Governance Design of School Information Systems with The Open Group Architecture Framework (TOGAF) At 1st State High School Pagelaran

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Abstract

The 1st State High School Pagelaran is one of the best public schools in Pringsewu Regency. This school is also an excellent state school where many of its students achieve achievements in both academic and non-academic fields. Currently, the 1st State High School Pagelaran does not yet have specific and integrated school information system architecture. Therefore, school information system architecture is needed that is in accordance with the needs in the framework of the information system development process at the 1st State High School Pagelaran. An organization in improving the performance of every business process that takes place in it must utilize information technology and information systems. However, this school does not yet have an integrated information system. Therefore, it is necessary to design an enterprise architecture that is used as a reference for the construction and development of school information systems. Enterprise Architecture Is the process of translating the vision and strategy of a business into more effective change. This study discusses the design of School Information System Architecture at the 1st State High School Pagelaran using TOGAF (The Open Group Architecture Framework) with the Architecture Development Method (ADM). The stages used in this architectural design are: Architecture Vision, Business Architecture, Application Architecture and Technology Architecture. The results of this research are the design of information systems and the design of the School Information System Architecture by producing a model and a basic framework called a Blue Print or Enterprise Architecture Model that can be used to design and develop information systems.

Keywords: The 1st State High School Pagelaran, TOGAF, Enterprise Architecture, Blueprint

I. INTRODUCTION

With the development of technology and the progress of the times, the need for information becomes very important. Accurate and fast information can help achieve the goals of an organization, especially in the field of education. Utilization of information systems is used to achieve the goals and mission of the organization. The user is not only an automated process for accessing information, but also creates the accuracy, speed and completeness of an integrated system. Information systems in organizations can be said to have strategic value if the system can support success in improving organizational performance.

In the world of education, information is a very important part. The school information system describes all activities that occur where data management is still not optimal. The 1st State High School Pagelaran is one of the leading high schools in Pringsewu Regency, which produces many outstanding students in both academic and non-academic fields. Currently, the system is still

running respectively. The new student admission system, the teaching and learning process, the administrative division, and the administration division have not yet become an integrated unit so that this causes inaccuracies and data out of sync. Therefore, we need an information system that is integrated and can manage the data as a whole. Information systems strategic planning uses TOGAF ADM in order to align the functions of information systems and support the organization's strategic plans. The Open Group Architecture Framework (TOGAF) is a framework for enterprise architecture that provides a comprehensive approach to the design, planning, implementation, and governance of enterprise information architectures.

Research conducted by [1], from the test results, it was found that the researcher's recommendations were well received by the participants and were expected to be realized. The suggestions that can be given are: 1) The 1st State High School Singaraja: if implementing the recommendations of this research, it is hoped that the school will cooperate with parties

who have knowledge and understand in detail the stages in the TOGAF ADM modelling and prepare a careful budget plan; 2) Further researchers are advised to test school readiness first before designing Enterprise Architecture with TOGAF ADM. Research conducted by [2], the result of this research is in the form of a blueprint which is a proposed application for Maria Mediatrix High School. It is hoped that the proposed applications can help Maria Mediatrix High School in aligning business processes well and can achieve business goals. The conclusion of this research is that by architectural design using the TOGAF ADM method it can align the business process activities of Maria Mediatrix High School. Furthermore, research conducted by [3], From the results of the study, it was found that a business process design in activities at Krida Nusantara Boarding School was carried out using the Enterprise Architecture Planning TOGAF ADM with the Value Chain model. The resulting research is about the environment of the business process system at Krida Nusantara Boarding School Integrated Senior High School which consists of three main activities. Those are PPDB, Teaching and Learning Activities, graduation and alumni.

Based on the background above, the formulation of the problem discussed is how to compile a Blue Print or a clear description of the plan for the use of information in supporting business activities at the 1st State High School Pagelaran and how to design an integrated school information system so that it can be used according to the needs of the 1st State High School Pagelaran.

