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Enterprise Architecture: A Strategy to Achieve e-Government Dimension of Smart Village Using TOGAF ADM 9.2

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Abstract—**Transformation in village government with the enterprise architecture smart village design model is significant for developing digital technology in the village government environment to realize a government with aspects of integrity values that are in synergy with the SDGs sustainable development goals. The method used in this study uses the adoption of the TOGAF ADM 9.2 framework, which consists of five phases: Preliminary, Architecture vision, Business architecture, Data architecture, Application architecture, while determining the clustering of villages by taking into account several aspects of the assessment released directly by the Ministry of Village, The Development of Disadvantaged Regions and Transmigration of the Republic of Indonesia in the form of a village index building the IDM which aims to identify and facilitate analysis of village capabilities and the characteristics of village government at each level. The output produced in this study is in the form of an enterprise architecture smart village design that will assist the village government in describing a target in the form of a digital development design on the e-Government dimension in the form of several application platforms covering various management of public administration services, public development aspirations, and management. Village development, as well as the management of village government documents. From a village sample that was used as the object of research with the value of the advanced village clustering index according to the Village Index data, the IDM was built so that the smart village design concept and the synergy of the SDGs development goals.**

Keywords— **Enterprise architecture; e-Government; TOGAF ADM 9.2; smart village; SDGs; IDM.**

I. INTRODUCTION

In the era of accelerated digitization and assurance of information governance, it has an essential role in an organization's progress in every agency and modern industry, where alignment of organizational goals between strategic plans and IT business strategies is needed to create an effective and efficient organization [1]. The current problem is that the Government of Indonesia is considered less involved in formulating policies and measures in each sector through information technology to support the performance of public services (e-Government) [2], [3]. In the e-Government Development Index (EGDI) released by the United Nations, known as the United Nations for 2020, Indonesia is still ranked 88th in the world, still below several countries in the ASEAN region [4]. The details of the data are presented in Table 1. The e-Government concept supports the digital transformation program toward sustainable development, commonly known as the Sustainable Development Goals (SDGs) [4].

TABLE I
ASEAN UN EGDI RANKING

Country	Rank 2020	EGDI 2020
Singapore	11	0.915
Malaysia	47	0.7892
Thailand	57	0.7565
Brunei Darussalam	60	0.7389
Philippines	77	0.6892
Indonesia	**88**	**0.6612**
Vietnam	86	0.6667
Cambodia	124	0.5113
Timor-Leste	134	0.4649
Myanmar	146	0.431
Laos	167	0.3288

Development in rural areas through the Ministry of Villages, Development of Disadvantaged Regions, and Transmigration, one of which is through the smart village concept. According to Herdiana [5], the smart village concept is developed based on the sustainable use of information technology [6]. Moreover, smart villages must be applied

differently depending on each country and according to the village's potential [7]. The analysis results of various dimensions must be applied as a standard as an integrated smart village development platform [8], [9].

In the process of identifying and analyzing the dimensions of the smart village scope, it is necessary to consider how the e-government concept can work and be supported by IT, especially at the village development stage, which is the main focus of the village government in building and designing villages [10], [11]. The main objective of the proposed sustainable development of the government's Enterprise Architecture framework is to provide comprehensive guidance on implementing the government's architectural framework [12]. The solution to be achieved in the successful implementation of smart villages is through blueprint design which is expected to harmonize the interests of government and technology in the implementation of e-Government so that business processes can run effectively and efficiently [13]. Implement best practices for the success of the planning [14]. It is necessary to design a smart village architecture for the Sragen Regency Government, which includes dimensions in the e-Government domain by paying attention to aspects of public services transparency and policies[15]. In this case, the researcher focuses on achieving the mission using the TOGAF ADM 9.2 framework approach to realize the smart village blueprint design for Sragen Regency, which is in synergy with the SDGs aspect.

