Migration planning for e-Government

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Abstract. Migration planning is one of the phases of the Architecture Development Method (ADM) in which migration planning will be selected as key work priorities and the development of migration plans from the old to the new system. E-government is the use of information technology by the government to provide information and services for its people, business, and other matters relating to the government. E-government can be considered as a strategy to build and develop a system in a digital technology-based public service. The aim of this article is to create the concept of migration planning for e-government which integrates the old system to a new system that can produce a good public service. The methodology used in this article is the TOGAF (The Open Group Architecture Technique) framework with Architecture Development Method (ADM) approach, which is limited to migration planning stage. The result of this article is the concept of the migration planning in terms of projects, benefits, and needs required by government for integrated e-government and supporting the government in order to facilitate public services.

1. Introduction

E-government is a term defined by various circles. The point of e-government is a process in which information technology is used as a tool to assist the running of a system in government through the internet or online media [1]. The existence of information technology system has helped people to do their duty quickly and precisely [2] [3] [4] [5] [6] [7], the same goes for the government. The performance of government duty (from operational, monitoring, and development) can be more easy and more efficient. However, this system has not been conducted thoroughly by a government agency. Previously, there had been several studies that address this issue, namely; The Critical Factors Affecting e-Government Adoption in Indonesia: A Conceptual Framework [8], Design of Enterprise Information System Architecture by Using TOGAF-ADM (Case Study of Garut District Transportation Department) [9], E-government Support for Administrative Reform in China [10], Measuring Satisfaction for Each E-Government Implementation Level [11], Adoption of e-government services in Turkey [12] and E-Government Implementation: Theoretical Aspects and Empirical Evidence [13].

There are several problems found in some studies above; the first study aimed to find the main factors affecting e-government, the second one only focused on one area of government, the third one discussed e-government in China, the fourth one discussed about e-government policy in agriculture, the fifth one discussed e-government in Turkey, and the last study explained the weaknesses of e-government implementation. Meanwhile, this article focusses on discussing migration planning in e-Government designs.
2. Methodology
The compilation of this article is derived from the TOGAF framework with some consideration; it takes a flexible method to integrate information units as well as information systems with different platforms and standards, it is able to integrate to different systems, it tends to be generic and flexible, it can anticipate all kinds of artefacts that may appear in the design process, the standard is widely accepted and able to cope with changes, it is relatively easy to implement, and it is open source (therefore, it is neutral to the technology of a particular vendor) [9].

TOGAF provides detailed methods on how to build, manage, and implement the enterprise architecture and information systems called Architecture Development Method (ADM) [14, 14]. ADM is a generic method that contains a set of activities used in modelling the development of enterprise architecture. The TOGAF ADM as shown in Figure 1 is also a flexible method that can verify the various modelling techniques used in the design, as this method can be adapted to changes and needs during design.

![TOGAF-ADM version 9.1](https://example.com/togaf-adm.png)

**Figure 1. TOGAF-ADM version 9.1 [14]**

The TOGAF phase explanation in figure 1 is:

**Phase A : Architecture Vision**
- The architecture vision stage is the early stage of ADM (Architecture Development Method). It includes information about the definition of scope, stakeholder identification, vision architecture, and approval.

**Phase B : Business Architecture**
- It defines the initial state of business architecture and determines the business model or desired business activity based on business scenarios.

**Phase C : Information System Architecture**
- At this stage, there are more emphasis on the activity of how the information system architecture developed.

**Phase D : Technology Architecture**
- It builds the desired technology architecture, starting from determining the type of technology candidate required

**Phase E : Opportunities and Solution**
- At this stage, there are more emphasis on the benefits derived from enterprise architecture that includes business architecture, data architecture, application architecture, and
technology architecture. Therefore, it becomes the basis for stakeholders to choose and determine the architecture to be implemented.

**Phase F**: Migration Planning
The phase of the migration plan handles how to move the initial architecture toward the goal by completing the implementation details and the migration plan.

**Phase G**: Implementation Governance
The implementation governance phase provides oversight of the implementation of the architecture.

**Phase H**: Architecture Change Management
It establishes an architectural management plan of the new system by monitoring the technological developments and changes in the organizational environment (both internal and external) and determines whether to undertake the next enterprise architecture development cycle.

