Architecture Information Design of Internal Quality Assurance Agency Stt Ibnu Sina Batam Using Enterprise Architecture Planning (EAP)

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Abstract

STT Ibnu Sina Batam is a private university that strives to improve the quality both in terms of quality of academic and administrative services. Therefore STT Ibnu Sina should continued to improve the quality of assurance system related to the collecting, processing and presentation of academic evaluation data so it can produce a clear picture of the needs at various levels of stakeholders in order to maintain the quality of the academic process in STT Ibnu Sina Batam. Internal quality control activities also one form of monitoring and evaluation to measure the achievement of the vision and mission of STT Ibn Sina predetermined. In designing the information architecture to help the performance of the Internal Quality Insurance Agency (LPMI) STT Ibnu Sina Batam, authors choose Enterprise Architecture Planning (EAP) as method. To represent a blueprint of collecting, processing and presentation of evaluation result data and information of the quality assurance STT Ibnu Sina Batam.

Keywords: Enterprise Architecture Planning; Internal Quality Assurance;

1. Introduction

1.1. Background

(STT) Ibnu Sina Batam is a private university that continues to strive to improve the quality both in terms of academic quality and administrative services. It is also related to the vision of STT Ibnu Sina Batam is to become a national superior engineering school that competes globally based on faith and taqwa. The information in education world can help business progress in universities including in terms of quality control.

As a form of quality control activities STT Ibnu Sina Batam has Internal Quality Assurance Agency (LPMI) which serves as a section that oversees and improve the quality of the ongoing academic process. In performing its function LPMI STT Ibnu Sina Batam already use information system (IS). However, the IS does not yet have a clear design on data architecture, application architecture and technology architecture that makes it difficult to collecting, processing and presenting quality evaluation information. LPMI requires information architecture that capable to identifying business functions and generating candidate applications and their functional requirements thoroughly and detail. EAP is a methodology for planning enterprise architecture that focuses on data architecture, application architecture and technology architecture oriented to business needs as well as how to implement the architecture created in order to achieve the desired goals. Therefore EAP is the right choice in designing information system to improve LPMI performance.

2. Literature Review

2.1. Internal Quality Assurance Agency (LPMI)

LPMI (Lembaga Penjamin Mutu Internal) Internal Quality Assurance Agency, as is a section that has the duty to implement, coordinate, monitor and evaluate education development activities and quality assurance in STT Ibnu Sina Batam.[4]

Quality Assurance Program is carried out consistently and continuously to guarantee:[4]

a)   customer and all stakeholders satisfaction.
b)   transparency
c)   efficiency and effectiveness
d)   accountability

2.2. Enterprise Architecture Planning

Enterprise Architecture is a well-defined practice for conducting enterprise analysis, design, planning, and implementation, using a holistic approach at all times, for the successful development and execution of strategy. Enterprise Architecture applies architecture principles and practices to guide organizations through the business, information, process, and technology changes necessary to execute their strategies. These practices utilize the various aspects of an enterprise to identify, motivate, and achieve these changes [3].

Steven H. Spewak in 1992 defined Enterprise Architecture Planning (EAP) as "the process of defining architectures for the use of information in support of the business and the plan for implementing those architectures." Spewak's approach to EAP is similar to that taken by DOE in that the business mission is the primary driver. That is followed by the data required to satisfy the mission,

followed by the applications that are built using that data, and finally by the technology to implement the applications.

2.3. EAP on Zachman Framework

EAP defines the blueprint for subsequent design and implementation and it places the planning/defining stages into a framework. It does not explain how to define the top two rows of the Zachman Framework in detail. The Zachman Framework provides the broad context for the description of the architecture layers, while EAP focuses on planning and managing the process of establishing the business alignment of the architectures.[1]

EAP is planning that focuses on the development of matrixes for comparing and analyzing data, applications, and technology. Most important, EAP produces an implementation plan. Within the Federal Enterprise Architecture, EAP will be completed segment enterprise by segment enterprise. The results of these efforts may be of Government wide value; therefore, as each segment completes EAP, the results will be published on the Architecture Plus website.[1]