II. THEORETICAL BASIS

2.1. Basic Concepts of Information Systems

A system is an important component and is needed by a company or official agency. This is because with an integrated system, the performance of a company or agency will be more focused and systematic. According to Jogiyanto (2005), the system is a network of procedures that are interconnected, gathered together to perform an activity or to complete a certain goal. Information system is a tool to present information in such a way that it is useful for the recipient. Its purpose is to provide information in planning, starting, organizing, operating a company that serves organizational synergy in the process of controlling decision making.

2.2. Enterprise Architecture

According to [1], Enterprise Architecture is the process of translating the vision and strategy of a business into more effective change by creating, communicating, and improving key requirements, principles and models that describe the company's future state and ensure the company evolves for the better. This is a form of activity that allows organizations to build the foundations needed for the survival of the organization and to face business challenges now and in the future. In planning and designing enterprise architecture, a framework is needed. A framework is a blueprint that describes how elements of information technology and information management work together as a single unit. Blueprints are useful as guides or guidelines that are useful for decision makers in designing, planning, measuring, and monitoring the use of information technology in enterprise business processes.

2.3. TOGAF

The Open Group Architecture Framework (TOGAF) is a framework for enterprise architecture that provides a comprehensive approach to the design, planning, implementation, and governance of enterprise information architectures. TOGAF is a top-level and holistic approach to design that is typically modelled on four levels. Those are business, applications, data, and technology. TOGAF has its own view, which can be defined as either a formal description of a system, or a detailed plan of the system at the component level to guide implementation, or as a component structure, their relationships, principles and guidelines governing its design and evolution. TOGAF ADM is a flexible method that can quantify various modelling techniques used in the design because this method can be adapted to changes and needs during the design process.

III. RESEARCH METHODS

TOGAF ADM is a flexible method that can identify various modeling techniques used in the design, because this method can be adapted to changes and needs during the design process.
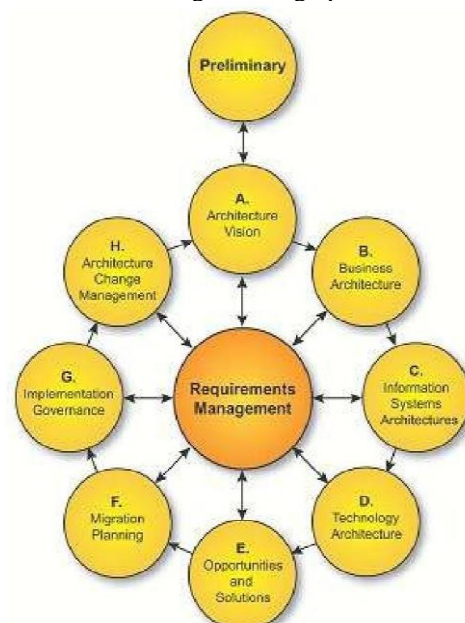
The 1st Figure: TOGAF Architecture Development
Method (Harrison, 2009:89)

1. Preliminary Phase includes preparation activities to develop architectural

capabilities and define architectural principles and the scope to be developed.

2. Phase A: Architecture Vision – is the initiation phase of the architectural development cycle which includes defining the scope, identifying stakeholders, compiling the architectural vision.
3. Phase B: Business Architecture – includes the development of a business architecture to support the agreed architectural vision.
4. Phase C: Information System Architectures – emphasizes the activity of how the information system architecture is developed. The definition of information system architecture in this stage includes data architecture and application architecture that will be used by the organization.
5. Phase D: Technology Architecture – builds the desired technology architecture, starting from determining the type of technology candidate required by using the Technology Portfolio Catalog which includes software and hardware.
6. Phase E: Opportunities and Solutions – At this stage, the model that has been built for the current architecture and objectives will be evaluated, identification of the main projects to be implemented to implement the objective architecture and classification as new development or reuse of existing systems.

