

# INFORMATION TECHNOLOGY BLUE PRINT DESIGN USING ENTERPRISE ARCHITECTURE PLANNING IN POLITEKNIK NEGERI BALI

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**Abstract.** The Information Technology (IT) blueprint basically contains a strategic plan of the company / institution in implementing and developing information technology / information systems in the company / institution. This study aims to design the IT Blueprint model in terms of data architecture, application architecture and technology architecture using the Zachman Framework enterprise architecture, where the blueprint is a comprehensive and integrated information technology system design. The methodology used in this study refers to the framework of Enterprise Architecture Planning. The results of this study obtained data architecture design, applications and technology along with data entities, business entities and business processes and business process functions so that they can illustrate the IT blueprint model along with the implementation roadmap that serves as a reference and guideline campus of Politeknik Negeri Bali (PNB).

*Keywords: enterprise architecture planning, design, blueprint*

## 1. INTRODUCTION

Various studies show that information technology plays a very important role in the continuity of an organization. The results of the gap analysis of governance conditions will be used as the basis for future strategies for improving information technology governance. In the development of information systems, integration factors also need to be considered to reduce gaps in the system development process. To reduce this gap, it is necessary to improve business processes and design information system technology such as (data), design of application infrastructure and design of network infrastructure (technology) so that universities are obliged to develop and implement and take advantage of advances in information technology to improve their ability to manage their enterprises.

Information technology provides various business opportunities to improve efficiency and effectiveness as well as provide a competitive edge. The impact of the existence of information technology forces a company to change in the face of technological developments grow so fast. Digital transformation is the right term to describe these conditions. Digital transformation encourages companies to adapt to digitalization and be able to create more value for the company. Digital transformation has an impact on more efficient business operations, better supply chain management, reduced cost and resource requirements and is able to generate better profits.

There is no planning for the development of further integrated Information Technology and Information Systems such as HR information systems, research information systems, scholarship information systems, career alumni information systems, paperless information systems, asset information systems, plagiarism information systems, library information systems, other information systems needed by the related institutions and work units in PNB will result in weakness in accelerating to obtain the required data information, such as during accreditation study programs, where existing data information must be accurate and connected to other data. Therefore, designing an information technology blueprint / blueprint is needed to become a new foundation in planning, implementing, implementing, implementing and developing information technology in PNB. Through the information technology blueprint, it will be able to describe in detail the direction and needs of information

technology development both in terms of software and hardware needed, and it is hoped that all work unit activities will be integrated and effective.

Various studies have shown that information technology has played an important role in the sustainability of an organization. The results after analyzing the conditions of governance will form the basis of future information technology governance management strategies [1]. In the development of information systems, integration factors also need to be considered to reduce crises in the system process. To overcome this, it is necessary to improve business processes and design information technology such as information infrastructure design (data), application infrastructure design and network infrastructure design (technology) so that universities are obliged to develop and implement and take advantage of advances in information technology to improve the capabilities of enterprise enterprises - her [2].

The absence of planning for the development of further integrated Information Technology and Information Systems such as HR information systems, Research information systems, scholarship information systems, career alumni information systems, paperless information systems, asset information systems, plagiarism information systems, library information systems, other information systems needed by related institutions and work units in PNB will result in weakness in accelerating to obtain the required data information such as during the accreditation process for study programs and institutional accreditation, which are required to provide accurate and fast data information and digitally recorded on the server.

Therefore, the design of an information technology blueprint / blueprint is needed by the SIM Unit to become the basis and guideline for planning, structuring, implementing, utilizing and developing information technology in PNB today and in the future. Through the information technology blueprint, the SIM Unit can describe in detail the direction and needs for the development of information technology needed and it is hoped that all activities of the university work unit will be integrated and efficient.

2. METHODS

In this study, the stages used to analyze the IT Blueprint design use the Enterprise Architecture Planning (EAP) method, which is a blueprint for organizing all enterprise business processes, required information and supporting technologies. In enterprise architecture, it consists of defining the present state, a vision of the future status of the business as well as technology, and other ways of managing complexity [3]. According to Marc and Lankhorst [4], enterprise architecture is part of the principles, methods and models used in the design and realization of enterprise organizational structures, business processes, information systems and infrastructure.

