies, but also through their value chain. This can also change the relationship between a company and its broader economic and social environment. The transformation process is complex, time consuming and always occurs within an ecosystem that is organization’s core disciplines and its environment (i.e. customers, competitors, government regulators and investors). This process only can be done handling an EA framework [3].

In this research, in addition to rebuilding the architecture of the old application using the method, it will have an impact on the infrastructure in the form of hardware. In the transition from the old system to the new system can take the old application resources, with the combined functions with the new system.

2. Method
Based on observations made in the Ministry of Trade, especially in the Directorate of Export and Import Facilitation, the Directorate General of Foreign Trade as for methods that can be used to improve system capabilities in this licensing system is the TOGAF ADM.

TOGAF is a framework to develop an enterprise architecture. TOGAF has a method that details at the same time supporting tool for implementing it. This framework was issued by The Open Group's Architecture Framework in 1995. The design of this infrastructure will use the approach of Enterprise Architecture Model derived from the framework of The Open Group Architecture Framework (TOGAF) version 9.1 as a framework for drafting [4].
TOGAF as a framework architectural design has several characteristics, which are: (1) Included in the third framework architectural design which is most often used. (2) A framework which is an open-standard. (3) Focusing on implementation cycle (ADM) and processes. (4) Neutral. (5) Accepted by the international community at large. (6) The approach is comprehensive (holistic). (7) Having the tools to complete the planning and processes [1].

Framework which includes 6 stages:

1. Architecture Vision
   It is a stage in determining the data architecture (data architecture) and application architecture (architecture application). Data architecture functions to utilize data as a function of business functions, processes and services. Whereas for application architecture it is more used as a design to use applications that will be needed.

2. Business Architecture
   Stages that aim to conduct an analysis of business processes that are running, and determine the business model or activity desired from a business scenario.

3. Information System Architecture
   It is a stage in determining the data architecture (data architecture) and application architecture (architecture application). Data architecture functions to utilize data as a function of business functions, processes and services. Whereas for application architecture it is more used as a design to use applications that will be needed.

4. Technology Architecture
   Technology architecture is one of the steps taken to design a technology architecture that will support an information system architecture that can define the main technology needed to provide environmental support for the application. The stages needed in compiling a technology architecture include identifying the principles of technology and platforms, in addition to defining technology platforms.

5. Opportunities and Solution
   Stages of opportunity and solutions emphasize the benefits obtained from the design of enterprise architecture.

6. Migration Planning
   In this stage an assessment is carried out in determining the information system migration plan from the old to the new system. Enterprise is carried out based on the main and supporting needs in the organization of the information system implementation plan. This stage functions so that the information system that is built becomes directed and runs well.

In determining these 6 stages, confirmation has been made to the person in charge of the system in this case the Director of Export and Import Facilitation who gives responsibility to the Section Head.

The most-known part of TOGAF is the architecture development method (ADM), which describes an iterative process consisting of eight phases, which are complemented by a preliminary preparation phase and the central activity of requirements management. The frame work defines an explicit stakeholder management and the enterprise content meta-model provides a terminological basis [5].

The concept of strategy management starts with adjusting the company to the environment to the strengths (Strengths), weaknesses (Weakness), opportunities (Opportunities), and threats (Threats) of that company, or what is known as SWOT analysis. SWOT analysis identifies factors company internal as strengths and weakness, while company external factor as opportunity and threats [6]. SWOT Analysis is (one of many possible strategic planning tools) used to evaluate the Strengths, Weakness, Opportunities and Threats involved in a project, or any other situation requiring a decision. Consequently, our objective is to apply this method of planning early in the life cycle of OBIA with the intent that concepts described here can be used to strengthen and guide this emerging discipline [7].

Understanding the critical success factors of the EA projects would increase the rate of success for such projects. Moreover, it would allow enterprises to prioritize their tasks and efficiently allocate the resources in an appropriate manner, which ensures the success and avoids the failure [8].
3. Results and Discussion

In this stage, the success in migrating the old system to the new system should be achieved, by selecting features in old applications that are still needed in the new system, and more efficient feature updates in the new system. In addition, there is a definition of scope, identification of stakeholders, preparation of architectural vision, and submission of approval to begin architectural development.

One of the definitions is the scope of network infrastructure and systems. Network infrastructure by adding new servers and access points from the Intrade network with the Indonesian National Single Window (INSW) network. INSW is a nationally integrated electronic system that can be accessed through an Internet network, which will integrate information related to the process of handling customs documents and other documents related to export-import, which ensures the security of data and information and integrating the flow and process of information between internal systems automatically, which includes customs, licensing, port / airport systems, and other systems related to the process of service and supervision of export-import activities. In the case of a system there is a security update from each module in it.