## IV. RESULTS AND DISCUSSION
4.1. Definition of Scope

The definition of the main functional area activities uses a value chain consisting of business functions which are grouped into 2. Those are primary activities and support activities.
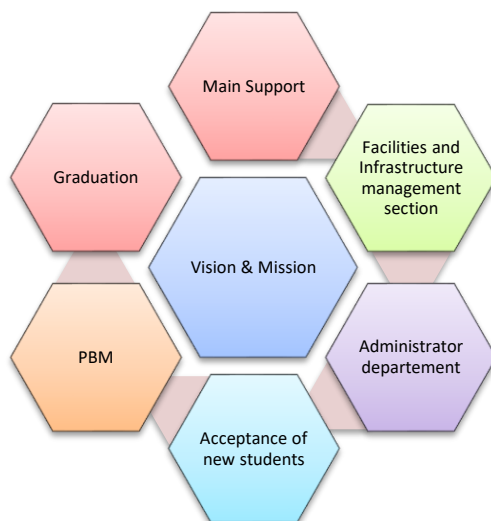
The 2nd Figure: Value Chain of the 1st State Senior High School Pagelaran

4.2. Business Architecture

Business Architecture is defining the process of business activities that occur in an organization. Business modeling is carried out to identify the processes of business functions, define business, describe business functions in the enterprise. The business architecture can act as an initial support in developing the plan.
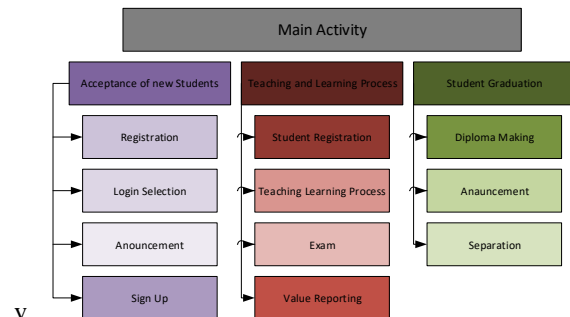
The 3rd Figure: Functional Decomposition Diagram of Main Activities

Some of the main business functions or activities are:
1) New Student Admission
   a. Registration of new students
   b. Filling out the form and registration requirements
   c. Entrance selection scheduling
   d. Implementation of selection
   e. Processing of exam results
   f. Announcement of selection results
   g. Re-registration process
   h. Implementation of the New Student Orientation Period
2) Teaching and learning process
   a. Making student ID cards
   b. Student re-registration
   c. Scheduling of subjects
   d. Determination of teacher and homeroom teacher
   e. Making exam schedule
   f. Appointment of exam supervisor
   g. Acceptance of exam results
   h. Report report filling
3) Student Graduation
   a. Determination of graduation requirements
   b. Diploma making
   c. Graduation announcement
   d. Student Farewell Implementation
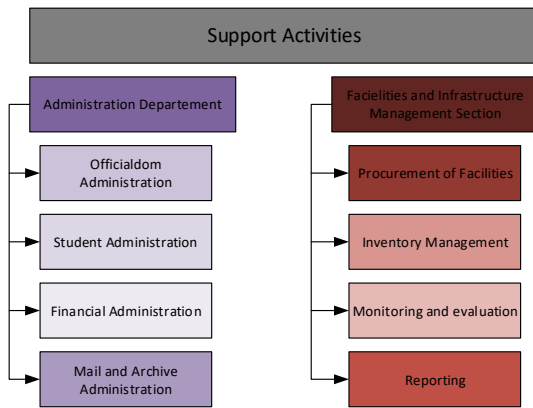
The 4th Figure: Functional Decomposition Diagram of Supporting Activities.

