THE ANALYSIS OF APPLICATIONS REQUIREMENTS IN APPLICATIONS ARCHITECTURAL DESIGN AT INDONESIA COMPUTER UNIVERSITY

Mauluddin Syahrul*

Abstract: *Indonesia Computer University (UNIKOM) is one of the universities in Indonesia which since its establishment in 2000 has been utilizing information technology systems that are built itself in the form of information system applications. The applications are made based on the needs, but the application making is less well-planned, so until now the applications that is built is not evenly distributed in each unit of work and a lot of applications are built but it is not integrated. To overcome this problem, it needs an applications architecture that will guide the applications development that fits the needs of existing business functions, and the early stage in this applications architecture design is the analysis of application requirements.*

In the study of application needs analysis that is part of application architectural design, the research methodology which is used is adopting the TOGAF ADM. To analyze the business functions it uses Michael Porter's value chain analysis and tools in business modeling uses UML.

The results of analysis to business functions and applications which are available today are known that UNIKOM has 11 business functions with a total of 161 sub-business functions and the number of existing applications to support the business functions are 22 applications. Based on an analysis of the applications support to business functions it is known that 59.01% or 95 business functions are supported by the applications and 40.99% or 66 business function are not supported by the applications yet. Then, based on the number of business functions the actual numbers of applications that are needed by UNIKOM are 11 applications. Determination of the number of applications is based on the business functions that can be realized in the application development applications that are integrated with each other, covering all units of work that are involved and all business functions.

Keywords: *Applications Architecture, Business function, TOGAF ADM.*

1. INTRODUCTION

Today the use of information technology systems in companies is increasing. Information technology systems is used not only for the efficiency of daily operations that can replace the humans role with a more efficient information

* Indonesia Computer University, Indonesia. *E-mail: Syahrulxm15@gmail.com*

technology (role of efficiency), but also in supporting the decision making process (the role of effectiveness). Moreover as the development of information technology systems, the role of information technology systems has reached the strategic role, it is used to win the competition.

Indonesia Computer University(UNIKOM) is one of the universities in Indonesia, which since its establishment in 2000 has been utilizing information system technology that is developed by UNIKOM itself. As the development of Indonesia Computer University, applications continue to be developed and made to support the existing business functions. The applications must be made based on the needs, but the application making is less well-planned, so until now the applications that are built are not evenly distributed in each unit and a lot of applications that are built but they are not integrated.

Based on the 2011-2015 strategic plan evaluation of UNIKOM and observation of the UNIKOM application state, the application issues at Indonesia Computer University are:

1. The application of lecture courses scheduling is still limited to study program internal and some study programs have not had a scheduling application.
2. The application of lecturers attendance has not been integrated yet with the payroll for payroll data processing is still using Microsoft Excel application.
3. The online tutelage application development is better done after scheduling applications which are owned by all study programs, because the online tutelage application requires a schedule of lectures for the selecting class process.
4. The application of each courses website has separate databaseso that the master data is not suitable to the data in main database.
5. The web-based applications are made separately and have their own addresses.

This causes difficulty for users when they will access these applications, because each user must remember the application addresses. For example, a student wants to see his course value, he must enter the site http://nilaionline.unikom.ac.id, to see the tuition payment must enter the site http://autodebet.unikom.ac.id, to do tutelage, he must enter the site http://perwalian.unikom.ac.id, to see the lectures announcement, he must enter the site http://dosen.unikom.ac.id or http://kuliahonline.unikom.ac.id and so on.

Some of the above problems arise because of there has not been guidance of application plan development in the form of draft applications architecture, so the applications which are built are uneven in each work unit there are also many

applications that are built but they are not integrated. In addition, the application development must be suitable to the architecture principles of which are owned by University which is the first step in implementing application development or applications architecture design.

Objective of the Study

The purposes of this study are to determine the current applications architecture problems, to find the support of existing applications to the business functions at Indonesia Computer University and to determine the number of applications which are required by Indonesia Computer University which is suitable to its business functions.

