Designing Enterprise Architecture for Academics Information System Platform using the Open Group Architecture Framework Architecture Development Method

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Abstract. The purpose of this research is to build an integrated information system at the Miftahul Jannah Foundation, the Miftahul Jannah Foundation is an educational institution that houses MTS Al Ihsan, MA Al Ihsan and Tarbiyah College of Sciences. Miftahul Jannah Foundation does not yet have a Blueprint to design an integrated information system. The method used to design architectural designs is based on the TOGAF ADM literature study. The steps applied in this design are among other Preparation, Architectural Vision, Business Architecture, Information System Architecture, and Technology Architecture. The output of this stage will produce an enterprise architecture that can be used by organizations to support business processes and achieve their strategic goals later. The conclusion of this research is that the company's architectural design using TOGAF ADM can be used in the Miftahul Jannah Foundation according to the documents and processes that are running and can produce a blueprint for creating information systems so that they can support ongoing business processes.

1. Introduction
TOGAF (The Open Group Architecture Framework) is an EA framework for designing, planning, building, and managing IT infrastructure organization which provides a details method and set of supporting tools. TOGAF is used by organization to design and implement enterprise architectures which give guarantee of a design and a procurement specification that can facilitate and benefit an open systems implementation with reduced risk. The results of using TOGAF in designing of enterprise architecture, reflecting stakeholder needs is achieved, using best practices, and to consider both current and future business needs [1]. TOGAF is a framework - a detailed method and a set of supporting tools - for developing an enterprise architecture. It may be used freely by any organization that wants to develop enterprise architecture for use within that organization [2]. TOGAF ADM (Architecture Development Method) The TOGAF ADM is the result of continuous contributions from a large number of architecture practitioners. It describes a method for developing and managing the lifecycle of an enterprise architecture, and forms the core of TOGAF. It integrates elements of TOGAF described in this document as well as other available architectural assets to meet the business’s needs for the organization and IT needs of an organization [2]. When developing information systems, companies can use TOGAF ADM. However, TOGAF has a weakness in the difficulty to use and is quite difficult to learn because it is
designed as a generic corporate architecture framework. TOGAF then becomes very large and complex, presenting artifacts that depend on needs so that they do not can be used and requires adjustments in its use [3]. TOGAF gives a detailed method on how to build and implement the EA and the information system called the Architecture Development Method (ADM). TOGAF ADM is the result of continuous contributions from practitioners of architecture. TOGAF ADM is a method to develop and manage the life cycle of EA. ADM makes the perspective of TOGAF integrated into the document architecture to meet the needs of business and its organizations [4]. Enterprise Architecture is a method for harmonizing business strategies and Information Technology strategies [5].

Education is a very important sector in the creation of reliable human resources. School information is about learning and teaching and also education. TOGAF is used to develop enterprise architecture, where there are detailed methods and tools to implement it. Education is a very important sector in the creation of reliable human resources. School information which is about learning and teaching as part of the education sector, is still not well managed. Handling and processing data that is still manual, searching for past data that takes a long time, and has not been coordinated every part involved in it. These things cause the value of school management performance has not reached optimal. Therefore we need an integrated information system and can manage information about education administration quickly and accurately with the support of computer equipment.

Miftahul Jannah Education Foundation was established on January 3, 1991, founded by KH.U. Muhammad H.M, Dr. KH. Mahrus As’ad., M.Ag and KH. Dede Rohanda, S. Pd. In academic implementation, located on Jl. Duke of Agung No. 40 Baleendah Bandung. The Miftahul Jannah Foundation houses Al Ihsan Kindergarten, Al Ihsan Madrasa, Al Ihsan MTS, Al Ihsan MA and STIT. Data as of December 2019, the number of students registered at the Yiftyan Miftahul Jannah Education numbered 1449 people, consisting of 155 students at the kindergarten level, 180 students at the Madrasah Diniyah level, 354 students at the MTs level, 410 students at the MA level and 350 at the STIT level.

The current condition of the Miftahul Jannah Education Foundation does not yet have a specific and integrated school information system architecture in accordance with the needs and goals of the Foundation, the cause is because the Foundation has not yet focused on the process of developing its information system.

The aims of this study will be carried out in the Miftahul Jannah Foundation that aims to assist in the creation of the company's blueprint architecture to solve the problem of information flow in existing business processes and as a guide when developing information systems. The design of enterprise architecture information systems for sports platforms will be designed using the Open Group Architecture Framework (TOGAF) Architecture Development Method (ADM) in developing the phase information system that is carried out, namely the Preliminary Phase, Vision Architecture Phase, Business Architecture Phase, Information System Architecture, and Phase Technology Architecture. This research produces a blueprint that will be used for making information systems that can support ongoing business processes.