Spewak defines Enterprise Architecture Planning (EAP) as "the process of defining an architecture for the use of information to support a business and plans to implement that architecture"[5]. Enterprise Architecture Planning is based on the Business Systems Planning (BSP) approach developed by John Zachman in 1980 [6]. It takes a business-oriented approach to architectural planning to provider: data quality, access to data, adaptability to changing requirements, interoperability and data sharing, and containment. cost.

The ultimate goal of Enterprise Architecture is to define practical and applicable technology applications and projects along with the projects needed to prepare an organization for the IT environment of the future. This view counters the more traditional view that applications must be defined before data requirements are determined or provided. [7].

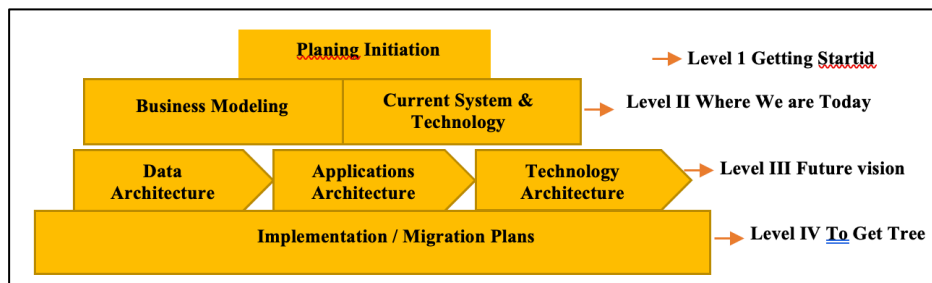


Figure 1. Layer Enterprise Architecture (Spewak)

**The Enterprise Architectural Planning Model consists of four levels:**

Level 1 - getting started: This layer leads to the creation of an EAP work plan and emphasizes the need for a high level of management commitment to support and resources the next six components (or steps) of the process. This consists of Initiation Planning, which includes in general, decisions about the methodology to be used, who should be involved, what support is needed, and what tools to use.

Level 2 - where we are today: This layer provides a baseline for defining the eventual architecture and long-term migration plans. Consists of: Business process modeling, compilation of a knowledge base of business functions, information used in conducting and supporting various business processes, Latest Systems and Technologies, definitions of current application systems and supporting technology platforms.

Level 3 - the vision in which we want to be: Arrows describe the basic definition process lines: data architecture, application architecture, and technology architecture. Consists of: Data Architecture - Defines the main types of data required to support a business. Application Architecture - Defines the main types of applications required to manage that data and support business functions. Technology Architecture - The definition of the technology platform required to support applications that manage data and support business functions.

Level 4 - how we plan to get there: It consists of an Implementation / Migration Plan - Definition of the sequence of application deployments, implementation schedule, cost / benefit analysis, and clear migration path.

The stages of this research begin with analyzing the main activities of the Teaching and Learning Process, Research and Community Service. Then analyze supporting activities, namely financial management, human resource management, and so on. The results of the analysis of the main and supporting activities will be carried out by realizing planning, reviewing current systems and technology by modeling business processes, designing technology architectures, application and data architectures and implementation plans in the form of IT Roadmaps and Blueprints.

### 3. RESULTS AND DISCUSSION

#### 3.1 Analysis of the Existing Condition of the SIM Unit

The Management Information System Unit (MIS) at Bali State Polytechnic has an important role in planning, designing and implementing computer network infrastructure. Starting 2017, the internet network uses a bandwidth of 300 Mbps (1: 1) with a National ISP. The implementation of the information system that has been developed by the SIM Unit began in 2016, namely the Online Information System (SION) and in 2018 it has been used but has not been maximized because there are still things that need to be refined and developed according to needs, so that in 2020 the utilization can be maximized. In 2020, the SIM unit will design and implement an integrated payment model for UKT with Bank BPD Bali, payment for new student registration online, online student re-registration, PBM reporting with Pider Dikti, lecturer reporting for promotion and lecturer certification with SISTER, Registration of online lecturer research profiles, Mobile lecturer absence, implementing the Online Journal Application and e-learning.

#### 3.2 Blueprint Design

##### a. Business Process Development

Based on the results of observations, interviews and analysis carried out on business processes at the PNB Campus, an overview of the problem is obtained, so it is necessary to develop and integrate data between existing information system data and information system data needed for the short and long term. These problems are as illustrated in Table 1.