2. LITERATURE REVIEW

Applications Architecture

Applications architecture is a process in *enterprise* architecture that is focused on the development and application of a solution or service that is being created for the organization (Surendro, 2009).

Applications architecture is not the system design or analysis of system requirements, but the definition of what software is needed to manage data and provide information for user to perform business functions (Spewak, 1992).

In designing applications architecture of what is to be considered is the definition limitation the application itself. Applications are mechanisms for managing enterprise data (Spewak, 1992). Data management activities are the activities such as insert, edit, sort, archive, analyze and reference data.

Enterprise Architecture

Enterprise architecture is a set of principles, methods and models that are plausible which are used to design and realize an enterprise organization, business processes, information systems and its infrastructure (Surendro, 2009).

Enterprise architecture is one of management practices to maximize the contribution of company resources, IT investments and system development activities to achieve its performance objectives. (Supriyana, 2010).

How the implementation of enterprise architecture can be used by organizations, organizations should adopt a method or *framework* that can be used in developing the enterprise architecture. So with the method of architecture enterprise is expected to manage complex systems and be able to synchronize business and IT which will be invested (Yunis and Surendro, 2009).

Value Chain Analysis

According to Surendro (2009) value chain analysis which was first proposed by porter provides a framework to identify and inventory the areas of business functions that is by grouping functional areas into:

Primary activities, *(line functions)* are the main activities of organization that involves the following activities:

(a) Inbound logistics, in this section it is related to the receipt, storage, and distribution of *inputs* into products.

(b) Operations, all activities which are related to the conversion of input into the final form of the product, such as production, manufacture, packaging, maintenance of equipment, facilities, operations, quality assurance, protection to the environment.

(c) Outbound logistics, activities which are related to the collection, storage, physical distribution or service to the customer.

(d) Marketing and Sales, activities which are related to the purchase of products and services by users and encouraging to be able to buy products that are made.

(e) Service, activities which are related to the services provision to increase or maintain the product value, such as installation, repair, training, materials supply, maintenance and technical guidance repair.

Secondary activities, (staff or overhead functions) are supporting activities that assist the main activities. Secondary activities involve several parts/functions, *i.e.*:

(a) Firm infrastructure, is the activity, costs, and assets that are related to general management, accounting, finance, security and safety of information systems, as well as other functions.

(b) Human resources management, comprised of the activities which are involved such as receipts, hearings, training, development, and compensation for all types of personnel, and developing the workers skill levels.

(c) Research, Technology, and System Development, activities which are related to costs that is associated with product, process improvement, equipment design, computer software development, telecommunications systems, new database capabilities, and computer-aided systems support development.

3. RESEARCH METHOD

Collection Data Method

The data which is collected in this study came from two sources as follows:

Primary Data Sources

The data which is derived from primary data source is obtained by using two ways:

Observation: Observation is data collection techniques through direct observation of symptoms or events that occur on studyobject. In this case the author made some observations to observe the physical state, location or place of study: *Indonesia Computer University* and keep necessary records.

Interview: Interviews are data collection techniques through face to face and questionand answer directly between data collector (author) with a party which is related to the studyobject. In this case the interviews were conducted with several stakeholders, such as director of development, chief of financial officer, infrastructure department, secretariat of study program, head of BAU, director of QA, ICT and Multimedia department, front office, head of Library.

Secondary Data Sources

The data derived from secondary data sources is obtained by documentation techniques. Documentation is data collection techniques by collecting the documents which are related to study object, such as Strategic Plan of UNIKOM, SOP (Standard Operational Procedure) and guidebooks of student/university.

Research methods

In analyzing these applicationsrequirements, the steps which are conductedare to adapt TOGAF ADM. The complete TOGAF ADM steps are in the picture below, whereas in this study it only follows the stepsofArchitecture Vision, Business Architecture and is proceed with the analysis of applicationsrequirements as part of Information System Architecture step:

Applications architecture is at the C step of Information System Architecture, and based on the picture above, before designing the applications architecture there are several steps that must be passed, *i.e.* Architecture Vision and Business Architecture. In the analysis of application needs will follow the steps as follows:

a. Architecture Vision

The main thing of this step is to create common view on the importance of enterprise architecture, especially applicationsarchitecture to achieve the university goal and define the scope of architectural models that will be developed.