2. Method

The method used in enterprise architecture design based on TOGAF ADM literature study, direct observation, and interviews with stakeholders. In the initial stage, it is direct observation, collecting documents in the business process, and conducting interviews with my interests.

The research was conducted at Miftahul Jannah Foundation. Documents obtained from direct observation of each business process and interviews with stakeholders, then problems are obtained, Preliminary Phase Vision Architecture, Business Architecture, Information System Architecture and Technology Architecture. So that it can be made a blueprint for enterprise architecture by referring to the corporate architecture framework used today. The Basic structure of the TOGAF ADM can be seen in Figure 1.
Figure 1. The Basic structure of the TOGAF ADM

TOGAF ADM is a result of the continuing contribution of a large number of architectural practitioners. This explains methods for developing and managing the life cycle company’s Architecture and forms the core of TOGAF. It integrates the TOGAF elements described in this Document as well as other architectural assets available, to meet the business and IT needs of an Organization [1].

3. Results and Discussion

Based on observations and interviews indicate that in Miftahul Jannah Foundation there is no blueprint for designing an enterprise information system architecture that will support business processes and still use manual processes that cause information and data not to be conveyed properly. When creating an enterprise architecture blueprint, it will use TOGAF ADM. The stages of the enterprise architecture design will refer to the TOGAF ADM stage which consists of Phase Vision Architecture, Business Architecture Phase, Phase Information System Architecture and Phase Technology Architecture [1]. This research that has been done can produce a blueprint as a guideline for creating information systems so that they can support ongoing business processes. The following is a further explanation of each phase of the TOGAF ADM

3.1 Preliminary phase

This phase will explain the preparation and initiation to EA, including the definition of organizational identification, organizational objectives, organizational models for EA, and architectural principles. The architectural principle is the basis for the development of EA [6]. The architectural principles developed consist of business principles, principles, data principles and application of technological principles. The results of interviews and strategic planning study documents can be identified as follows: determined business principles will make educators and education staff professional according to standards. By developing the professionalism of educators and education staff, the Miftahul Jannah Foundation will become an educational institution with international standards. Data principles consist of data assets, shared data, accessible data, and data security. The principles of management of technological change consist of responsiveness and interoperability [7].
3.2 Vision Architecture Phase
Vision architecture delivers enterprise architecture vision is proposed. A high-level description of the basic architecture and architecture target architecture vision is provided by a domain that includes business, data, application, and technology with the objective to achieve a target architecture that integrates business applications, technology infrastructure, and the needs of the organization. Determining the vision of architecture is an important step to analyze the value chain of the organization. The result is an analysis of the value chain that includes the domain and business functions and supports the core business functions in the organization. The purpose of the analysis of the value chain is to process identification in the Organization and providing the highest margins to its stakeholders [9]. The value chain of the Office of education can be seen in Figure 3 that includes supporting activity and core activity.

![Figure 2. Value Chain Miftahul Jannah Foundation](image)

In this phase, the need is to identify the business goals and strategic drivers of the organization. The vision of architecture can be determined based on the company's current condition and mission of the company itself.

3.3 Business Architecture Phase
The Business Architecture Phase aims to ensure that the enterprise architecture design will be made in line with needs based on the vision and mission, work units, and stakeholders in the Miftahul Jannah Foundation (Table 1).

| No | Issues                                                                 | Current Architecture                  | Method                                  | Expected Architecture                               |
|----|------------------------------------------------------------------------|---------------------------------------|-----------------------------------------|---------------------------------------------------|
| 1  | Still doing business processes using manual documents so that the business process runs takes a long time | The entire business process is still using manual documents | Automation process with data information based on documents in the ongoing business process | Business processes are run using information Systems |
| 2  | There is no harmony between the achievement of vision and mission with information technology architecture | To carry out the process of achieving its vision and mission, it has not used information technology architecture | Evaluate the implementation of vision and mission using information technology architecture | Aligning vision and mission can utilize proven information technology architecture |
| 3  | New student registration                                               | New student                           | Build an online                         | Build a system to serve                           |
service procedures are still served in places that can make prospective students need more time and money to register.