Table 1 Business Problems in PNB Campus Process

Business Process Activities	Problem
New Student Admission / Admission	There is no integration with the Partner Bank when payment for registration for obtaining User and PIN
Student UKT Payments	There is no partner bank to support UKT payments
Data Reporting Higher Education	There is no feeder information system that connects the Campus Academic Information System with the Central PDDikti Information System when reporting academic data.
Lecturer Workload	There is no administrative management available. Lecturer workload online
Human resources	There is no optimal management of personnel data. There is no integrated fingerprint management
SKP	There is no web-based information system management available for input and reporting of employee SKP
Repository	There is no university repository for presenting and storing digital data from theses, researches and scientific journals.
Research	There is no university repository for presenting and storing digital data from theses, researches and scientific journals. There is no research theme search feature that is used to prevent recurrence of research themes.
Alumni and Career	Unavailability of alumni and career data management which is one of the important information for universities and the general public
Access to Information Report data to leaders	The unavailability of provision of information for reporting that can be accessed by the leadership to be used as material in decision making for executives regarding all activities that occur within the university
Data Cloud	System Unavailability of online data storage resources for lecturers, employees and students
Libraries	Data Cloud System Unavailability of online data storage resources for lecturers, employees and students
BLU	Unavailability of management of BLU transactions The unavailability of recording income from borrowing and leasing assets, borrowing and leasing space and buildings and technology assets

#### b. Data Entities and Business Entity Relationships

The characteristics of the data have been defined so that the next process is the identification of the characteristics of the identification and clarification of data for the business processes in the training high. This can be done by referring to Table 2 as follows:

Table 2 Identification of Data Entities and Business Entity Relationships

Data Entity	Business Entity
New Student Admission Payment	User, Pin, Partner Bank H2H
UKT Payments	Student Payments, Partner Bank H2H
Data Reporting of Student Colleges	Lecturers NIP, Student Study Results, Historical Teaching Lecturers, Alumni
Budget	Budget code, Name of budget
SDM	NIP Employee, Employee Name, Transfer, History, Education, Rank, Class, Position
Paperless	Letter code, letter name, disposition, incoming mail, outgoing mail
SKP	Employee NIP, Employee Name, Rank, Class, Position, Performance
Repository	Code repo, Students, Lecturers, Employees, Thesis, Thesis, Research, Scientific Journal
Research	Code, Lecturer-Employee NIP, Name, Research
Alumni and Career	NIM , Name of Student, Address, Job
Access to Data Report information to leadership	NIM, Student Name, Address, Work, Employee NIP, Employee Name, Rank, Class, Position, Performance
Library	NIM , Student's Name, Biodata
BLU	Transaction Code, BLU Code, Building, Asset
Business Dashboard system	Academic System, Portal, Registration, Payment, Scholarships, HR, BKD, SKP, Research, Budget, BLU

### c. Candidate Application and Application Gap Analysis

There are 14 candidates for new information system applications that will be developed in the short and long term. Namely, 1) Research, 2) Human Resources, 3) BKD, 4) SKP, 5) Feeder, 6) Repository, 7) Scholarships, 8) Career Alumni, 9) Paperless, 10) BLU, 11) Assets, 12) Budget, 13) Busines Dashboard System, 14) Access to data report information to the leader.

The application comparison between the current application architecture and the application to be developed is obtained a total of 34 applications. There are 14 new applications that will be developed, and 6 customized applications, while 10 applications are integrated.

### d. Technology and Technology Gap Analysis

The implementation of a computer network topology that has been used is to use a Star Topology where all connections are centralized on one Switch node (Manager switch). The current technology architecture that will be used to support the business functions of developing information systems in PNB is as follows:

- a. The hardware that is owned is adequate for the technology architecture
- b. The existence of a centralized server room so that all servers and routers as well as microtic and other network devices are located in one special room. (SIM unit).
- c. It allows the addition of servers and rack servers for long-term information system implementation
- d. Allows for the development of networks in new buildings to support business functions for the development of new information systems.