Table 1: EAP on Zachman Framework

	DATA What	FUNCTION How	NETWORK Where
Objective/Scope (Conceptual) Role : Planner	List of important in the business	List of Business Process	List of Business Location
Enterprise Model (Conceptual) Role : Owner	Conceptual Data/Object Model	Business Process Model	Business Logistics System

2.4. EAP Components
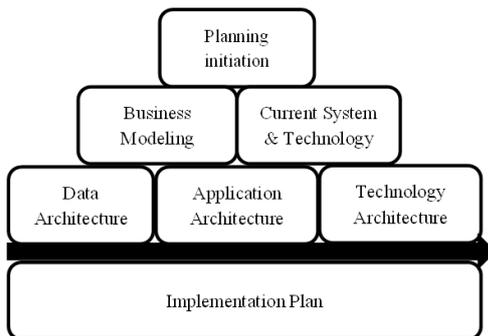
Fig. 1: Component Level of EAP

EAP hierarchy of activity is represented in the figure above, in which the layers are implemented in order, from top to bottom.[2]

- Level 1 getting started: This layer leads to producing an EAP work plan and emphasize the necessity of high-level management commitment to support and resource the subsequent six components (or steps) of the process. It consists of Planning Initiation, which covers in general, decisions on which methodology to use, who should be involved, what other support is required, and what toolset will be used.
- Level 2 where we are today: This layer provides a baseline for defining the eventual architecture and the long-range migration plan. It consists of:
  - Business process modeling, the compilation of a knowledge base about the business functions and the information used in conducting and supporting the various business processes
  - Current Systems and Technology, the definition of current application systems and supporting technology platforms.
- Level 3 the vision of where we want to be: The arrows delineate the basic definition process flow: data architecture, applications architecture, and technology architecture. It consists of:
  - Data Architecture - Definition of the major kinds of data needed to support the business.
  - Applications Architecture - Definition of the major kinds of applications needed to manage that data and support the business functions.
  - Technology Architecture - Definition of the technology platforms needed to support the applications that manage the data and support the business functions.
- Level 4 how we plan to get there: This consists of the Implementation / Migration Plans - Definition of the sequence for implementing applications, a schedule for implementation, a cost/benefit analysis, and a clear path for migration.

3. Methodology/Materials

3.1. Research Framework

In order to develop the blue print of Information System in LPMI STT Ibnu Sina Batam required several stages of workmanship which refers to the basic structure of Enterprise Architecture Planning method with Zachman framework. The stages can be explained in Figure 2 below:
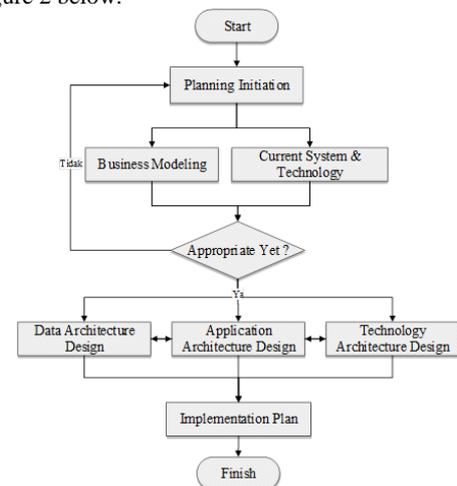
Fig. 2: Research Framework

The stages of the research methodology above will be explained in the following description

1. **Planning Initiation**
   This activity includes literature study in the form of material enrichment about design of agency architecture and case study of corporate architecture design which has been done by others beforehand as well as determining the scope of architecture, vision and mission to be achieved, work plan, and get commitment from the company for this designing process

2. **Business Modeling**
   These activities include documentation of the organization's organizational structure, business function identification, and the definition of the original business model.

3. **Current System and Technology**
   This stage will discuss how the current technology (application) that supports the monitoring and evaluation function at LPMI STT Ibnu Sina Batam.

4. **Data Architecture Planning**
   These activities include defining data entities involved in organization and design of data architecture

5. **Application Architecture Planning**

These activities include creating a list of candidate applications, defining applications and relating applications with business functions.

