Injuruty: Interdiciplinary Journal and Humanity
Volume 2, Number 6, June 2023
e-ISSN: 2963-4113 and p-ISSN: 2963-3397

DESIGN OF STRATEGIC INFORMATION SYSTEM BLUEPRINT WITH ENTERPRISE ARCHITECTURE PLANNING METHOD

Reza Jakaria Rahmanto, Wing Wahyu Winarno, M Rudyanto Arief
Universitas Amikom Yogyakarta, Central Java, Indonesia
Email: reza.1223@students.amikom.ac.id, wing@stieykpn.ac.id, rudy@amikom.ac.id

Abstract

The rapid and dynamic development of information technology in today's digital era has a significant impact on organizations in managing information and data. This also applies to universities that need to optimize data and information management in order to improve service quality and organizational performance. Therefore, it is necessary to design an appropriate and integrated strategic information system, which is able to support the decision-making process effectively and efficiently, as well as integrate various functions and processes in various organizational units on campus. Enterprise is a set of organizations that have several general goals / principles and / or a baseline. Higher education is one of the enterprises engaged in education. The increasing need for data and information in business functions carried out by a university is one of the drivers of the use of information systems in universities. Therefore, in this study will be designed on 3 (three) architectural models, namely data architecture, architecture, applications and technology architectures using the Enterprise Architecture Planning (EAP) method.

Keywords: Information Systems; Enterprise Architecture Planning; Data Architecture; Application Architecture; Technology Architecture.

INTRODUCTION

The rapid and dynamic development of information technology in today's digital era has a significant impact on organizations in managing information and data (Wirawan, 2020). This also applies to universities that need to optimize data and information management in order to improve service quality and organizational performance. Therefore, it is necessary to design an appropriate and integrated strategic information system, which is able to support the decision-making process effectively and efficiently, as well as integrate various functions and processes in various organizational units on campus.

Another research conducted at Dharma Wacana College stated that the blueprint of information systems is useful as a foundation for the development of better overall information systems in the university's business process (Utomo & Wellem, 2013). The research was conducted using Enterprise Architecture Planning method. The conclusion of the study states that the functional business model consists of nine function areas (five main function areas and four supporters) and 123 business functions for a total of 29 organizational units located in one business location (one building), with 10 different information access locations in the value chain model and business function mapping matrix with organizational units (Saxton et al., 1979).

In previous research using the zachman framework. The conclusion of the study is that the resulting SI / IT blueprint can help the course of academic business processes, data architecture, application architecture and technology architecture so that they are interrelated and can facilitate the management, delivery of data and information Ekstrom, (2012) and the Ward and Peppard planning method shows that the use of information technology based on SI applications is an important part of fulfilling information services and business processes in higher education organizations (Wyatt & Spiegelhalter, 1991).

Previous research used the Ward and Peppard planning method. Successfully see from various points of view in terms of internal and external strengths and weaknesses on the business side or IS/IT, so as to identify the needs of the future IS/IT portfolio needed (Prasetya, 2006). In research using the EAP method is a strategy that can be used to help align existing businesses with existing technology. This method can identify starting from business processes to planning the implementation of information systems to be created (Djalal et al., 2015).

The role of information systems only serves as a support in terms of operational cost efficiency, increasing operational accuracy and productivity, so now its role can be increased as one of the strategic tools to improve competitiveness and decision making . There are three main objectives of efforts to implement IS / IT in a company or organization, namely first is to automate various processes with the aim of improving work efficiency, second is to maximize management effectiveness by meeting information needs for decision making, and the third is to add competitive advantage and improve company competitiveness by changing styles and ways of doing business (Wallace et al., 2000).

In strategic information system planning, a complete and easy-to-use methodology is needed. Enterprise Architecture Planning (EAP) is a method developed to build enterprise architecture. The EAP stage involves 7 (seven) blocks, each of which is built through 4 (four) stages, namely the Planning Initialization stage, the current Enterprise Condition Review stage (business modeling and current systems and technology), the Enterprise Plan Review stage in the future (data architecture, application architecture and technology architecture), and the last stage of the Implementation Plan so as to produce a Blueprint that can later be used as a reference for information system development (Wallace et al., 2000).

Enterprise Architecture Planning successfully outlines the organizational conditions and business processes carried out at UOGP. In the study, organizational needs, especially in business processes in the academic and information technology fields were studied by considering the interests of the organization at UOGP, the enterprise architecture of information systems that was successfully created will be a reference for short-term and long-term technology (Heart et al., 1998). Meanwhile, in research conducted at the University of Muhammadiyah East Kalimantan, there are problems in the academic department, where the management of academic activities of each faculty has developed supporting information systems for their respective academic activities, so that what happens is the difficulty in integrating data between different systems and often overlapping features with existing information systems. So the problem of information systems in the Academic section of the University of Muhammadiyah East Kalimantan will be found to solve the problem. This research focuses on designing strategic information system blueprints in the academic section

using the Enterprise Architecture Planning (EAP) method (Supriadi et al., 2019). This research is expected to contribute to the University of Muhammadiyah East Kalimantan in improving service quality and organizational performance.