II. MATERIALS AND METHODS

A. Enterprise Architecture

In realizing a smart village, it cannot be separated from the components or the need for artifacts [16]. Realize a smart village dimension design. A framework is needed to facilitate this research to achieve the concept or research objectives and produce outputs following the needs [8], [17]. Enterprise architecture can be defined as part of the general principles, methods, and models used in designing and implementing a company with an organizational structure, business processes, information systems, and infrastructure [18].

B. Smart Village

Various countries have established E-government service initiatives to achieve sustainable development (SDGs) [19]. Indonesia, from the central to the regional levels, aspects of e-Government have been used for many things, from digital-based government services to open access to public services, business people, and other governments [20]. Agencies in an integrated and integrated manner or one data solution by the objectives of the Presidential Regulation. No.39 of 2019 concerning one Indonesian data. In supporting the realization of the SDGs by implementing the smart village concept. One of the smart village development concepts in the e-Government dimension that researchers have put forward is a part of the process of integrating the use of ICT in village and community life, with the hope of producing usefulness and sustainable development by the SDGs aspect between ICT technology and people living in the area village [3], [21]. The comparison of smart village implementation in various countries is as follows.

1) Smart Village in Germany: In applying the smart village concept, especially in European countries, they compete to build smart villages in various ways according to the characteristics and problems of each country. One of Germany's applications is to overcome the lack of digital services in rural areas and the lack of networks between citizens, communities, and local governments [8].

2) Smart Village in Korea: The development of the smart village concept in the ASIA region, especially in Korea, addresses the gap between urban and rural environmental services. Smart village development aims to increase the population's life index and promote national development as a sustainable service to solve village problems and increase convenience by using intelligent information technology [8].

3) Smart Village in Malaysia: The Smart City Smart Village (SCSV) developed by Negara Malaysia is one of the projects in the Digital Malaysia initiative. Digital Malaysia took the initiative to develop the Malaysian Multimedia Super Corridor and Global Innovation (GSIAC) concept in 2010. SCSV aims to improve services by implementing a smart digital system with an ICT technology concept approach [17].

4) Smart Village in Indonesia: One of the smart village programs in Indonesia is through the implementation of the "Smart Village Nusantara" which was pioneered by PT. Telkom Indonesia Tbk. The main goal of developing smart villages in Indonesia is assessed from various aspects, one of which is looking at the various potentials of villages in Indonesia that are expected to encourage increased activity and productivity of the economic value of the village community.

TOGAF is an implementation of an EA framework that is suitable for formulating technology management both from the ease of research [12]. This framework provides a systematic description of the process life cycle in technology transformation, a strategic step, and a requirement to create a product or solution that the company will adopt and manage [18]. TOGAF is a detailed approach related to management development and implementation [22]. The description of the framework method for implementing smart village development with the description of the TOGAF ADM 9.2 phase used is as follows.

The five phases in the smart village implementation process into the implementation of TOGAF ADM 9.2 are briefly described in phases as follows:

- Preliminary: Framework and Principles
- A: Architecture Vision
- B: Business Architecture
- C: Information System Architectures
- D: Data Architecture
- E: Application Architecture

In the next stage, according to the comparison data of enterprise architecture frameworks that have been carried out by previous researchers on the comparison of implementation methodologies in terms of Concepts, Modeling, and Processes from various enterprise architecture frameworks such as EAP, TOGAF, DoDAF, Gartner, and FEAF, it can be concluded that the TOGAF framework has value. The highest comparison in various aspects compared to other Enterprise Architecture Implementation Methodology (EAIM) [23].
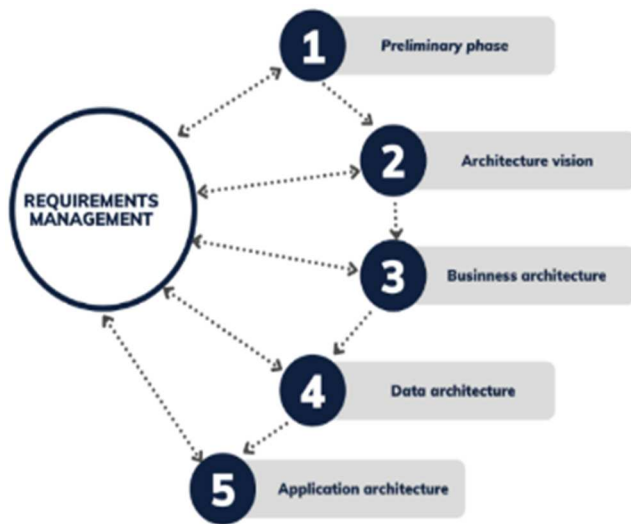
Fig. 1 TOGAF ADM [24]