Identification of relevant stakeholders includes exporters / importers who will submit and obtain permits, processing technicians and authorized officials, parties involved in data integration. The vision in making this architecture is to create a system that is efficiently effective and in accordance with user needs.

The strategy used to find out the influential factors to determine planning in order to increase the efficiency and effectiveness of the system in accordance with user needs, it is necessary to analyze internal and external factors, namely by using a SWOT analysis. So that these factors can be taken into consideration in determining the strategy [6].

The results from the analysis of factors that influence the planning of efficiency and effectiveness and are identified internally and externally. In conducting a SWOT analysis the variables determined are the results of identification in the field and are based on input from various parties. Weight values and ratings are determined based on estimates and refer to previous studies. From the observations it can be identified internal and external factors, in the Table 1 and 2.

| Strategic Factors | Weight | Rating | Weight x Rating |
|-------------------|--------|--------|-----------------|
| 1. There is internal support from the Ministry of Trade to be able to develop a system to make it easier for users to access the system. | 0.15 | 4.0 | 0.6 |
| 2. The system has been integrated with the system found in other Ministries / Institutions. | 0.1 | 2.5 | 0.25 |
| 3. The system can be easily accessed by users. | 0.07 | 2.0 | 0.14 |
| 4. All units within the Ministry of Trade, especially at the Directorate General of Foreign Trade, are connected to internal networks. | 0.15 | 2.5 | 0.38 |
| 5. There are modules that can help in the process of improving the system. | 0.1 | 3.0 | 0.3 |
Weakness

1. The available system is not supported by the power of the server. 0.15 4.0 0.6
2. The system does not fully accommodate user requests. 0.1 2.5 0.25
3. Access to the internet network within the Ministry of Trade, especially at the Directorate General of Foreign Trade, is still limited and relatively slow. 0.08 3.0 0.24
4. Limited authority in managing data sources. 0.1 3.0 0.3
Total 1.0 30.6

Table 2. External Factor Evaluation Matrix.

| Strategic Factors | Weight | Rating | Weight x Rating |
|-------------------|--------|--------|-----------------|
| Opportunity       |        |        |                 |
| 1. There are regulations for conducting a system-based licensing process. | 0.2    | 4.0    | 0.8             |
| 2. The existence of increasingly sophisticated technology support makes it possible to develop the system. | 0.15   | 2.5    | 0.38            |
| 3. Community demands for system-based licensing services. | 0.15   | 2.5    | 0.38            |
| Threat            |        |        |                 |
| 1. Data that is threatened because it is hacked by irresponsible parties. | 0.2    | 4.0    | 0.8             |
| 2. Not all users understand information technology. | 0.15   | 3.0    | 0.45            |
| 3. The presence of users in this case is that the business actor entering the supporting document for the permit is not in accordance with the specified requirements. | 0.15   | 3.0    | 0.45            |
| Total             | 1.0    | 3.26   |                 |

In the analysis SWOT matrix, namely to audit or assess an organization and its environment. In the analytical framework of strategy formulation, SWOT Analysis is the first step in the Matching Stage. In preparing the SWOT Matrix, decision makers put a focus on the main problems, which then helps them to formulate strategic planning. This stage aims to conduct an analysis of the business processes that are running, and determine the desired business model or activity from the business scenario. There are several things that must be done at this stage, including:

a. The business process that is running in the inadequate, the business actor submits a permit application, is processed by the technical unit to validate the supporting data for the permit. Permit is issued and used by business actors as a complement to export or import documents. In addition to physically issued documents, there are documents in the form of electronic data that are processed and integrated with INSW portals, which are valid electronic data containers from various agencies as true and reliable data for processes in the field, namely at ports or airports managed by Customs Custom. In addition to being forwarded to the final process in the field, Inatrade is a gateway from other agencies related to the export and import process, including surveyor data, namely the agency...
appointed to survey goods to be exported or imported, data for submission of goods including submission of import goods (PIB) and submissions export of goods (PEB), and other supporting data from other agencies seen from the side of cooperation between other agencies and the Ministry of Trade.

The new flow that will be used as a project file where the business actor submits an application and supporting requirements for the application online, and will receive a license letter issued digitally.

b. The point of view taken between stakeholders is the user of Inatrade applications, including business actors, technical units, trade-related institutions and electronic data that will flow through the Inatrade and will be forwarded to the INSW portal in the form of speed and accuracy of data. The data sent must be in accordance with the business process of the related process, no data is lost and the time needed is fast.

c. Resources provided to support the speed of sending data and data that are accurate including supporting reliable hardware and Inatrade software that can process data both as a front end and back end.

d. Models to describe business processes using the value chain.

e. Make a business process relationship matrix with the organization.

In the ISA stage there are steps in determining the data architecture (data architecture) and application architecture (architecture application). Data architecture functions to utilize data as a function of business functions, processes and services. Whereas for application architecture it is more used as a design to use applications that will be needed [9].