| No | Issues                                                                 | Current Architecture                                      | Method                  | Expected Architecture                                      |
|----|------------------------------------------------------------------------|----------------------------------------------------------|-------------------------|----------------------------------------------------------|
| 4  | There is no communicative and informative marketing information media and educational foundations, to explain in detail the academic implementation at the Miftahul Jannah Foundation. | registration service procedures are still served in places/offline registration. | registration system. | prospective online student registrations to make it easier. |
|    |                                                                        | No marketing information media available.                 | Build an online marketing system. | Build an online marketing system expands marketing and strengthens the target market through the website. |

From Table 1, the gap analysis can be concluded that it is necessary to align the achievement of the vision and mission with the vision of technological architecture that will help to carry out business processes using information systems to be more effective and efficient in achieving business goals.

3.4 Information System Architecture
At this stage it is explained how the architecture of the academic information system at the Miftahul Jannah Foundation will be developed. In the Information Systems Architecture phase can be seen from two aspects, namely application architecture and data architecture. An explanation of the two aspects is as follows:

3.4.1 Application Architecture
The application architecture explains the need for an academic information system at the Miftahul Jannah Foundation in order to function properly, on time and online. With the implementation of an online academic information system so it can be accessed anytime and anywhere. The academic information system at the Miftahul Jannah Foundation is a single system that can be managed by each work unit. Stakeholders in the Miftahul Jannah Foundation information system are dynamic and real-time according to the need to achieve the vision and mission.

3.4.2 Data Architecture
In data architecture, stakeholders in the Miftahul Jannah Foundation require centralized and integrated data from various work units that aim to improve coordination and synchronization of business processes and information can be delivered on time, accurately and relevantly. After the data is integrated, it is expected to make information that is timely, accurate and relevant (Table 2).

| No | Issues                                                                 | Current Architecture                                      | Method                  | Expected Architecture                                      |
|----|------------------------------------------------------------------------|----------------------------------------------------------|-------------------------|----------------------------------------------------------|
| 1  | There is no integrated information system to support business process requirements. | current business processes do not use integrated information systems. | Develop an integrated academic information system to support business processes. | Academic information system that is integrated in order to support all business processes. |
|    |                                                                        | Integration uses manual communication                      | Service Oriented Architecture. | Integrated information system using SOA                  |
| 2  | All business processes are not integrated with information systems     |                                                          |                         |                                                          |

Table 2. GAP Analysis Data Architecture
Table 2 explains the gap analysis table of academic information systems and concluded that the implementation of Service Oriented Architecture (SOA) is needed in the process of integrating academic information systems that can support business processes.

3.5 Technology Architecture Phase
At this stage the technology architecture can support the vision, mission and business strategy. The building design for an academic information system at the Miftahul Jannah Foundation which can be integrated with other parts of the foundation based on an analysis that has been done before. It can be seen in Figure 5 the choice of technology for platform technology in applications, ranging from application software, network technology and security, and internet architecture that supports these applications.

Solutions offered for Technology Architecture for software and software that illustrate that later the Miftahul Jannah Foundation information system can be integrated with other information systems in accordance with business process requirements, and can be seen in Figure 3.

![Diagram of Technology Architecture of Academic Information System at Miftahul Jannah Foundation]

Figure 3. Proposed Technology Architecture Software

Solution offered for computer network technology architecture that describes that the Miftahul Jannah Foundation information system that will be made is web-based and mobile and has good security to prevent crime and can be seen in Figure 4.
Figure 4. Proposed Technology in computer network architecture

From research that has been done using TOGAF ADM for information systems in the Miftahul Jannah Foundation can integrate data from each work unit and can be implemented in the academic management center by adjusting existing business processes. TOGAF ADM is designed as a general framework and has good alignment between business and technology. TOGAF can produce various architectural models or facilitate work and facilitate to integrate, adapt to the future in scalability and extensibility [10].

4. Conclusion
Based on the implementation of the TOGAF ADM at the Miftahul Jannah Foundation, conclusions can be reached among others. The process of designing an enterprise architecture using the TOGAF ADM can be used at the Miftahul Jannah Foundation in accordance with the documents and processes that are running. It also can produce a blueprint for an information system that can be made wrong. One important supporting factor, so that existing business processes can run more effectively and quickly in making decisions. In addition, the design of an integrated academic information system at the Miftahul Jannah Foundation can facilitate and accelerate service to all stakeholders, especially in the field of information services. Solutions offered for mobile and web-based information systems platforms and technology integration platforms for each proposed information system is Service Oriented Architecture.
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