At this step it will be explained the architecture principles which are related to applications development on UNIKOM strategic plan, so it is expectedthat
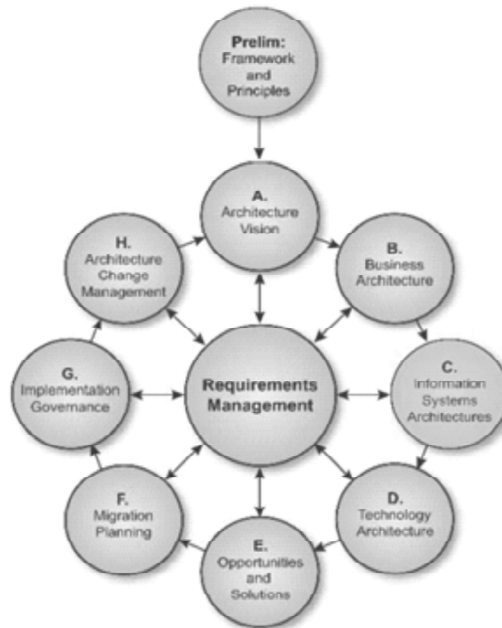
Figure 1: Togaf ADM (Architecture Development Method)

everything that is done in designing architecture generatesthe information system design which is suitable to UNIKOMneeds.

b. Business Architecture

The main thing of this step is to identify all business functions and sub-functions as the initial conditions description of business architecture.

At this step it will be explainedthe steps to identify business functions then do business modeling that will be a picture of the current UNIKOM business architecture.

c. Applications Architecture

At this step it will perform the applications search that exist today, and then do a gap analysis between applications and all business functions to determine how much the current applicationssupport of the business functions.

4. DISCUSSION

This section will discuss the vision of the architecture (Architecture Vision), business architecture (Business Architecture), a gap analysis of the current applications support tobusiness functions.

Architecture Vision

Based on the vision, mission of UNIKOM and strategic plan of UNIKOM,the applicationsarchitecture design vision is as follows:

> "Designing the applications architecture in order to realize the information system applications of UNIKOM which is integrated and aligned with strategic plans of UNIKOM"

In the effort to create a common view which is related to the enterprise architectureimportance, especially applications architecture and is related how to determine the scope of an architecture model to be developed, it can refer to the architecture principles in UNIKOM as follows:

(a) Information System is integrated to entire units.

(b) Information System facilitates Accreditation reporting.

(c) Information System is utilized for internal and external campus communication.

(d) Information System is Web-based developed.

(e) Information System provides a medium for distance learning.

(f) Information System meets the information needs in total by focusing on quality.

(g) Information System generates accurate and up to date information.

(h) Information System creates the information service system that is oriented on stakeholder satisfaction.

(i) Information System serves the needs of academic information systems.

(j) Information System serves the needs of information *via* Smartphone/ Mobile.

Business Architecture

At this step of the business modeling, modeling tools use Business Use Case. As for knowing the business functions that exist within UNIKOM, it will be identified using Michael Porter's value chain.

Business Functions Identification

Defining the main business functions in Indonesia Computer University is described using Michael Porter's value chain as follows:

Business Modeling

Based on the picture above, there are 11 business functions that exist in Indonesia Computer University. The next step is the step of a business modeling that will be modeled using business use case as follows:
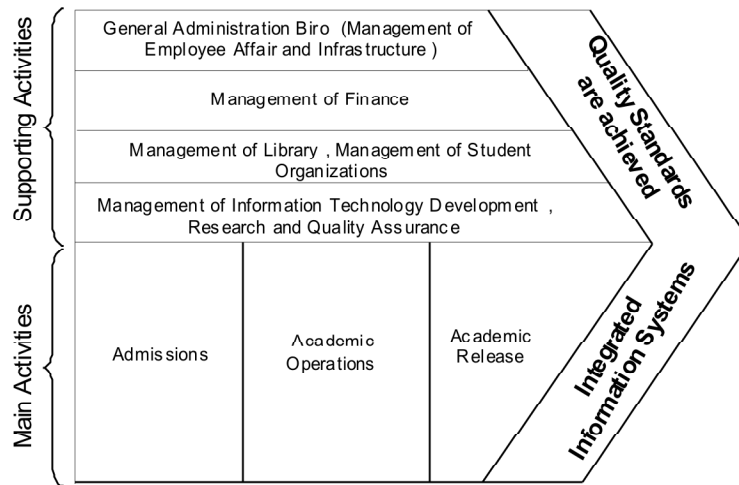
Figure 2: Value Chain in Indonesia Computer University

