Design of Enterprise Information System with TOGAF Framework (Case Study: STD Bali)

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Abstract— **The purpose of this study is to design enterprise architecture at universities in order to improve service to external parties and internal organization. In this study, the methodology of The Open Group Architecture Framework Architecture Development Method (TOGAF ADM) is used. Research enterprise information system design in Bali to discuss STD enterprise architecture to migration planning stage. The result of this research is the design of information systems for each sub-unit business with the main goal of improving performance in every sub-organizations to produce information that is relevant, accurate and timely. This study produced an information systems architecture blueprint candidates application form for each sub-organization ordered according to priority needs so that the implementation of more focused and does not interfere with the performance of information systems either already exist or are being built. On the results of the mapping are 4 main systems Academic Information Systems, Admission Information Systems, Providing Education, Graduation, Alumni and Career Information System. There are also four support systems that the financial management system, employee payroll system, technical services information system and general affairs information system.**

Keywords— *Information System, Enterprise Architecture, TOGAF ADM*

I. INTRODUCTION

Sekolah Tinggi Desain Bali, abbreviated STD Bali, is a private university located in Denpasar, Bali. Previous STD Bali named New Media, and then after the formation of Visual Communication Design Program, STD Bali and New Media split on March 12, 2013 [1]. STD Bali has a lot of information systems that include portal system, payroll systems, academic information systems, e-learning, the system transcript online, the system of new admissions, library information systems, cashier information systems, inventory information systems, IT systems clinic, the system records of violations student, college scheduling systems and other systems. The problems that occurred in the use of information systems in STD Bali is still poorly integrated. Some of the causes are still not well integrated into the existing system STD Bali, in this case, the main problem is the lack of consideration of long term factors that the system would be required by other systems (integrated

with each other). System integration has the goal of reducing inequalities in the system development process, to reduce. this gap, we need a paradigm in planning, designing, and managing information technology and information systems known as enterprise architecture [2]. In designing the system architecture required a framework. Framework needed to organize innovations in the enterprise and can be used to develop the architecture easily [2].

II. LITERATURE REVIEW

A. Information System

The information system is a combination of several components between people, information technology, procedures and data to support business processes so that the resulting information.

B. Enterprise Information System

Enterprise Information Systems is a technology platform that can unite all the information from the various parts into one information logically so that the enterprise can get the required information easily. Integration does not only include the use of LAN networking technology, but also the incorporation of the business processes of each division. Enterprise Information Systems provides a complete unity of information and fast, allowing secure access to the entire information system, accessible in some places, to facilitate the achievement of organizational goals and improve the quality of decision-making. The information presented in enterprise information system is a comprehensive information, not per piece, this type of information is critical to corporate decision-making in general. The overall activity of the system used to support the measures taken by the business they work for the company, so the use of enterprise systems will increase the business intelligence of the system (executive) [3].
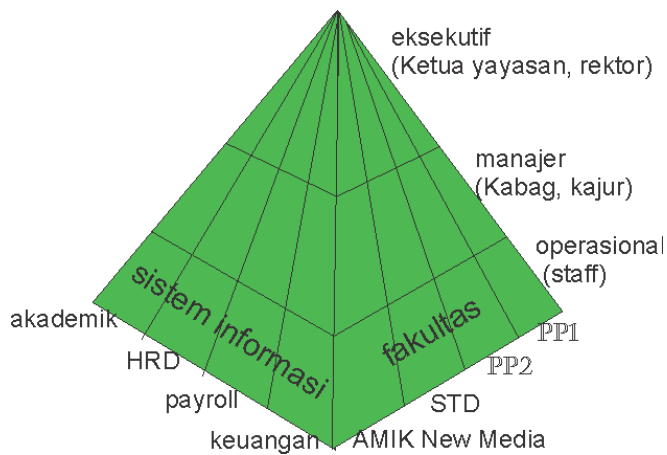
Fig. 1.   Overview of Enterprise Information Systems Campus [4]