Some of the business functions or Supporting activities are:

1) Administration Section
   a. Implementation of Staffing Procedures and Mechanisms
   b. Management of teacher and staff data
   c. Making Student Identification Number
   d. Compilation of student activity lists
   e. Financial administration or committee funds and grants
   f. Incoming & outgoing mail management
   g. Procurement of letters
   h. Document archive management

2) Facilities and Infrastructure Management Section
   a. Compilation of a list of facilities and infrastructure needs
   b. Procurement implementation
   c. Implementation of inventory management
   d. Supervision and evaluation of infrastructure
   e. Ownership document storage
   f. Procurement reporting

Use cases describe certain functions in a system in the form of components, events or classes. A use case is a sequence of related action steps (scenarios), both automated and manual, with the aim of completing a single business task. The use case is described in the form of an ellipse/oval. The component of Business Architecture at the 1st State Senior High School Pagelaran is illustrated by involving four (4) actors. The actors are Admin, Committee, Prospective Students and Principal which are described in the Use Case Diagram below:
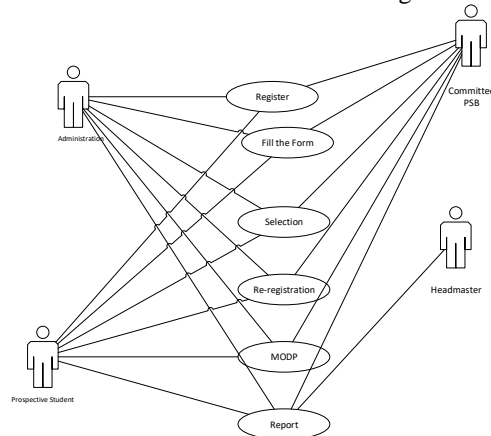
The 4th Figure: Use Case Diagram of New Student Admission

The architecture business that was created can be seen in the 4th figure where the image explains the process of New Student Admission. The process includes registration, filling out forms, selection, re-registration, MOPD and reports.

4.3. Data Architecture

Data Architecture is the definition of entities based on business functions that have been defined using the previous value chain. The purpose of the data architecture is to identify data that supports business functions as defined in the business architecture and aims to define the data requirements that will be used in the application architecture. The following entity candidates are obtained:

The 1st Table: Candidate Data Entities

Number	Entity Candidate
1	New Student Admission
2	Teaching and learning process
3	Student Graduation
4	Administration Section
5	Facilities and Infrastructure Management Section

The 2nd Table: Gap Analysis

Current business architecture	Analysis	Target future business architecture and policies

IT activities are currently limited to ISPs (Internet Service Providers). This was realized because of proposals from various parties.	• Upgrading good IT planning policies. • Perform IT updates that have not been running according to the needs required by the company.	The implementation of IT activities is integral in all sectors of the IT company with the right and clear strategy and these activities must be based on the vision and mission of the management (Top Down).
The IT activities at the 1st State Senior High School Pagelaran do not have IT experts so that if there is damage to the system it will be difficult to repair it.	• A clear IT policy upgrade was carried out. • IT communication is directed by the head of the IT unit.	Establishing the IT sector which is part of the representatives of the superiors in charge of providing direction and supervision in managing the company's IT policies so that communication is more focused.
In carrying out its services, the 1st State High School Pagelaran has not used IT as a primary need.	Updating IT facilities and implementing IT facilities in service/business processes	All business processes of the company can be fully supported by IT as the main requirement.
Human Resources at the 1st State Senior High School Pagelaran still do not understand IT.	IT technical training/guidance for all employees	HR already has certification in implementation, Knowledge Management (KM) in all parts of the company.
The activity of accepting new student admissions at this time still does not use IT as its main need.	Build and design an Information System Application of New Student Admissions	Has an online application for new student admissions that can help business processes at the 1st State High School Pagelaran

4.4. Application Architecture

The need and exchange of information in general have been seen in the description above about the business process modeling architecture so that the determination of the application architecture used to assist the main business functions and support organizations can be defined and described using the Application Portfolio.