1. Use Case Admissions
2. Use Case Academic Operations
3. Use Case Academic Release
4. Use Case Employee Affair Management
5. Use Case Infrastructures Management
6. Use Case Finance Management
7. Use Case Library Management
8. Use Case Student Organizations Management
9. Use Case Information Technology Development Management
10. Use Case Research and Community Service Management
11. Use Case Quality Assurance Management

Prior to describe each use case of business functions, it is necessary to do the decomposition onbusiness functions to determine the complete business function.

Here is an example of decomposition result for Admissions (PMB):

1. Admissions (PMB)

1.1. Admissions PMB Planning

    1.1.1. PMB Committee Formation

    1.1.2. PMB Budget Determination

    1.1.3. PMBSelection Standardization

    1.1.4. PMB Activity Scheduling

1.2. Promotion Planning

    1.2.1. Market Research

    1.2.2. Promotion Path Strategy Determination

    1.2.3. Promotion Implementation

    1.2.4. Promotion Activity Reporting and Evaluation

1.3. Admissions Selection

    1.3.1. Entrance Exam Materials Preparation

    1.3.2. Entrance Exam Enrollment

    1.3.3. Entrance Exam Implementation

    1.3.4. Entrance Exam Result Processing

1.4. New Student Registration

    1.4.1. New Student Registration

    1.4.2. Class Division

1.5. Admissions (PMB)Reporting and Evaluation

    1.5.1. PMB Reporting and Evaluation

    1.5.2. Promotion Activity Reporting and Evaluation

Use Case Admissions (PMB)

Based on the decomposition of business functions, the following business use case admissions are divided into several packages including planning PMB, Promotion Planning, Selection PMB, New Student Registration and Reporting. Use Case also show who the parties related to the business functions of new admissions.

After doing business modeling then collecting data on the current applications and it is noted that there are 22 applications.

Then the next step is the current applications support analysis to the business sub-functions. At this step the business function that is taken is simply a business function that can be supported by the application and applications list of that are included into the matrix table is the involved application in the business functions. Here are the examples of current applications support to admissions business functions:

After the applications support matrix table is made to the business functions then through the table it will be known business functions which hasbeen and has not been supported yet by the application.