Based on the background presented above, the problem can be formulated as follows: How to make a blueprint for designing a strategic information system at the University of Muhammadiyah East Kalimantan to improve academic services?

In solving the problem, this research uses a case study approach on qualitative methods in data collection that will be analyzed to find out the most significant data in producing the results of the Blueprint for Information System Development at UMKT. The purpose of this study is to contribute research results that can be used as a blueprint design for strategic information systems that can support the decision-making process of the leadership of the University of Muhammadiyah East Kalimantan.

RESEARCH METHOD

This study uses the Enterprise Architecture Planning (EAP) Method because it is considered by researchers to have the best exposure to solve the problems raised. While the research methodology uses qualitative with a case study approach (Tetnowski, 2015).

Data collection techniques are the most strategic step in research, because the main purpose of research is to obtain data. Data collection can be done in a variety of sources, and in a variety of ways. When viewed from the data source, the data collection can use primary data sources, namely data sources that directly provide data to data collectors and secondary data which are data sources that do not directly provide data to data collectors, or it can be said that secondary data can be obtained through other people or documents. Furthermore, when viewed in terms of data collection methods or techniques, data collection techniques can be done by

1. Observation

   With this method, researchers conduct direct analysis and observation of the activities studied. In particular, observing the application of information systems and information technology by collecting internal and external data at the University of Muhammadiyah East Kalimantan.

2. Interview Method

   Researchers conducted interviews to collect data by asking the research subjects verbally for information directly. The resource persons to be interviewed are sources who are related and relevant to the data desired by the researcher. The data obtained from the interview will be the primary or primary data source.

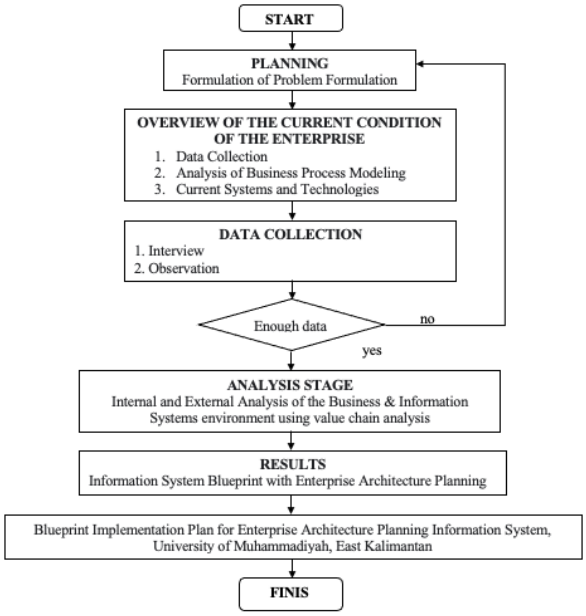

Figure. 1 Research Flow

RESULT AND DISCUSSION

Data Collection Results

Data collection carried out according to interviews and observations with the Rectorate of the University of Muhammadiyah East Kalimantan is related to the importance of having a strategic planning of information systems in campus academic information systems. Business process analysis is carried out using Value Chain. The results of data analysis are used as a basis for producing strategic planning of academic information systems in academic services.

Value Chain Analysis Results

In the structure of a compulsory college can indicate which parts and what can represent that can be handled by the institution of higher education in this case the institution of higher education (Graham et al., 2013). So that in determining the organizational structure will be very decisive in the business modeling step. University of Muhammadiyah East Kalimantan as a higher education institution, its business process cannot be separated from carrying out a Tri Dharma obligation of higher education, namely education, research and community service. So that the main functional areas can be described based on the concept of Value Chain (value chain) in figure 2 below which in general can be grouped into main activities and supporting activities.

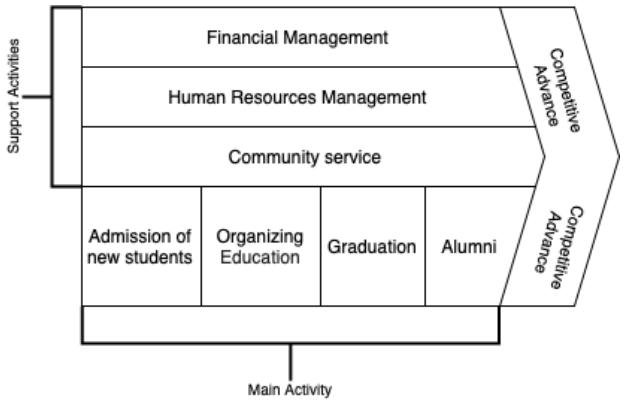

Figure 2. Value Chain University of Muhammadiyah East Kalimantan

The main activity consists of:

a. New Student Admission

Student admission can be explained as activities that include several processes including the process of accepting new students, selecting new students, and collecting new students.