This researcher focuses on the village government within the Sragen district government environment. In this case, Sragen has 196 villages with details in the status category of 5 Independent Villages, 80 Advanced Villages, 110 Developing Villages, and 1 Underdeveloped Village. The following are 5 (five) Village statuses based on the classification that has been determined with the IDM tolerance level as follows [25]:

- Very Underdeveloped Village: IDM ≤ 0,4907
- Abandoned Village: 0,4907 < IDM ≤ 0,5989
- Developing Village: 0,5989 < IDM ≤ 0,7072
- Advanced Village: 0,7072 < IDM ≤ 0,8155
- Independent Village: IDM > 0,8155

The formula used to calculate IDM is as follows.

$$IDM = \frac{\text{IKS+IKE+IKL}}{3} \qquad (1)$$

*notes:
IDM: Building Village Index
IKS: Social Resilience Index
IKE: Economic Resilience Index
IKL: Environmental Resilience Index

In determining the sampling, the researchers determined the village with the advanced index as the object of the research sample [20]. Assessment of village objects in the developed village category by taking into account the clustering status of the developing village index value (IDM) based on the Regulation of the Minister of Villages for Development of Disadvantaged Regions and Transmigration of the Republic of Indonesia Number 2 of 2016 concerning the index of developing villages through standard operating procedures (SOP) for updating the development status of the village index which aims to facilitate researchers in determining the scope and knowing the model needs and characteristics of each village. The reason for taking this sample is to make it easier for researchers to determine the scope and know each village's model needs and characteristics [26].

A. Preliminary Phase

The preliminary Phase is the initial initiation condition in the enterprise architecture design process. As for the principle, the catalog artifact will focus on the category of business principles used to facilitate the design of achieving the goals of implementing enterprise architecture.

TABLE II
BUSINESS PRINCIPLE CATALOG

Principle	Rational	Implications
Practicing the value of community service business processes (core value service)	The process is shorter, easier, provides ease of service for the community, and shortens the flow of bureaucracy.	Community service business processes must have a short business process flow and provide a new solution in the form of IT technology.
Integration management in business processes with the application of village IT technology makes it easy to get access to information through village information systems	The application of IT / SI technology in the village government environment, especially in data integration management, can impact the acceleration of information services.	There is a service development of each catalog and IT / SI module and several service development services processes.
Management governance of a good village information system by the laws and regulations.	The construction of management and governance processes through various business purposes services that must be controlled and following the law	Any changes and systematics of business process flow on the utilization of IT / SI must refer to the legislation, and every village community service process must have quality standardization.

B. Architecture Vision

Architecture Vision is the initial stage in the TOGAF ADM phase with the main objective of aligning the importance of enterprise architecture in an organization. In this case, it makes it easier for the designer to describe the scope of the research to be made. This study focuses on the e-government dimension in developed villages which has the vision of "Towards an Independent, Prosperous and Cultured Sragen Regency Based on the Spirit of Mutual Cooperation," and one of its missions is "Realizing clean, innovative, effective, reliable, and synergized government governance with technology-based public services. And in its implementation, the government has targets and programs to achieve these goals. This value chain artifact describes the grouping of activities based on primary activity and support activity in village government activities to achieve value and competitive government success.
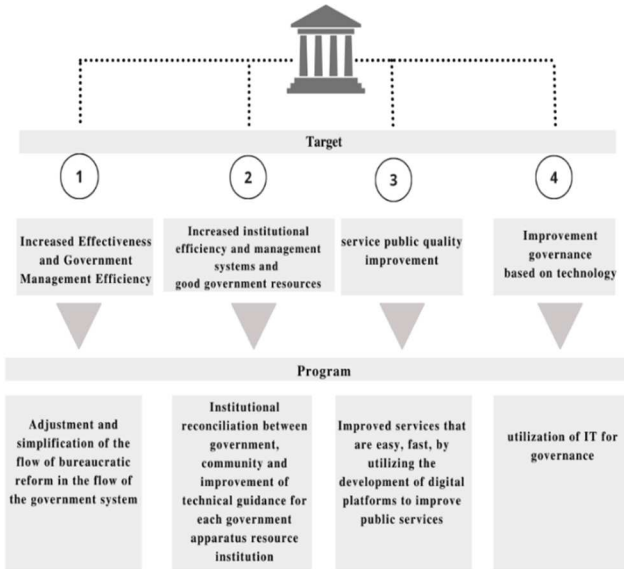
Fig. 2 Value Chain