The analysis results to all business functions and to applications which already exist today that Indonesia Computer University has 11 business functions with a
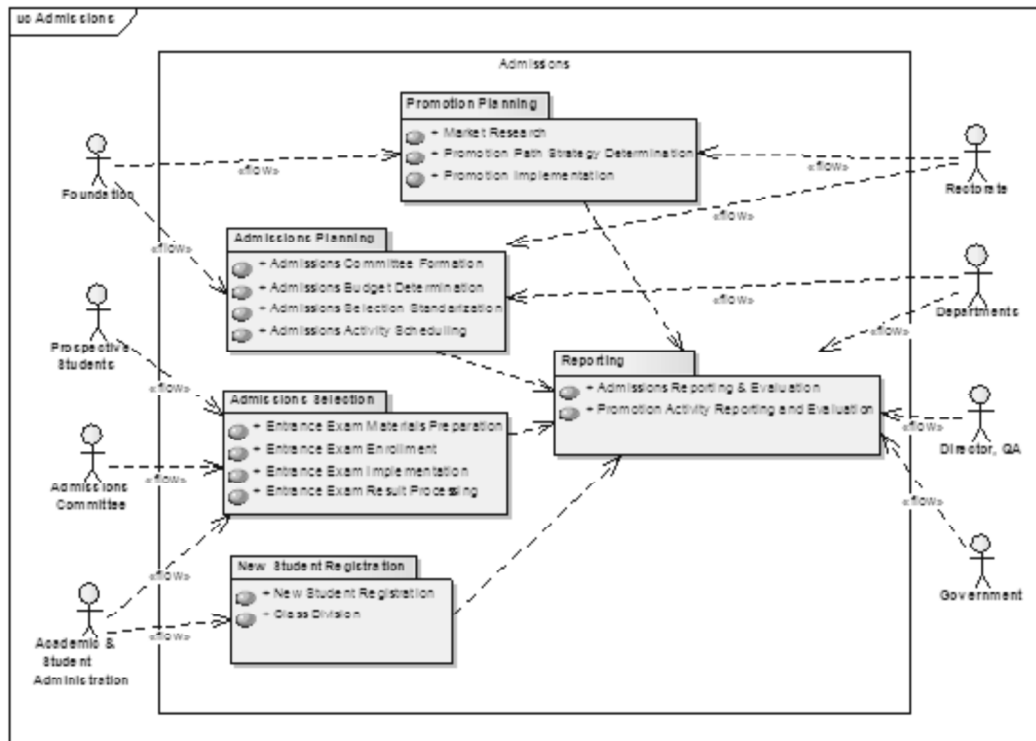
Figure 3: An example of use case new admissions

total of 161 sub-functions and the existing applications to support the business functions are 22 applications. Based on the applications support matrix table for business functions it is known that 95 business functions have been supported by applications and 66 business functions have not been supported by applications. If it is in percentage the business functions which are supported by applications are around 59.01% and 40.99% of business functions are not supported by applications. This shows that there are still many business functions that require application support.

Then based on the number of major business functions, the actual number of applications which are required by Indonesia Computer University are 11 applications *i.e.* admissions information systems, academic information systems, alumni information systems, employee affair management information systems, infrastructure management information systems, student organization information systems, library management information systems, research and community service management information systems, information technology management information systems, finance information systems and quality assurance information systems.

Table 1
The examples of analysis results of the current applications support to admissions business functions

Function	Application	SIAKAD (Academic Information System)	http://pmb.unikom.ac.id	Sms Gateway
Entrance Exam (USM) Enrollment	USM Registrant Profile Management	✓	✓	
	USM Card Printing	✓	✓	
	USM Payment Processing	✓	✓	
	USM Payment Announcement		✓	
Entrance Exam Results Processing	USM Scores Processing	✓	✓	
	USM Scores Announcement	✓	✓	✓
New Student Registration	Re-registration Profile Processing	✓		
	Re-registration Profile Requirements Processing	✓		
	Student ID Number Division Processing	✓		
	Class Division Processing	v		
	New Student Registration Payment Processing	✓		
Reporting	Admissions Reporting and Evaluation	✓		
	Admission reporting for Accreditation	✓		

1. CONCLUSION

Through this analysis study of the applications requirements that are part of the applications architecture designing at Indonesia Computer University, it is known that in the current applications architecture, Indonesia Computer University has already 22 applications, but of 161 business functions, the new 95 business functions have been supported by the applications, the remaining, 66 business function have not been supported by the applications yet. This shows that the number of applications which are made have not met all of the business functions needs yet. Whereas based on the number of business functions, Indonesia Computer University actually only requires 11 applications to support all business functions, *i.e.* admissions information system, academic information systems, alumni information systems, employee affair management information systems, infrastructure management information systems, student organizations

information systems, library management information systems, research and community service information systems, information technology management information systems, finance information systems and quality assurance information systems. The determination of applications number based on the business functions so that in the application development can be realized the applications that are integrated with each other, covering all work units which are involved and all business functions can be supported by the application. This is to avoid the development of applications based on the needs of only at one work unit or based on the needs of certain sub-business functions.

The study results of application requirements analysisis expected to be the starting point in the applications architecture designor more broadly in the enterprise architecture design, especially in Indonesia Computer University.

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