In the chart of figure 1. Describe the campus enterprise information systems, there are three categories: information systems, faculty, and level. In the category of information systems covering academic information systems, HR, payroll, finance and others. In the category of faculties are faculties owned STD Bali include AMIK New Media, College of Design, Professional Courses 1-year and 2-year professional program. Information is provided on the staffing level, more detailed information is given on the level of manager and critical information in the decision given at the executive level

C. Framework Arsitektur Enterprise

Enterprise architecture is a strategy or design that is structured in an organization that is used to support business processes in order to achieve business goals [5]. Enterprise Architecture Framework is a framework or tools to make even develop an enterprise architecture to classify complex information

III.   TOGAF FRAMEWORK

TOGAF framework is widely used in banking, industry and education. TOGAF is used to develop an enterprise architecture, where there are detailed methods and tools for building, implementing and maintaining an enterprise architecture, this is what differentiates from other enterprise architecture frameworks. In addition, TOGAF is also a flexible and open source. The main element of the framework is the TOGAF ADM (Architecture Development Method).

Figure 2 explain TOGAF framework. The TOGAF framework includes a preliminary stage, architecture vision, business architecture, information system architecture, technology architecture, opportunities and solutions, migration planning, implementation governance and change management architecture [2]. In this paper, only to be discussed until the migration planning phases.
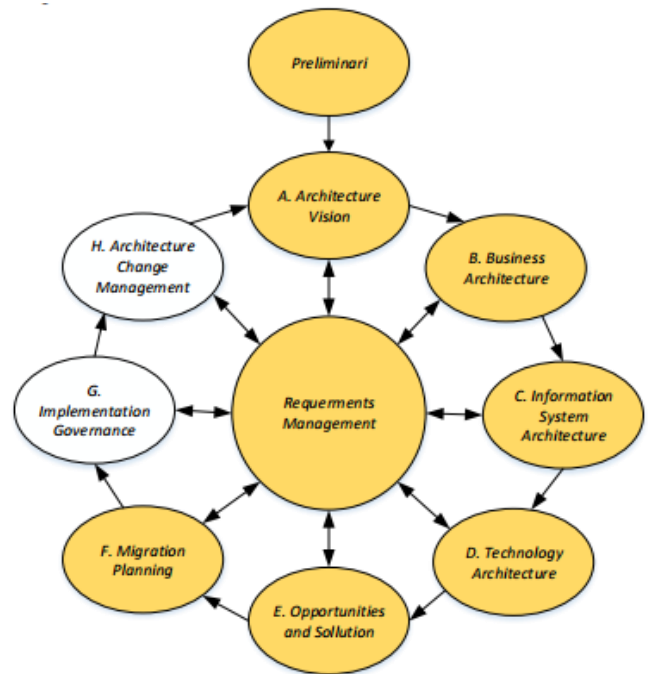

Fig. 2.   Framework TOGAF [5]

IV.   IMPLEMENTATION OF TOGAF FRAMEWORK

The stages in the design of enterprise information systems with the TOGAF framework.

A. Preliminary

In this stage, the process of identifying the scope of the enterprise architecture, identification of resources needed in the manufacturing enterprise system, the establishment of the framework used in building enterprise architecture and determining architectural principles [6]. In the enterprise information system design, preliminary stages used to identify the business processes associated with the main system in STD Bali. There are two activities associated business processes with information systems in STD that is the main activity and supporting activities.

In Table I describes the identification of business processes that occur on the system STD. At the preliminary stage of the process, there are two main activities and supported activities.

TABLE I.   IDENTIFICATION OF BUSSINESS PROCESS

Main Activity	Registration New Student	New Admissions Process
		Selection of New Admissions Process
		Registration Process
	Providing Education	Curriculum Management
		Lecture Process
		Management of Test Score
		Making of Academic Transcript
		Scholarship Management

	Graduation	Thesis Registration
		Apprenticeship Registration
		Thesis Seminar
	Alumni and Career	Alumni Management
		Jobs center Management
Support Activities	Financial Management	Budget Planning
		Investment
		Infrastructure Maintenance
		Facilities and Infrastructure Organization
	Human Resource Management	Lecturer Management
		EmployeeManagement
	Techinical Service Division	Library, Studio, Lab Activities Maintenance
	Community Service	Community service management for student and lecturer
	General Affairs	Facilities and Infrastructure Management