Fig. 3 Target and Program

C. Business Architecture

At the stage of business architecture. Where this stage will review related to a business strategy that will define the organization's initial conditions to be built with the hope of achieving the goals that have been declared in the previous stage. Business process targeting describes research analysis results to produce a more efficient service flow by utilizing IT technology.
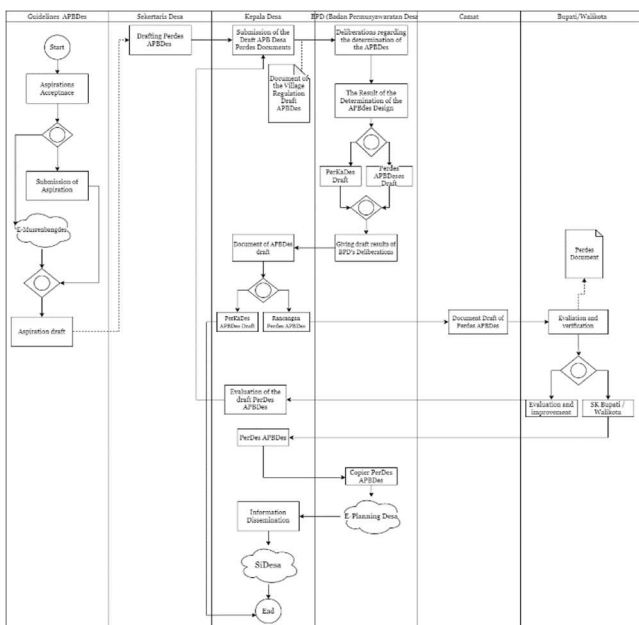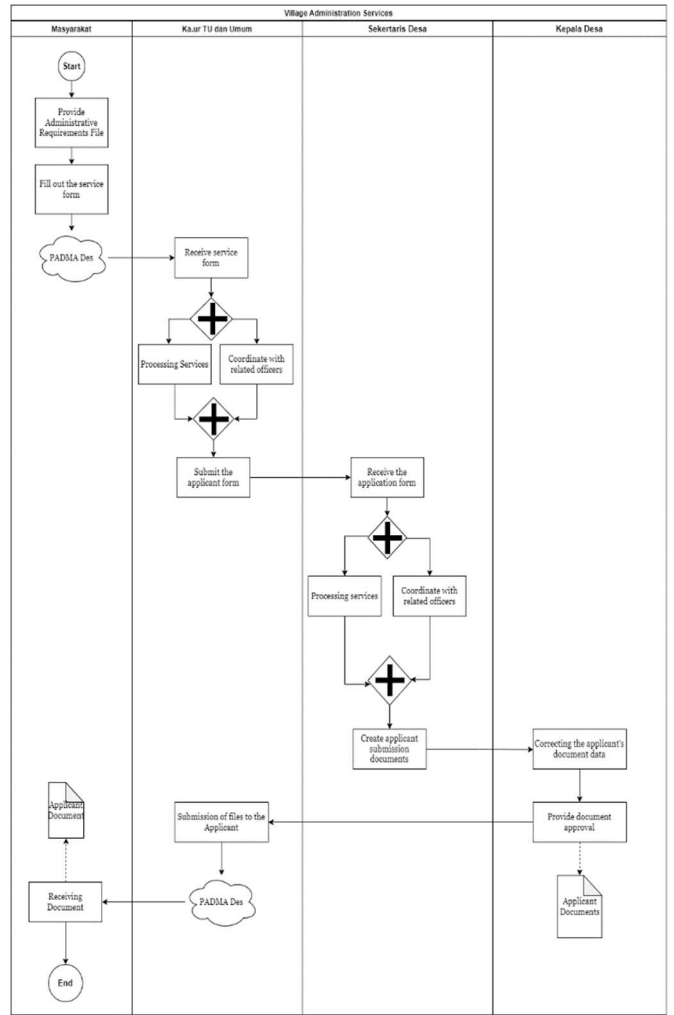