In the Inatrade system this section is the most important thing in business functions because it provides information related to the data generated by the licenses issued.

1. The relationship between business functions and data entities in the data architecture, the relation is Unary relationship (U) - the entity is related to itself, Cardinality - this is the degree to which Entities are related to each other, relationship (R) - how entities are related to each other, in Table 3:

| Data Entity          | Business process |
|----------------------|------------------|
| Businessmen          | Businessmen      |
| Licensing supporting Documents | Technical unit (processor) |
| Notification submitting a permit application | data on applications for export / import licenses |
| License agreement    | License agreement |

Table 3. Data Entities.

| Apply validation of licensing documents | R | R |
| License signing | C |
| Licensing is taken | R | U |

The stages used in the application architecture include:

1. Defining application candidates
   In determining and defining application candidates can refer to table 4.4, there is an information system for submitting applications, the process of licensing applications, and printed approval of the applications submitted by business actors.

2. Determine the relationship between applications and business functions
In making an application based on the information system that has been created, the flow between the first phase application and the last stage can occur.

Technology architecture is one of the steps taken to design a technology architecture that will support an information system architecture that can define the main technology needed to provide environmental support for the application. The stages needed in compiling a technology architecture include identifying the principles of technology and platforms, in addition to defining technology platforms.

Software-as-a-Service (SaaS) is also known as on-demand or hosted applications which can be used in the enterprise resource planning systems and it will be very useful in these applications. SaaS can be molded for adapting for the implantation in the software applications like ERP systems. And it is comfortable with the change the way organizations make payment for services, implement, and run their software applications. The SaaS software model has fixed financial and operative advantages over the others in comparison with, on-premise software models [8].

Identification results that have been analyzed include:

1. Computer hardware platform
   The hardware used for the licensing process is a PC and smartphone device.

2. Computer software platform
   The software platform used is web based, including browser applications, and android applications.

3. Data management and storage
   In the process of managing and storing data, the data inputted and processed by the processor / technical related permission will be stored in the database server.

4. Network / telecommunications platform
   The network used is a server with platform linux (Open Source) with database using NFS (Network File System).

5. Internet platform
   The internet uses intranet, internet, and Multiprotocol Label Switching (MPLS) networks.

6. Service and System integration Consultation
   All registrations and publications use the internet, with a number of procedures that must go to the data validation service for the first time. The manual service system must still go to the Department of Commerce service department via the service window to apply for permits and requirements, and can consult technical and non-technical licensing processes.

Innovation vs implementation orientation, it can be disputed if TOGAF at all can handle innovation as it might be claimed to be an implementation framework. The case demonstrates a range of business improvement initiatives the raise a counter-claim that TOGAF can navigate relatively wide within the technology life-cycle, and more over probably clearer address late-life changes of technologies than eg much more purely innovation management theory [10].

Stages of opportunity and solutions emphasize the benefits obtained from the design of enterprise architecture. There are several stages that will be carried out at the opportunity and solution stages as follows:

1. Identify possible opportunities that arise and can be achieved by the company. Opportunities in implementing the architecture can be realized because the factor of application implementation is in accordance with what the user wants by minimizing the failure of the system itself, there is application training so that all technical units can use the application according to their respective needs.

2. Combine and review the results of gap analysis and solutions from business architecture, information systems, and technology.

At this stage an assessment is carried out in determining the information system migration plan from the old to the new system. Enterprise is carried out based on the main and supporting needs in the organization of the information system implementation plan. This stage functions so that the application of the information system that is built becomes directed and runs well.
In general, the differences between the old system and the new, in the flow and process for the licensing. In addition, there are server migrations from the old to the new, and utilize the old server for internal development.

In creating an architectural framework, business processes must be considered that accommodate the ongoing process and there are enhancements or additions in accordance with applicable regulations. There must be a cut-off or information stating that certain application modules are no longer used, but there are modules that align modules that are new to accommodate or indeed cannot be implemented. The propose EA to re-engineer the process model and outline the main steps and components. Additionally, we adopt quality management frameworks, not only for re-engineering purposes, but also for the whole EA design and development processes. However, the search and space limitations led us to present only the conceptual background. Therefore, our future research will focus on the implementation and evaluation of the proposed model in case studies for gathering empirical evidences [2].

4. Conclusion
Based on the results of the research from the implementation and testing of data can be concluded that electronic system architecture design in the Directorate of Export and Import Facilitation, Directorate General of Foreign Trade, Ministry of Trade can be used as a guide in its development. The results of this design obtained an integrated system that produces integrated business processes in all organizational units and units that require data flow to INSW through the Inatrade portal. In the move from the old system to the new system can take the old application resources, can be combined with the new system functions.

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