The 3rd Table: Application Portfolio of the 1st State Senior High School Pagelaran

Application Code	Application Name
APC_1.1	1.1 New Student Registration Application
APC_1.2	1.2 Entrance Selection Processing Application
APC_1.3	1.3 New Student Registration Application
APC_2.1	2.1 Scheduling Application
APC_2.2	2.2 Payment Administration Application
APC_2.3	2.3 Value Administration Application
APC_3.1	3.1 Alumni Database Application
APC_4.1	4.1 Teacher Attendance Absence Application
APC_4.2	4.2 Teacher Salary Calculation Application
APC_5.1	5.1 Archiving Application
APC_5.2	5.2 Inventory Application

4.5. Technology Architecture

Technology Architecture describes the software and hardware components needed to support business, data and application architectures. The results of the identification of network services that will be provided in the form of LAN, internet, database server, and application server. For the initial stage, the Database Management System (DBMS) in the 1st State Senior High School Pagelaran will use MySQL.

4.5.1. Software Technology Design

The following is a proposed software technology design:
1) Server   : Linux Ubuntu
2) Operating System (OS)   : Windows7
3) Office Software   : Microsoft Office 2010
4) WEB Application   : PHP
5) DBMS   : MYSQL
6) Browser   : Internet Explorer, Mozilla Firefox, Google Chrome

4.5.2. Computer Technology Requirements Design
1) Server
   With specification: Processor Intel
   Dual Core HDD 2 TB Memori 8Gb
2) Personal Computer (PC) Client
   With specification: Processor Core I3 HDD 500Gb Memori 4Gb

4.5.3. Computer Network Design
The architecture that will be described is a proposed architecture to improve or increase the ability to support applications. Below is the design of the proposed computer network architecture at the 1st State Senior High School Pagelaran.
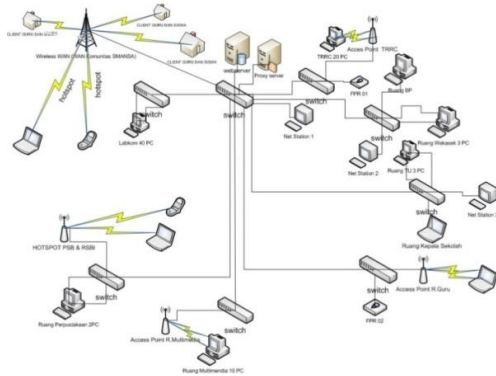
The 5th Figure: Network Architecture Plan at the 1st State Senior High School Pagelaran

4.5.4. Blueprint
Blueprint is a design that is formulated with the aim of providing direction for the activities of the organization/community or institution on an ongoing basis so that each activity is in accordance with the demands, challenges, and needs of the environment. The Blueprint is also a detailed framework as a basis for policy making which includes; setting goals and targets, formulating strategies, implementing programs and focusing activities, as well as steps or implementations that must be carried out by each unit in the work environment. The existence of a blueprint does not guarantee that the organization or institution will achieve what is designed and visualized on paper. But this Blueprint is like a vision that will guide our steps closer to our dreams. This will help to focus more on the goal. In planning and developing applications as well as providing the infrastructure needed to support the implementation process, several strategies must be considered to minimize the risk of failure. The strategies that can be carried out include:

1) Considering implementation costs,
2) Human resource development,
3) Identification of strategic parameters by evaluating business architecture, data architecture, application architecture, and technology architecture.

V. CONCLUSION
Utilization of Information Systems and Technology at the 1st State High School Pagelaran is very important supporting factor to support existing business processes so that they can run more effectively and quickly in the decision-making process. This research focuses on the design of school information systems with the scope of design. Those are vision architecture, business architecture, data architecture, application architecture, and technology architecture. With the design of an integrated school information system at the 1st State High School Pagelaran, it is hoped that it can simplify and speed up access to data and information as well as services to all relevant stakeholders. To get a more detailed and complete model, further research is needed, with more complete stages.

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