Fig. 4 *Apbdes Musrembangdes*

Fig. 5 Village administration services

Business service catalog artifacts define services to village governments related to business functions on the e-Government dimension.

TABLE III
BUSINESS SERVICE CATALOG

Function	Service	Business Processes
Administration	Administrative services	Village Administrative Service Submission
Building	Planning Services	Implementation of Development Planning and Village Planning Deliberations (MUSRENBANGDES)
Logistics	Management Services	Management of assets owned by the village
Finance	Management Services	Village-owned Financial Management
Administration	Management Services	Mail management and disposition information

In the GAP Analysis phase, architectural model verification is carried out to obtain internal consistency and accuracy results to identify gaps between baseline and target.

TABLE IV
GAP ANALYSIS

Requirement	N	P	F	Information	Alternative Solutions
Improved quality and access to Basic services	v			Currently, the service is still using the manual method	development of digital-based service improvement
Development and utilization of appropriate technology for the progress of the village		v		The development of digital innovation services is less developed in the village government	Development of IT Strategy enterprise architecture design
improving the quality of order of the village community based on the needs of the village community			v	participation of public institutions lacks synergy	institutional improvement to increase development synergies

D. Data Architecture

The data used to support the company's business functions are defined at the data architecture stage. This stage is expected to indicate the target to support the success of the target organization's goals. This data architecture stage produces several artifacts, one of which is an ERD Diagram that defines the relationship between data entities and the required components. In other words, the relationship between data and applications can be well defined at this stage.
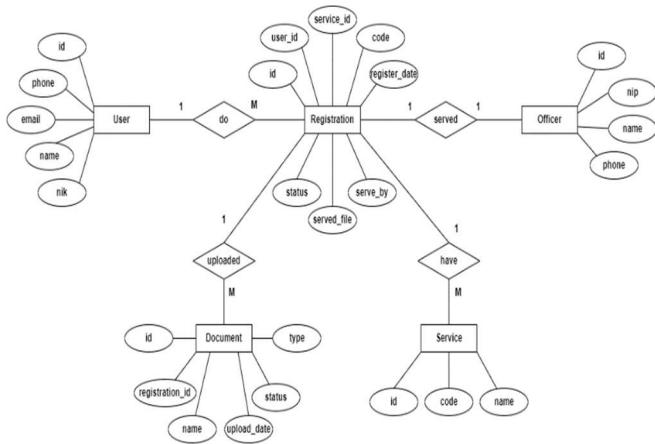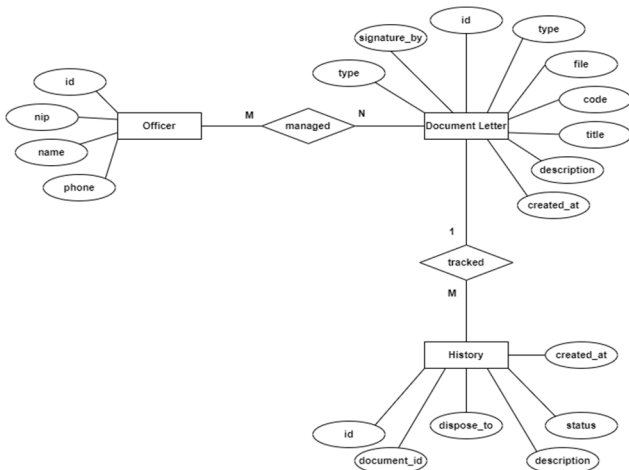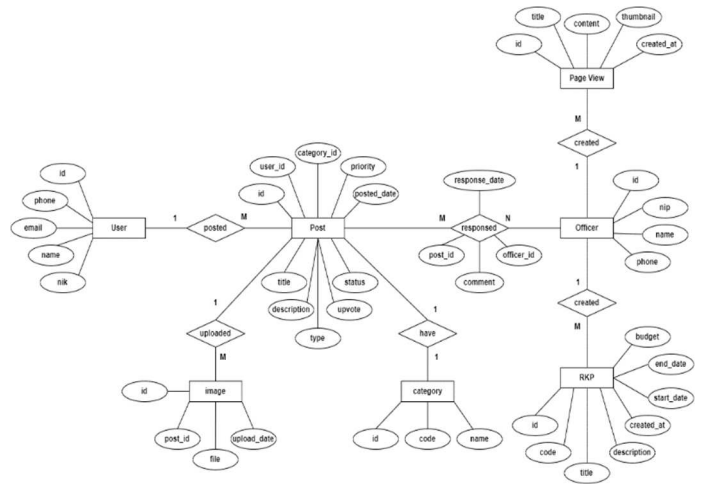