## 3.2 Implementation Plan

### a. Order of Application Implementation

Determining the sequence of application architecture implementation to be developed based on the current business process needs and based on an organizational perspective so that the order of the application architecture is as follows:

Table 3. List of Application Implementation Sequences

Serial Number	Application Candidate Name
1	Repository Information System Application
2	Information System Applications
3	Research Information System Applications
4	BKD Information System Application
5	Applications for Career Alumni Information Systems
6	SKP Information System Application
7	Feeder Information System Application
8	Paperless Information System Applications
9	Information System Applications Data reports to leaders
10	Businnes Dashboard System Information System Applications
11	Budget Information System Applications
12	Asset Information System Applications
13	BLU Information System Applications
14	Library System Applications

**b. IT Blueprint Design Model in PNB**

The IT Blueprint Business Process Architecture at PNB consists of 2 process domains. First, the Main Domain (Tri Dharma Perguruan Tinggi), namely Education, Research and Community Service and Second, namely the Support Domain. The following is a drawing of a blueprint design model.

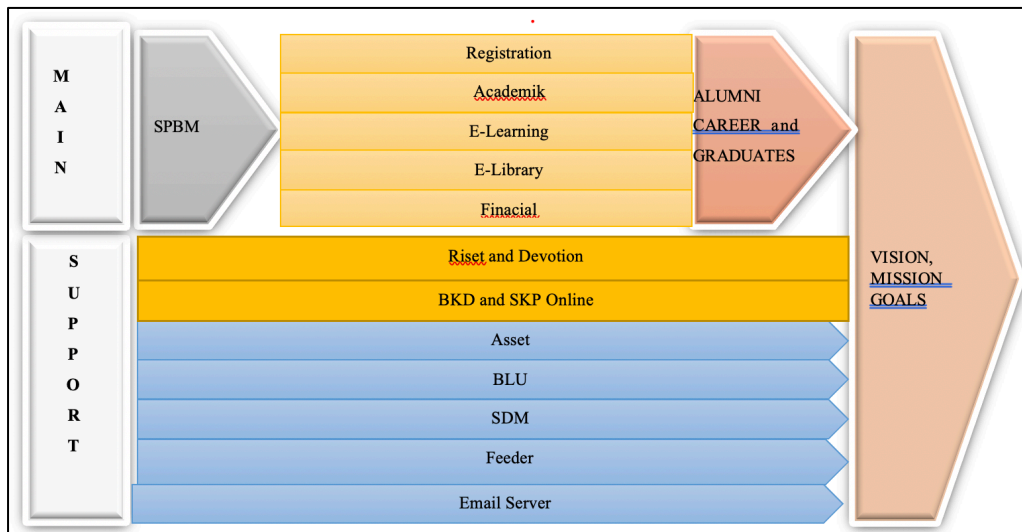


Figure 2. Model blueprint design.

**c. Implementation Roadmap**

The stages of the Road Map for Application Architecture Implementation are prepared based on the perspective of institutions and budgets that have a priority scale for the implementation of technology on the PNB campus. The following is the Roadmap for the information system implementation plan from 2016 to 2020

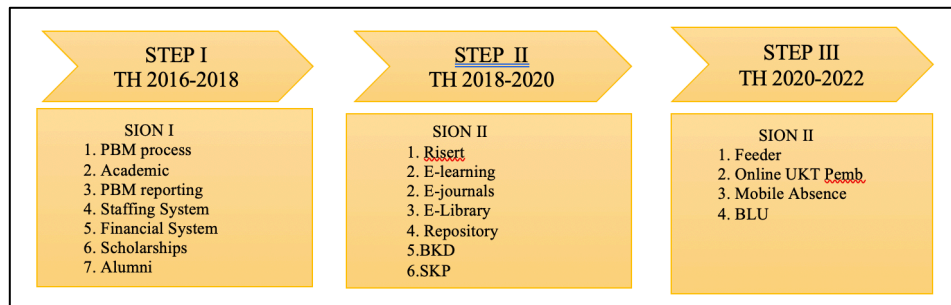


Figure 3. Road Map of the Information System Implementation Plan

#### 4. CONCLUSION

Based on the results of the discussion of enterprise architecture design using the Zachman Framework, conclusions can be drawn, namely:

- There are 14 global business process problems that have not been developed to achieve the vision, mission and objectives of PNB
- There are 34 application architectures with details of 14 candidate applications that need new development, 6 applications that need to be customized, and 10 applications that are integrated,
- Obtain a conceptual overview of the current network architecture and an overview of the technology architecture that will be upgraded to support the main business functions of higher education and a list of the implementation sequence of application candidates to be developed which are grouped into Resource Management System, Knowledge Management System, Community Management System, Executive Dashboard System.

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