B. Architecture Vision

At this stage, the equation architectural vision in the construction of enterprise information systems. The vision includes the description of the current environment, the target of business and engineering perspective. In the enterprise information system design in STD, covering architectural vision such as:

1. Make enterprise architecture that is in tune with the needs of the end user
2. Building a system design integration which is expected in the future can be integrated with other systems that do not have/have not been built
3. Able to provide fast, precise, and accurate information system integration STD in Bali.
4. Making the process of sharing data between divisions or sections in Bali STD easily.

C. Bussiness Architecture

Analysis of the business processes that take place at this time. At this stage, the business architecture defines the initial conditions, determine the business model or business activity that is desired by the business scenario. In the enterprise information system design in STD, covering business architecture

TABLE II.   BUSSINESS ARCHITECTURE

Admissions Business Process	Planning and Promotion for Admissions
	Admissions Process
	Selection of New Admissions Process
	Registration Process
Lecture Business Process	Curriculum Academic Management
	Lecturer Management
	Scheduling and Classroom Management
	Leave Management

	Student and Lecturer Management
	Print academic Transcript
	Scheduling exam, thesis seminar, apprentice
	Scheduling studio and lab
Graduation Business Process	Graduation Planning and Implementation
	Print Certificate and Transcript
	Student's Status Determination
Alumni and Career Business Process	Alumni Record
	Alumni's career Record
	Job Vacancy Management
Financial Management Business Process	Budget Planning Mangement
	Investment
	Infrastructure Maintenance
	Facilities and infrastructure Organization
Human Resource Business Process	Lecturer Management
	Employee Management
Technical Service Business Process	Library, Studio and Lab Management
Community Service Business Process	Community services for student and lecturer
General Affairs Business Process	Facilities and Infrastructure Management

In Table II describes the business processes that have been agreed in Bali STD information systems. There are nine business processes that include Business Process Admission freshmen Business Process Delivery of Education, Business Process Release of Students, Business Process Alumni and Career, Business Process Financial Management, Business Process Management of human resources, the Business Process Technical Services Unit, Business Process Community Service and Business process General Bureau.

D. Information System Architecture

Modeling information systems architecture will be designed. This stage defines the types of applications needed to manage the data and support business processes. At this stage more emphasis on how the activity of information systems architecture developed [7]. Defining the information system architecture in this stage include data architecture and application architecture that will be used by the organization. Architectural data is more focused on how the data is used for the needs of business functions, processes, and services. The technique can be used with are ER Diagram, Class Diagram, and Object Diagram. In the enterprise information system design in STD, identification and grouping of data covering.

TABLE III.   DATA ARCHITECTURE

User Login Data	Class Data	Alumni Data
Student Data	Room Data	Career Data
Lecturer Data	Employee Data	Student's Score Data

Courses Data	Transcript Data	Lecture Schedule Data
Study Program Data	Book / Reference Data	Room Data
Faculty Data	Student's Journal Data	Studio Data
Registration Card Data	Payment Data	Finance Data

Information System	
Community Service Information System	Community Service application
General affairs Information System	Canteen application

In Table IV contains the applications needed to build enterprise information systems in STD Bali. Applications created, accessed via one login data and in accordance with the authorization permissions of the application.

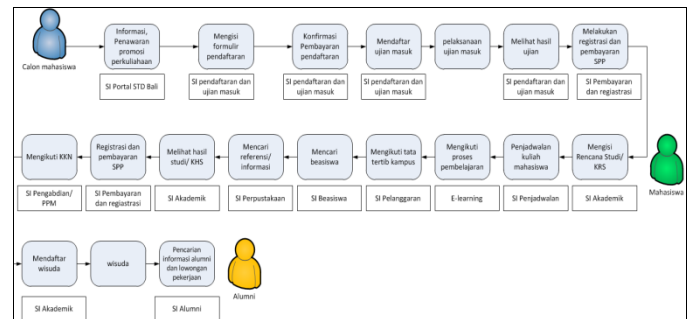Fig. 3.   Scheme of Information System Application [4]