6. **Technology Architecture Planning**
   These activities include defining the flow of data and processes involved in the organization and design of technologies that support the flow

7. **Implementation Plan**
   At this stage will be discussed about the determination of the sequence of applications, create implementation schedule and determine the determinants of success and making recommendations.

4. Results and Findings

4.1. Planning initiation

At this stage we define the organization as an object by describing the vision of the organization associated with the vision of the information system planning so that the development of architecture can be done in accordance with business objectives.

4.1.1. Definition of LPMI

Internal Quality Assurance Agency, is an agency that has the task of implementing, coordinating, monitoring, and evaluating the activities of educational development and quality assurance

4.1.2. Function of LPMI

Monitoring and Self-Evaluation consistently, honestly and openly, whose results are used as proposals for subsequent service performance improvements, so as to ensure the continuity of academic quality improvement

4.1.3. The scope of LPMI

STT Ibnu Sina's internal condition is evaluated based on a number of parameters, namely: organization and human resource management and infrastructure, students and graduates, as well as curriculum and learning process

4.2. Business Modeling

At the business modeling stage includes documentation of organizational structure, identification of areas and key business functions of the organization and modeling of ongoing business functions.
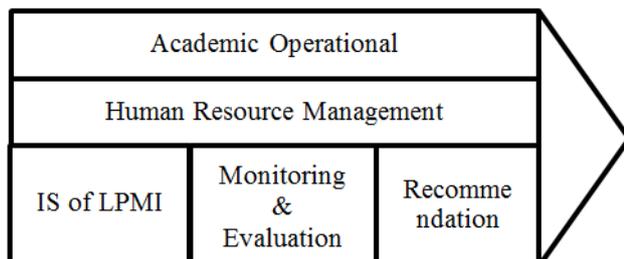

Fig. 3: Value Chain of Business Modeling LPMI

4.2.1. Definition of Business Function LPMI

After initiating the business function area of LPMI with value chain utilization, it can be done the composition of the decomposition structure of the business function by using the function hierarchy chart. In accordance with the scope and limitations in this study, the decomposed function is related to quality assurance as the main function.

1. Information System of LPMI

1.1 Publication of quality assurance information
    1.1.1 Quality assurance news
    1.1.2 Publication of the quality assurance agency profile
    1.1.3 Publication of quality assurance documents
1.2 Socialization and implementation of academic quality assurance

2. Monitoring & Evaluation
2.1 Prepare material evaluation questionnaire
    2.1.1 Preparation of lecturer performance evaluation questionnaire materials
    2.1.2 Preparation of questionnaire materials evaluation of academic civitas
    2.1.3 Preparation of evaluation questionnaire material of study program
    2.1.4 Preparation of questionnaire materials for graduate user evaluation
    2.1.5 Preparation of alumni evaluation questionnaire materials
2.2 Establishment of evaluation questionnaire participants
2.3 Scheduling the implementation of the evaluation questionnaire
2.4 Determination of the completeness of evaluation results

3. Recommendation
3.1 Preparation of evaluation report
    3.1.1 Preparation of lecturer evaluation report
    3.1.2 Preparation of reports of academic evaluation results
    3.1.3 Preparation of evaluation result of project management report
    3.1.4 Preparation of evaluation reports of graduate users
    3.1.5 Preparation of evaluation report of alumni
3.2 Preparation of quality improvement proposal report

4.3. Current System and Technology

Before doing the system development thoroughly, it is necessary research on the system running. The purpose of doing research on the current system is basically to understand the workings and weaknesses of the system, thus the system development can be done better.

4.3.1 Information System LPMI

LPMI's current information system based on LPMI's main business function
1. LPMI information system is an online website application that contains news activities LPMI.
2. LPMI questionnaire information system is an online questionnaire application to collect respondents' answers to quality assurance.
3. Information system of LPMI evaluation result is website application that contains list and document of quality evaluation result.

4.3.2 Identification Technology LPMI

Based on observations and interviews about the technology used LPMI, this is the following results
1. Processing of LPMI business process data using only one computer as operational tool. With the operating system used is windows 7 Ultimate
2. The results of evaluation and quality assurance recommendations report are uploaded in to the LPMI website hosting server in pdf document form
3. Quality policy recommendation process is done by printing the recommendation result in paper with printer.