Fig. 6 db_Padma

Fig. 7 db_sisuryaDes

Fig. 8 db_Planing_Sidesa_Musrenbangdes

E. Application Architecture

The definition of the application used is described at the application architecture stage, where complex data and information will be managed and produce an application target that is used to support the organization's business activities

TABLE V
APPLICATION TARGET

No	Application Component	Target
1	PADMA Des	Village community administration service (PADMA Des) develops SIMADES and SUKET applications. PADMA Des is a service platform service that can be accessed directly by the village community.
2	Si Desa	Information service system along with village profile information and platform reporting and complaint services that can be accessed directly by the village community
3	Sisurya	Service letter system and village disposition canal
4	E-Planning Desa	Development planning information system (Village RKP, VILLAGE RPJMD)
5	E-Musrenbangdes	Aspiration service platform for discussion of village development plans

The Application Communication Diagram will generate artifacts that describe the interrelationships between existing applications.
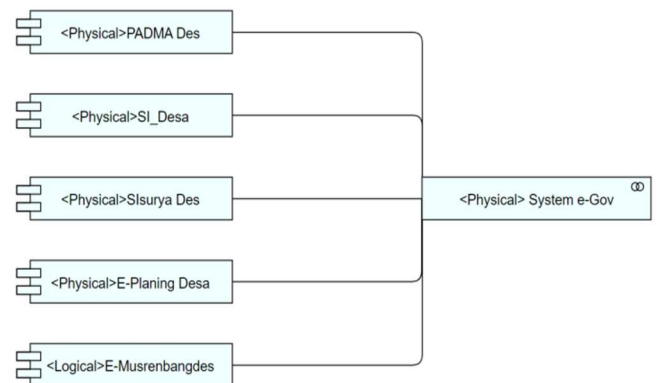

Fig. 9 Application of Communication Diagram

IV. Conclusion

Based on the research results conducted in designing a Blueprint enterprise architecture Smart village using the TOGAF ADM framework method. 9.2 focused on the e-government dimension by sampling villages under the Sragen Regency government with an IDM index value of 0.7072 < IDM 0.8155 or villages with Advanced clustering. It can be concluded from the research output in the form of an enterprise architecture smart village blueprint that will become a guideline for the digital development design strategy reference on the e-Government dimension in the form of several application platforms covering various management of public administration services, public development aspirations, and management of village development management, as well as governance management. Manage village government documents.

In realizing the sustainability of the development of the smart village concept, by looking at the potential, needs, and characteristics of each village, the results of this study need sustainable development from various phases as a complement to subsequent research which aims to facilitate identification in each village and the suitability of the area for implementing the smart village concept.

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