### 3. Result and discussion

#### 3.1. Preliminary
The preliminary stage is the earliest stage of the TOGAF framework for enterprise architecture scales. This stage also describes the definition of architecture and framework that aims to explain the preparation stage to define framework and methodology and to implement architectural tools.

#### 3.2. Requirement management
The requirement management phase includes a very important stage as it relates to a strategic plan and a management policy. Table 1 describes management needs in government

**Table 1. Requirement management in Government**

| Why | Dissemination of information, implementation of coordination, integration, and synchronization of empowerment based on organizational structure, work procedures related to administrative interest, service and reporting that refer to the standard of quality services, as well as visions and missions that have been set. |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| How | Establish data centers at the regency level with source data derived from each area of government. Improve the coordination of administrative process, service, and the preparation of routine report periodically based on each field. Increase the provision of information access service to the community. Unavailability of data communication network that connects between each related governmental field. |
| What | Government data |
| Who | All related field in government. |
| Where | Garut Regency Government |
| When | Data can be accessed anytime in every field in Garut Regency Government |

#### 3.3. Phase A. Architecture vision
The case in this design includes technology as a tool not a goal and men as a manager who have a purpose. Using that as a first step, the government should be able to build infrastructures for the needs of e-government as a tool of a community service; build up educated, creative, and skilled human resources; develop a network of technology-based partnership as innovation (for example, providing online brainstorming media on government information); build a knowledge-based development mindset and technology, especially providing technology-based services to the community; and develop an existing information system in order to adjust the information system needs as described in table 2 below.
Table 2. Four government perspectives.

| Customer Perspective                                    | Financial Perspective                              |
|---------------------------------------------------------|---------------------------------------------------|
| Government information is conveyed on time              | Optimize local budgets according to government needs |
| Systems can respond to community’s information requests fast | Reduce budgets and suppress the manipulation of confidential data |
| Integrated report system                                |                                                   |
| Community services and related parties based on information systems technology |                                                   |
| Presentation of quality data and information            |                                                   |
| Internal Process Perspective                            | Learning and Growth Perspective                   |
| Facilitate documentation management                    | Provide training to government staff               |
| Accelerate the process of compiling government information | Provide re-engineering and program transformation (eg: introduction of new software packages, redesign applications if they are not appropriate) |
| Centralize data and information                         |                                                   |
| Facilitate the preparation of inventory reports from each unit |                                                   |
| Facilitate the process of government data services      |                                                   |
| Government facilities and infrastructure                |                                                   |

3.4. Phase B. Business architecture

Identify key functional areas. The Identification is done in Table 3 in order to understand the existed main functional areas that are related to the organizational unit and the flow of information.

Table 3. Description of functional area.

| No | Functional Area                                    | Description                                                                 |
|----|----------------------------------------------------|-----------------------------------------------------------------------------|
| 1  | Acceptance of service data                         | All initial activities regarding data services and government information that have been documented are in the form of files and archives |
| 2  | Preparation of service data                        | Manage existing government data                                             |
| 3  | Reporting                                           | A form of activity that explains the results of program evaluation into a program for government reports |
| 4  | Counselling and socialization                      | Publish and socialize the government program                                |
| 5  | Complaints and information services for the community | Provide all service and information as the final form of the results of government programming to be published to the public |

Identify the supported functional area. Table 4 describes the supported functional areas of government.

Table 4. Description of functional area of Government.

| No | Functional Area                        | Description                                                                 |
|----|----------------------------------------|-----------------------------------------------------------------------------|
| 1  | Financial Management                   | Activities that prepare the budget to build and support government programs |
| 2  | Human Resource Management              | Activities to improve human resource management to support government programs |
| 3  | Management of SI/TI                    | Activities to manage information systems / technology in government          |
| 4  | Procurement of facilities and infrastructure | Activities that prepare facilities and infrastructures in supporting the government programs |

3.5. Phase C. Information system architecture

Design Applications that will be built is a web-based one. This is based on consideration that the application does not need to be installed and can be used anywhere in all operating systems as long as there is a browser application. The system is represented into 3 (three) layers, namely:
The presentation layer is the layer that gives the user interface to the user such as HTTP. This layer interacts directly with the user. This layer is planned to be built with JSP (Java Server Page). Application Layer is the layer that bridges between presentation layer and database layer. This layer forwards and receives requests from users. The requests will be forwarded to the model and continue to the database. This layer will be built with Server. And Database Layer is the layer that will be associated with the database server directly; for example, entities and utility are directly connected to the database. This layer will be designed using java programming.