4.4. Data Architecture

The data architecture aims to define the data that will be used to develop and build the application architecture. Based on the steps in the methodology of enterprise architecture planning

4.4.1 Data Characteristics

Quality assurance information must come from valid and assured data of authenticity and with the interest to measure and improve the quality. The process must be carried out effectively, efficiently and professionally. For that we need some important aspects that need to be considered are:

1. **Secure,** data security is important to keep the final quality assurance results in accordance with the circumstances. Because the data is a reference for policy making, target and institutional goals in the future.
2. **Data Integrity,** data integrity will ensure that there is no difference in data reception on all quality assurance stakeholders
3. **Confidentiality,** confidentiality of respondents' data Quality assurance is important to maintain the honesty of participants in answering questionnaires or reporting complaints of quality violations.
4. **Reliability,** Information obtained must be guaranteed validity. There should be no errors in data processing and the results are unchanged when viewed by all stakeholders
5. **Documentation,** data documentation and quality evaluation results are required to find out the progress roadmap or deficiencies in terms of quality assurance.

4.4.2. Data Entity Candidate

The entity candidate is an entity that will be part of the organization's information architecture plan, thus the entity to be defined is a business entity and based on that business entity will be defined data entity. In accordance with the value chain conditions
The data entity is then developed based on the specified entity candidate. Besides these data entities are also developed by observing the flow of information that has been running at this time and what information is used by every major business function

Table.2: Data Entity Candidate

No	Business Entity	Data Entity
1	LPMI Information System Entity	1. News Entity 2. Document Entities 3. Profile Entity
2	Monitoring and Evaluation Entities	4. Complaint Entity 5. Entity Questionnaire
3	Entity report quality recommendations	6. Entity Evaluation Results 7. Report Entity 8. Dashboard Entity
4	Academic operational entity	9. Student Entity 10. Lecturer Entity 11. Staff Entity 12. Alumni Entity 13. Entity Subject
5	Resource management entity	14. LPMI Member Entity 15. Entity Implementing Agency 16. Respondent Entity

4.5. Application Architecture

The purpose of creating application architecture is to define the applications needed to organize the data and support the business functions of the organization.

4.5.1. Application Characteristics

The quality assurance process requires an application that is capable to merge the principles of consistent, honest and open and effective and efficient in order to maintaining the quality of the organization, following application characteristics required to support the monitoring and evaluation function of quality assurance:

1. **Online,** the application is able to see whenever and wherever it needs.
2. **Responsive Design,** the application is able to access through various information devices
3. **User friendly,** the application will be use for many stakeholders of quality assurance then it required application is easy to use
4. **Transparency,** the evaluation process can be seen clearly.
5. **Real-time,** the direct evaluation process can be viewed honestly and openly

4.5.2. Application Candidates

Determination of application candidate based on business function and information system requirement that has not been fulfilled in existing system and application.

Table.3: Application Candidates

No	Application Group	Application Candidates
1	LPMI information system	1.1. LPMI news web application 1.2. Web application quality document archive
2	Monitoring and evaluation system	2.1. Web application questionnaire 2.2. Web application complaints
3	Quality recommendation system	3.1. Web application evaluation report 3.2. Web app dashboard achievement of quality
4	Academic operational system	4.1 Application of participant management questionnaire
5	Resource management system	5.1 Application of Intitution Management

4.5.3. Relationship Application to Business Function

The relationship between application and business function is an application candidate relation to LPMI's business function that has been previously defined.

Table 4: Relationship Application to Business Function

No	Applications	1.1	1.2	2.1	2.2	3.1	3.2	4.1	5.1
1	LPMI news web application	√							
2	LPMI document archive apps		√						
3	Questionnaire web apps				√				
4	Complaints web apps			√					
5	Evaluation Report Apps					√			
6	Dashboard achievement of quality	√					√		
7	Participant Management Apps							√	√
8	Institution Management Apps							√	√

1. LPMI Information System Application Group
This application manages all forms of quality assurance documentation. Starting from news, announcements and quality assurance documents

2. Monitoring and Evaluation Application Group
This application manages the monitoring process of academic civitas complaints about quality assurance and evaluation that is a periodic questionnaire conducted by all stakeholders of the quality assurance policy

3. Quality Recommendation Application Group
This application manages the calculation of evaluation result, recommendation of academic quality improvement and target of academic quality improvement

4. Academic Operational System Application Group
This application manages the data of participant evaluation of the questionnaire, course and schedule of evaluation implementation

5. Resource Management Application Group
This application manages LPMI agency data and implementing stakeholders of the quality policy.