Figure 3 describes the process of registering prospective college student, then complete the requirements that must be met. Then the lecture and the release of students become alumni.
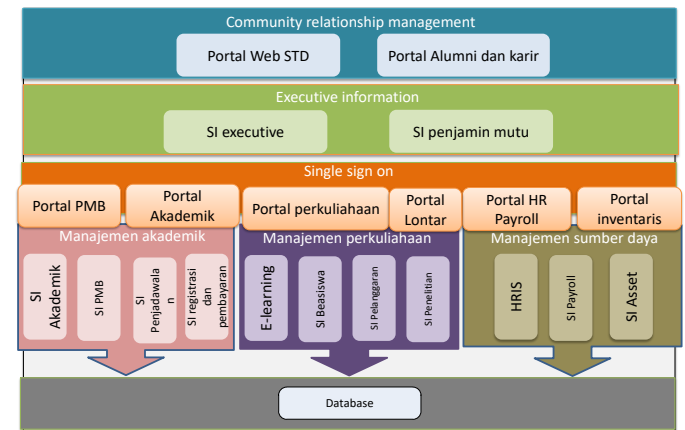
In Table III. Contains the data needed to build enterprise information systems. The data is stored in one database. In the application architecture more pressure on how the planned application requirements by using the Application Portfolio Catalog, and focuses on the application model to be designed. The technique can be used include Application Communication Diagram, Application and User Location Diagram and others. In the enterprise information system design in STD, infor-mation systems architecture includes

TABLE IV.   APPLICATION ARCHITECTURE

Academic Information System	Academic application (KRS, KHS, academic leave, lecture schedule, Student and Lecturer Management)
	E-learning application
	Library application
	Student's Violation application
	Scholarship application
	Community Service application
	E-journal application
	Yudisium Registration application
	Schedule application
Admission Information System	Marketing and Promotion application
	Registration and Payment application
	Management and Schedule Admission application
	Exam application
	Registration New Student application
Graduation and Student's Status Information System	Student's status Reporting application
	Graduation's application
Alumni and Career Information System	Alumni application
	Career application
Financial Information System	Financial application
	Sponsored financial application
	Outflow application
Human Resource Information System	Employee Management application
	Payroll application
Technical Service Division	Studio and Lab application
	IT Service application

Fig. 4.   Overview of Enterprise Information System STD Bali [4]

Figure 4 illustrates the unity of the system login infor-mation in one process and one database. In the visible image information systems STD and alumni web portal that can be seen by web visitors. At the executive can view key information of the whole integrated system.

E. Technology Architecture

Mapping architecture condition at this time to see the readiness of the existing computer network. The architectural design of the desired technology, starting from the determination of the type of candidate needed technology using Technology Portfolio Catalog that includes software and

hardware. In this stage also consider alternatives necessary in election technology. Techniques used include Environment and Location Diagram, Network Computing diagrams, and more.
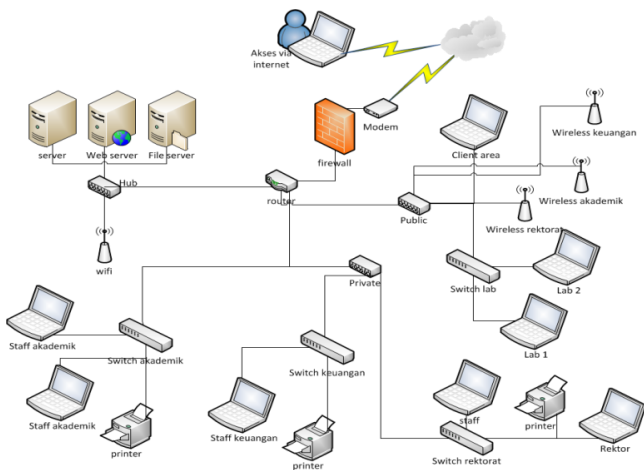

Fig. 5.   Overview of Architecture Enterprise System Network [5]