b. Education Delivery

The implementation of education is a process that includes academic administrative processes related to the curriculum, lecture processes, examinations, managing transcripts and other academic processes.

c. Graduation Process

The implementation of the graduation process is an activity that accommodates the graduation process starting from graduation registration to the student graduation procession.

d. **Alumni**

Alumni management is an activity to manage alumni data, distribution of alumni workplaces and as a career center to assist alumni in finding job vacancies.

Supporting activities consist of:

a. Financial management
b. Human resource management
c. Community service

Future Enterprise Fist

At the enterprise planning stage in the future, architectural modeling is carried out based on the Results of *Value Chain Analysis and* business Boubaker et al., (2014) process modeling that has been carried out in the previous stage and refers to the results of the analysis of the current condition of systems and information technology at the University of Muhammadiyah East Kalimantan.

Data architecture

Data architecture has the purpose of defining data that will be used to develop and build the architecture of an application. Based on the steps contained in EAP, the data architecture is defined into 2 (two), namely:

Data entity candidate

Candidate entities are entities that will be part of the architectural planning of the institution, so the determination must be based on the conditions of the main business functions in the *value chain described* earlier, based on this description, the entity to be defined is a business entity and based on the business entity it can be defined data entity. Based on the list contained in the value chain list, the list of main business entities can be defined as follows:

1. New student admissions entity
2. Education delivery entity
3. Graduation entity
4. Alumni Entity

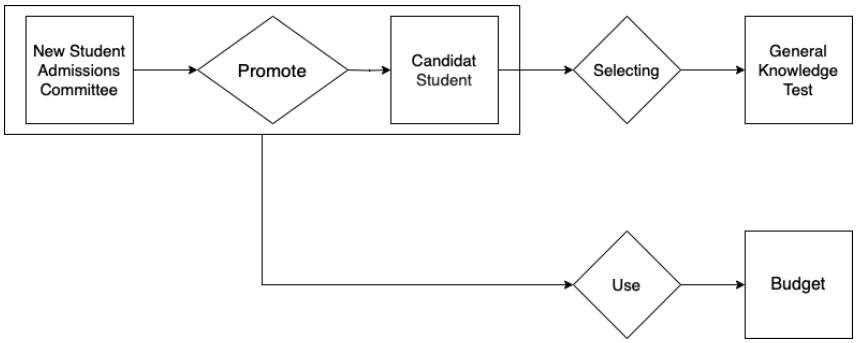

Figure 3. ERD New Student Admission

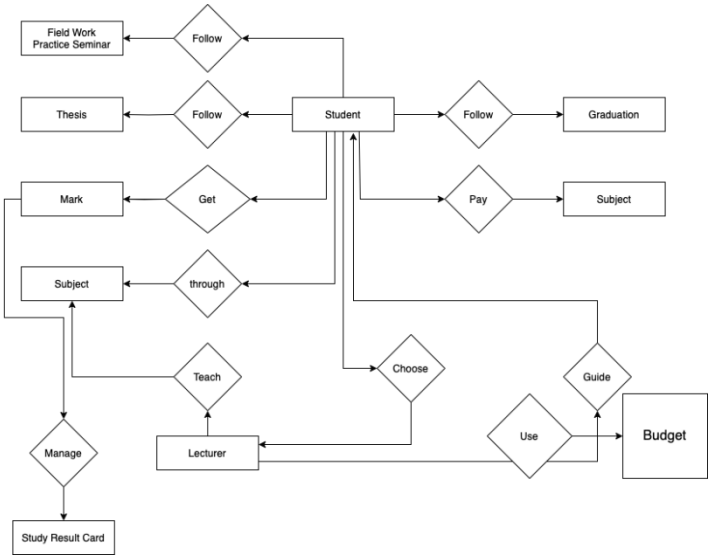

Figure 4. ERD Course Process

The purpose of creating and defining application architecture is to define the main applications needed to organize data and can support the business of the agency or organization. The architecture of this application in EAP is part that must be defined

Table 1. Application Candidates

NO	Application Groups	Application Number	App Name
1	New Student Admission Information System	01:01	PMB Budgeting
		01:02	Prospective Student Registration on Campus
		01:03	Online Prospective Student Registration
		01:04	General Proficiency Test
		01:05	TKU Result Processing
		01:06	Re-register New Students
		01:07	Freshman List
2	Academic information systems	02:01	Curriculum Management
		02:02	Academic Calendar
		02:03	Guardianship Process and Management
		02:04	KRS Preparation & Changes
		02:05	Student Administration
		02:06	Academic Leave Administration
		02:07	Exam Administration
		02:08	Seminar Administration PKL
		02:09	Thesis Administration
		02:10	KHS
		02:11	Online Academic Information
3	Graduation	03:01	Student Status Assignment
		03:02	Transcript Generation
		03:04	Diploma Making
4	Alumni	04:01	Alumni Data Collection
		04:02	Alumni Usage Data Collection