4.6. Technology Architecture

Technology architecture is the most important part in the implementation of an information system because the architecture of this technology describes the position and technology used in supporting the operational information system of the internal quality assurance institution STT Ibnu Sina Batam.

Based on what has been obtained in the previous architecture, at this stage that will be defined is how the application of technology to the application that has been defined. This section will also illustrate the enterprise network architecture and business system architecture from LPMI STT Ibnu Sina Batam, based on business systems that have been obtained in the previous stage.

Table.6: Technology Principles

No	Technology	Description
1	Operating System	1. Supports software for the development of the latest applications 2. Have the ability to serve many users
2	Hardware	1. Supports the latest technologies and applications 2. Have a high level of service and utilization
3	Application	1. Have a responsive design to support various information technology devices 2. Facilitate the user in using the application 3. Connected with the internet to keep on access 4. Have a minimum error or miscalculation 5. Have application usage documentation 6. Each application must go through the testing process 7. Priority in new application development is given to Informatics Engineering students before submitting to application developer
4	Communication And Network	1. Availability of network in installation environment must continue to exist 2. Network capacity supports the development of further information systems 3. Network equipment must support the latest technology or further technology development 4. Able to serve supporting devices with high level of availability
5	Database	1. Separate from the application to lighten the network capacity load 2. Separate from the data of other agencies or agencies to maintain the

		confidentiality of users 3. Able to serve with high level of availability 4. Compatible with programming languages to support the development of information systems 5. Online stored information is available on a continuous basis and may be updated regularly as required 6. In accordance with the needs of the organization
6	Security	1. Supports both physical and electronic security systems 2. Access to technology is limited and documented 3. Authentication for application and technology permissions supports a good encryption system

4.6.1. Network Architecture

This network architecture describes the physical design of the network as well as the position of each server both the function and the flow of data flowing from each server
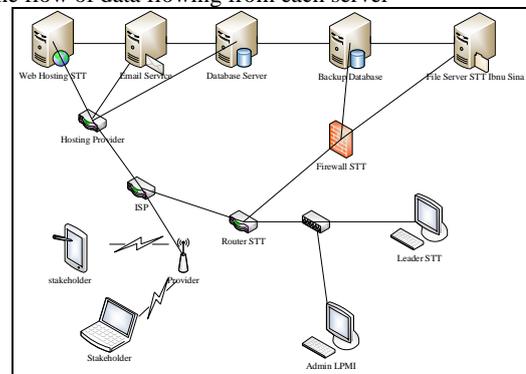
Fig. 4: Network Architecture LPMI

1. **Infrastructure,** Infrastructure LPMI information system will be divided in two places and integrated i hosting provider that will handle LPMI website, email service and database server while the server side STT Ibnu Sina Batam will handle database backup and file server
2. **Security,** server-side security of the hosting provider will be handled by the hosting company and server side STT will use third party security tools required both software and hardware
3. **Access,** use of routers in the STT area for administrative purposes and network services accessed on the local area network STT Ibnu Sina Batam
4. **Multiplatform,** network devices capable of serving various communication media devices that use the internet network

