

# A Comparative Government Architecture's System Network in National Data Center (Case Study in Indonesia And Qatar)

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## ABSTRACT

This study aims to provide a policy design for the government system in the form of rules, methods, and a strategy for the development of information systems as an integrated whole from the bottom up. Since the regional information systems must be merged into a single line window, any type of data or information system strategy must be planned in advance. This research is using qualitative analysis to gathering the data those are relevant to support the decision making on government architecture. The integration system concept is based on the premise of good governance at its most fundamental level, which is the existence of transactions and online interactions between a government institution and the community. Not only does an integrated system necessitate online collaboration between multiple institutions and communities, but it also entails how it could complicate the technical architecture. The model government architecture is taken into consideration throughout the process of building and managing data architecture.

**Keywords:** *Comparative Government, Government Architecture, National Data Center, Indonesia, Qatar*

## 1. INTRODUCTION

The development of government architecture can be characterized by the elements used to influence the development of the architectural landscape [1]. Government Architecture is intended to direct and assist developers in their design activities. Architecture influences organizational design and investment decisions and in turn is influenced by design behavior and decisions[2]. Initially, Government Architecture emerged as a result of implementing individual projects. Thus, architecture and design are closely related as architecture aims to guide designers in their design endeavors [3]. A typical Government Architecture application includes frameworks, tools, principles, patterns, basic features, and shared services. It is used to influence new design projects at the conceptual level at the implementation level. At the conceptual level, the initial architecture of a project is affected, while the shared facilities and services that are already available can be used when implementing the design [4].

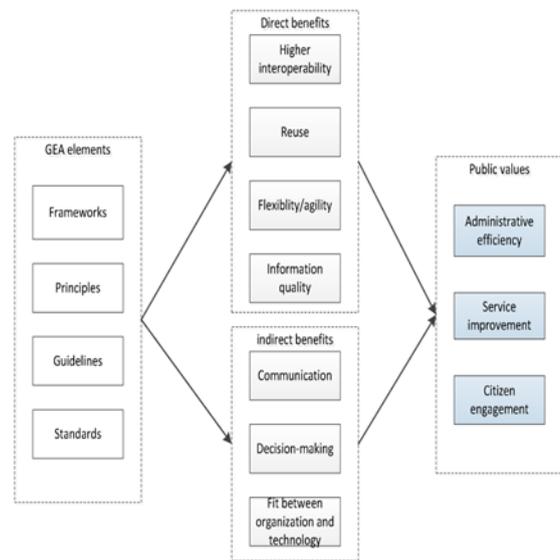
Government Architecture is aimed at addressing various issues as the architecture aims to guide various design projects from providing integrated services to social media platforms[5]. Complexity is at the core of architectural challenges. When a project fails, one of the reasons is usually because the system or situation is more complex than expected. Many architectural methods, model principles, rules, standards, and so on are aimed at simplifying the situation [6]. Government Architecture cannot be viewed as an isolated instrument because it requires governance to be effective[7]. Government Architecture is shaped by interactions between stakeholders and is influenced by contemporary developments. Organizations can adapt their Government Architecture strategy according to path dependencies and anticipated or desired benefits[3]. While the initial focus may have been on reducing administrative costs and interoperability, current developments such as cloud computing and open data (related) are influencing these developments [8]. This resulted in the expansion of Government Architecture to be able to handle the new temporary challenges.

Government Architecture showcases emerging phenomena such as new standards, technology, innovation, and players entering the field and no central control or invisible hand. In the Netherlands and Norway, Government Architecture is intended to guide and direct the development of ICT projects in government [9]. This is a common pattern that provides some similarities. An important difference is the use of project startup architecture (PSA) and Government Architecture. Whereas Government Architecture refers to the domain or government organization as a whole, the initial architecture refers to the initial architecture developed for a particular project [9] Government Architecture influences design decisions and organizational investment behavior and is further influenced by design behavior and decisions. Furthermore, Government Architecture influences the design and system architecture decisions to be developed by a project. The use of architecture is about balancing the use of architecture in design projects and giving designers leeway to deal with the inherent complexities they work with [3]. When a project starts, the project requirements must meet the requirements as proposed in the Government Architecture, such as the level of security and privacy [4].

The usage patterns are based on how Government Architecture should be used to guide development projects, although we found that these usage patterns are often more dynamic. Correspondingly, Government Architecture can be used to guide modifications of daily activities. It follows a similar process. The Netherlands is one of the countries that has implemented Government Architecture, and in 2004 the Ministry of government reform initiated the development of a national Government Architecture aimed at reducing bureaucracy, while at a later stage the emphasis shifted to interoperability, due to the EU's focus on interoperability [10]. A second version was released in 2007 and in 2009 a third version was released, focusing on managers and administrators [9]. While the second version contains a large number of principles, this number is reduced in the third version [1].