Figure 5 illustrates the architectural overview of the network to connect one computer to another computer. There is a server used to store databases and enterprise information systems.
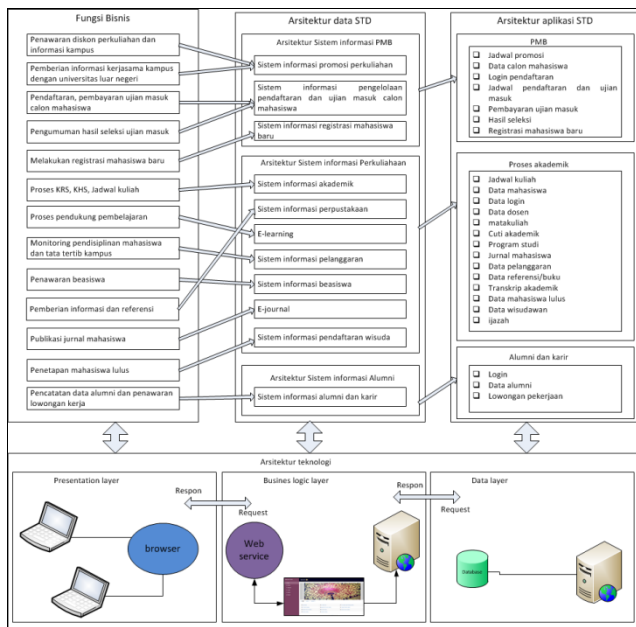

Fig. 6.   Blueprint Enterprise Architecture [5]

Figure 6. Describe the blueprint of enterprise architecture. In the blueprint contained business processes that have been approved, grouping data architecture, application architecture grouping STD, and process technology architecture.

F. Opportunities and Solution

At this stage, will be evaluated by choosing an alternative implementation, defining the implementation strategy, and implementation plan. At this stage more pressing on the benefits of enterprise architecture that includes business architecture, data architecture, application architecture, and technology architecture, so that it becomes the basis for stakeholders to select and specify the architecture to be implemented [5]. Opportunities and the proposed solution is to design information systems enterprise STD Bali and development of applications and provide the necessary infrastructure. To support the implementation process there are several strategies that should be considered to minimize the risk of failure

1. Human Resource Development
2. Reduce the risk during the development and implementation of the system, like:
    a. Documenting the entire system is complete and structured information.
    b. Implementation of information systems carried out in parallel with some applications that already exist today.
    c. Training of application users
    d. To disseminate to all stakeholders including students.

G. Migration Planning

Made the order of implementation systems on a priority basis. At this stage will be evaluated in determining a migration plan from an information system. Usually at this stage for the modeling use matrix judgments and decisions of the major needs and organization support of the implementation has information systems. Interest migration planning is the process of planning a migration or transition from the current system to the new system so that the implementation of information sys-tems more effective and goes well [5]. These are steps for doing migration planning.

1. Given the level of interest of a business process
2. Re-order / priority application system
3. Looking at the order of application of the system in the information system architecture
4. Build applications based on business processes that have been made.
    For migration planning process is done gradually so as not to change the entire existing system and does not create a system user to panic if it should migrate to the new system.business

V.   CONCLUSIONS

The conclusions of design enterprise information system STD Bali are:
1. Through enterprise information systems, to create an integrated information system
2. Using TOGAF ADM can produce a design of enterprise system architecture that will be applied in STD Bali well and been able to meet the needs of the business process and user needs in STD Bali.
3. From the result of mapping, there are 4 main systems

    a. Academic Information System, consists of 9 applications

    b. Admission Information System consists of 5 applications

    c. Graduation and Academic Status Information System consists of 2 applications

    d. Alumni and Career Information System consists of 2 applications

4. There are supported system include

    a. Finance Management System

    b. Employee Payroll System

    c. Technical Service Information System

    d. General Affairs Information System

Recommendation from the enterprise information system design in STD Bali,

1. This study discusses the design phase of enterprise information systems in STD Bali so as the further research is necessary to develop the process of implementation of enterprise information systems.

2. Enterprise architecture must always be managed and evaluated on an ongoing basis to follow the needs of business functions required.

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