Technology architecture

Based on what has been obtained in the data architecture and application architecture described above, at this stage will be defined how the application of technology to applications that have been defined (Zheng et al., 2017). This section will also describe enterprise network architecture and architecture. system in the business process of the University of Muhammadiyah East Kalimantan, based on the business system that has been described in the previous stage.

This stage of the system and technology, there are hardware, software, and network systems used at the University of Muhammadiyah East Kalimantan. The network architecture to be defined is a proposed architecture, to improve or add to the support capabilities of applications that have been defined in the previous stage

The proposed network architecture design adds 2 (two) servers, namely DNS servers that will provide services so that the entire academic community can connect to the internet, while web hosting servers are used to support previous Web Hosting Servers that only use 1 (one) web hosting server, so that they can also be used by the student community. Both servers can also make it possible to support application development patterns based on online applications.

From the description of the network architecture proposal above, it is also necessary to propose a business system architecture at the University of Muhammadiyah East Kalimantan. This business system architecture is obtained from the main business processes that will be carried out by the institution, where each business function is derived to become an application.

Implementation Plan

The implementation plan has the purpose of formulating and preparing plans for the implementation of the architecture that has been designed, the architecture is data architecture, application architecture and technology architecture. The implementation plan is the last stage in the EAP method.

East Kalimantan.

a. Order of Application Implementation Plan

The order of application implementation is based on the relationship between the application and existing data entities and is presented on a matrix of data, where the matrix is the result of the application architecture that has benefits, as follows:

1) The data can show the state of data sharing application architecture data sharing.
2) Used in making the order of what applications will be built using references, applications that generate data must be in

Implement it first than applications that require data. Based on the reference above, the implementation plan based on the data driven model can be sorted as suggested in the EAP method, then the stages that will or must be implemented by making changes to the order of columns and rows in the application matrix to the data, will form coordinates and marked with the character C = Create.

Applications that have been sorted will be grouped into implementation roadmap groups, depedency data is not the only determinant of the order of applications to be built There are several other factors that must be considered, namely: benefits, needs, risks, and their direct impact on the organization can be used as the next reference in implementing applications.

Based on the data shown by table 2 below, 24 applications that support the organization's main business functions can be identified, and all of these applications do not exist at all and there are about 10 (ten) applications that are very potential to be developed immediately.

Table 2. Application Implementation Sequence

No	Applikasi SI	Month Start	Month Completed	Duration
1	PMB budgeting	1	3	2
2	Online New Student Registration	1	3	2
3	Academic Information System	3	6	3
4	Academic Calendar Preparation	6	7	1
5	Elarning	7	9	2
6	Administration of PKL Seminar & Thesis	9	10	1
7	Curriculum Management	10	11	1
8	Diploma Making	11	12	2
9	Alumni Data Collection System	12	14	2
10	Trust Process & Management	14	16	2

Table 3. Roadmap Implementation Plan

No	Information System Applications	Strart	Finish	Year Ke-1												Year Ke-2			
				1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
1	PMB budgeting	01-Jan	01-Mar																
2	Online New Student Registration	01-Jan	01-Mar																
3	Academic Information System	01-Mar	01-Jun																
4	Academic Calendar Preparation	01-Jun	01-Jul																
5	Elarning	01-Jul	01-Sep																
6	Administration of PKL Seminar & Thesis	01-Sep	01-Oct																
7	Curriculum Management	01-Oct	01-Nov																
8	Making diplomat	01-Nov	01-Dec																
9	Alumni Data Collection System	01-Dec	01-Feb																
10	Trust Process & Management	01-Feb	01-Apr																

1) Planning The implementation of all applications on the roadmap will be carried out by 2 (teams) consisting of 4 programmers and 2 system analysts and system design.
2) The average processing schedule takes between 30 to 90 days for each application

CONCLUSION

Based on the results of modeling that has been carried out by creating an enterprise architecture with the Enterprise Architecture Planning (EAP) method, it can be concluded that enterprise architecture is needed by the University of Muhammadiyah East Kalimantan in order to have a standard enterprise information architecture and can be used as a guideline in developing information systems.

The EAP model that has been created and proposed is not the final architecture of the information system of the University of Muhammadiyah East Kalimantan, so that the architecture has a maximum limit that can be used for the next 5 (five) years so that the University of Muhammadiyah East Kalimantan will continue to develop strategic planning of information systems.

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