4.6.2. Architecture of Technology Base on Business Functions

Conceptual architecture of technology to business functions is a technology architecture used to implement and organize the application and database
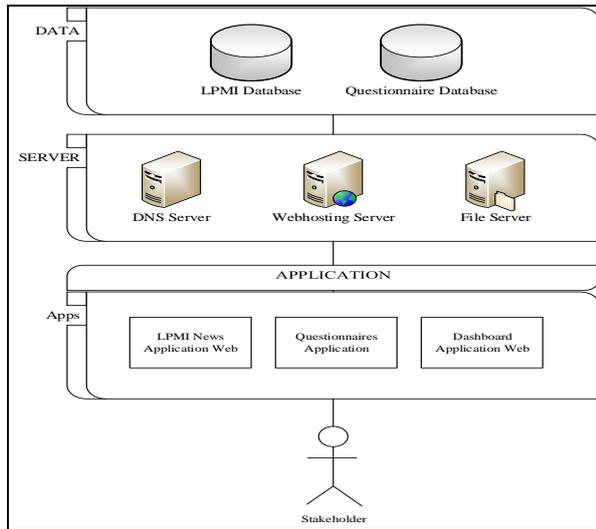
Fig. 5: Architecture of Technology Base on Business Functions

4.7. Implementation Plan

At this stage, the preparation plan of enterprise architecture implementation, enterprise architecture design based on business model and design of previous architecture

4.7.1. Implementation Sequence of Application

The first step taken is to prioritize the development and application of the application based on business functions that have been defined

Table.7: Implementation Sequence of Application

Cue No	Apps No	Application Name	Action
1	5.1	LPMI Management Application	New Apps
2	4.1	Application Management Participants / Respondents	New Apps
3	1.1	LPMI News Web App	Development
4	1.2	LPMI Document Archive Web	New Apps
5	2.2	Web Complaint Application	New Apps
6	2.1	Web Application Questionnaire	New Apps
7	3.1	Web Application Evaluation Result Report	New Apps
8	3.2	Web Dashboard Quality Application	New Apps

4.7.2. Estimated Application Implementation Time

Estimated application deployment is needed to find out the time needed when app implementation is done. Given the implementation of quality assurance carried out periodically at the end of each semester then the estimated need of application development time is 6 months with other provisions as follows

1. The parties involved are committed to the implementation of this enterprise architecture project
2. During the development of the system there is no policy change affecting the quality assurance process
3. The resources available are adequate for implementation
4. Specification and sequence of implementation adjusted to the order that has been prepared previously
5. The equipment used does not experience any disturbance or damage in the implementation process
6. Costs available are adequate for implementation in accordance with the architecture and business functions of an organization's defined information system

Table.8: Estimated Application Implementation Time

No	Application Name	Months					
		1	2	3	4	5	6
1	LPMI Management Application	√					
2	Application Management Participants / Respondents	√					
3	LPMI News Web App		√	√			
4	LPMI Document Archive Web		√	√			
5	Web Complaint Application			√			
6	Web Application Questionnaire			√	√		
7	Web Application Evaluation Result Report				√	√	
8	Web Dashboard Quality Application				√	√	
9	Application Testing						√

4.7.3. Factors Affecting Implementation Success

Factors that can affect the success of an important information system is considered considering the business function of quality assurance is very important for a college to achieve the goal and development of future quality assurance

1. Management support in implementation of quality assurance information system
2. Upgraded technological capabilities and support
3. Resources capable of performing the function of quality assurance management information system
4. Stakeholders committed to improving the quality of higher education
5. Managerial and leadership skills committed to evaluating and improving the quality of higher education

5. Conclusion

5.1. Conclusion

Based on the background and research and discussion conducted on the business functions of the company internal quality assurance agency STT Ibnu Sina Batam with the method of enterprise architecture planning, it can be drawn conclusion as:

1. By applying the method of architecture planning on the main business function of LPMI that is monitoring and evaluation of quality guarantee generated enterprise architecture of LPMI information system with 16 entity data architecture and 8 application proposal
2. Based on the business functions, the architectures and factors of enterprise support that have been previously defined the implementation plan of enterprise information system architecture LPMI that is the sequence of application workmanship and the estimated time of application for 6 months

5.2. Suggestion

1. In order for the implementation of this enterprise architecture can be done required commitment from the management, agencies and implementing institutions of quality policy to continue to improve quality service in college
2. Enterprise architecture that has been defined must be well managed and updated to follow the development of technology and information systems in accordance with the direction of quality assurance policy in universities
3. Blue print in this design of enterprise architecture is a high-level model of information architecture that requires more detailed design before implementation.
4. With the fulfillment of technology needs and quality assurance information system will encourage the improvement

of the quality of universities so that will affect the increase of college accreditation

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