3.6. Phase D. Technological architecture
This phase aims to identify the current technological devices and their usage of the application, as well as making suggestions for related technology tools arranged in the principles in table 5.

**Table 5.** The technological principles to be used.

| Types      | Principles                                                                                                                                 |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| Software   | 1. The operating system used supports the hardware used  
2. The operating system supports the application of enterprise systems to be applied  
3. Supports client server and network system  
4. The original application has a license  
5. A web-based multiplatform application (can operate on all platforms and open source)  
6. In accordance with user needs and user friendly  
7. Applies object-oriented method  
8. Data are centered and consistent, not redundant and not a duplicate  
9. DBMS should be able to meet the data needs, data transaction, and application  
10. Has backup data and data recovery functions  
11. Database and application have protection and limitation on access right |
| Hardware   | 1. Does not depend on specific brands and manufacturers  
2. In accordance with the needs of enterprise systems to be applied  
3. Can be used in the long term  
4. Has specifications, durability, and adaptability to the enterprise system to be applied  
5. Support multitasking technology and client server  
6. Comfortable and compatible |
| Communication Tools | 1. Support wired and wireless networks as well as client server. It is multiuser  
2. Support data access speed. It is stable and undistorted  
3. Support internet access and web-based applications  
4. Support the implementation of enterprise systems  
5. Support business functions for long period of time |

3.7. Phase E. Opportunity and solution
This phase is described in Table 6 in which it identifies strategic parameters by evaluating the gaps in enterprise architectures including business architecture, data architecture, architecture application, and technology architecture to further develop strategies for solutions.

**Table 6.** Gap and Potential Solution.

| Architecture | Gap                                                                 | Potential Solution                                                                 |
|--------------|----------------------------------------------------------------------|------------------------------------------------------------------------------------|
| Business     | Service process is not efficient yet. The old public service process and officers use desktop applications once and in one application. If the desktop application needs to be updated, it will take time to replicate the application to each computer that uses the application. This results in a delay in daily operations. | Data input of public services is conducted only  
The application update should be fast by minimizing the loading time. |
Table 6. Cont.

| Data | Application | Technology |
|------|-------------|------------|
| The new IS / IT personnel takes a long time to understand the business processes and the SI / IT solutions related to business processes in the Garut regency government | To reduce duplication, the Government database is centralized. Re-design the database by adhering to the database design principles. | Has not integrated yet |
| Data are associated with the above problems. There is data duplication. The integrated database has not been designed | Improving the function of online service. Change desktop services to online. Migrate the desktop application to a web application | Use web services technology |
| | | |

3.8. Phase F. Migration planning
The migration viewpoint requires model and concept that can be used to determine the transition from the current architecture to the desired architecture in Table 7.

Table 7. Project, benefit, and requirement.

| Project | Benefit | Requirement |
|---------|---------|-------------|
| Developing Database & Data Migration | The better the database design is done, the more it will increase the speed, accuracy, and accuracy of obtaining information. | Microsoft SQL Server, etc |
| Developing service | Improve integration, flexibility, and also reduce redundancy | Java, PHP, etc. |
| Migrating desktop application to web | Reduce server database resource in operating unit, reduce license fee for Ms. SQL Server installation in each database server operating unit, and reduce the loading time for application update, the ease of centralized management of web applications. | Microsoft SQL Server Java, PHP, etc. |
| Integration of services between web applications | Improve integration, flexibility, and also reduce redundancy | Microsoft SQL Server Java, PHP, etc. |
| Developing an application web services online | One-door service system | Microsoft SQL Server Java, PHP, etc. |
| Developing an application web intranet portal | Increase user ease to access web application | Microsoft SQL Server Java, PHP, etc. |
| Developing enterprise architecture documentation using the TOGAF framework | Availability of enterprise architecture documentation as a reference for developing sustainable enterprise architecture | TOGAF version 9.1 |

3.9. Discussion
The primary purpose of this study was made a concept of migration planning for e-government, earlier research made migration planning by ITIL [15]

4. Conclusion
The migration planning phase of TOGAF 9.1 can generate the concept of migration in terms of projects, benefits, and needs required by government. This concept can be used in government to realize the concept of e-government, especially in the case of public services.
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