Many countries has had plans for implementing ICT in government or e-Government since the early 2000s. Government architecture became part of this plan in 2006, as part of the government's proposition [2]. Central to the Norwegian architecture are a number of suggested general public ICT components, with the idea that the functionality required by most services should be developed once and made publicly available which can be reused. Norway does not have an explicit focus on Government Architecture at the national level. However, some of the typical components of Government Architecture have been focused on but their regulatory steps in Government Architecture have not

officially started [9]. In business, knowledge is limited about the effect of EA practices and we find that the same is true for the government domain [11]. The pattern in the previous (sub)section shows the process of how Government Architecture is used and updated, but not how this process contributes to the creation of public value. Therefore, we investigated the overall purpose and benefits of Government Architecture. Government Architecture elements are used to create these values and elements [12] The processes we produced from both countries aim to create observable direct or indirect benefits [13]. Immediate benefits include better interoperability, reuse, flexibility/agility, and information quality. Indirect benefits include better communication, decision-making, and compatibility between the organization and technology.



Source: [9]

**Figure 2** Conceptualizing Government Architectures and Their Impacts

The main goal of government is to create diverse public values for its citizens. Therefore, the direct and indirect benefits that can be observed from this government architecture should contribute to the creation of public values. The public values are expressed in terms of services or outcomes. Administrative efficiency, service development, and citizen involvement are the three major values defined by Rose and Persson [4]. Administrative efficiency represents the search for value, which is expressed by efficiency, effectiveness, economy, and deconstructed into target variables such as return on investment, net present value, and increased capacity and yield. Service improvement stems from customer orientation, with a focus on how to use ICTs to provide better services to the public, including issues such as better access to services and information, online access to services, and cost savings for citizens and other external

stakeholders [14]. Values associated with civic engagement combine ideals of community empowerment with democratic values such as citizen access to information. The value of citizen involvement is related to the involvement, empowerment, and use of e-Government services for citizen involvement, and the role of citizens in the design and development of e-Government services provided by the public [15].

This study aims to make a policy design for the government integrated data system as a guideline, processes, and plan for the development of the information system as a whole bottom-up integrated system since the information system in the region needs to be integrated into a one-stop service to minimize the lack of planning any kind of data or information system strategy. The things first are an integrated regional government within a one-line information system in data management and decision making.

## **2. LITERATURE REVIEW**

### ***2.1. Government Architecture Framework***

Governance of architecture requires a synergy of the appropriate structures, processes, and people. Its operation is highly dependent on an organization's culture and takes time to establish. It is the capability that ensures that the architecture is implemented properly in business and architecture initiatives and that it maintains its relevance and effectiveness within the organization. The enterprise architecture's purpose is to facilitate the development of an information technology and technology infrastructure that supports business direction. Thus, governance can be viewed as a necessary capability for ensuring that initiatives are carried out in a manner consistent with the business direction. Zachman introduced the concept of an architectural framework that provides multiple views of information systems. A framework is used to describe and understand enterprise architecture [16]. The framework model chosen determines what aspects can be captured at what level of abstraction. The use of frameworks has gotten a lot of attention in enterprise architecture, and there are a number of them, even if many of them do not qualify as architectural frameworks. Frameworks are often expressed as matrices that visualize the relationships between the various elements in each domain.

### ***2.2. Architectural Principles***

The use of architectural principles for the design of service systems is usually used in system design. Principles are especially useful when it comes to solving unstructured or 'complex' problems, which cannot be formulated explicitly and quantitatively, and which

cannot be solved by known and feasible computational techniques [16] Principles are usually used to guide stakeholders in designing complex information systems. Principles are often based on the experience of architects, which they have gained over years of developing information systems. Similarly, the principles developed are the result of engineers reflecting on experience gained from previous engineering projects, sometimes combined with professional codes of ethics and practical limitations. Principles have been defined in various ways and have been used interchangeably with other problem-solving ideas, including laws, patterns, rules, and axioms [6]. The Open Group defines design principles as "general rules and guidelines, intended to be enduring and rarely changed, that inform and support the way an organization fulfills its mission". The disadvantage of this definition is that it does not differ from guidelines, which are more indicative and do not have to be followed. Ideally, principles should be unrelated to any particular technology or person. Principles should emphasize "doing the right thing" but not specifying 'how' it is to be achieved. There are five (5) criteria for determining whether a principle is effective[17]:

1. Clear and unambiguous intentions: The principles' intentions are clear and unambiguous, minimizing violations, whether intentional or not. The principles' underlying tenets are easily grasped and understood by individuals throughout the enterprise.
2. Robust: from the principles, enforceable policies and standards can be developed. Each set of principles should be conclusive and precise enough to resolve a wide variety of potentially contentious situations.
3. Comprehensive: every potentially significant principle governing the enterprise's management of information and technology has been defined, albeit at a high level. The principles are universally applicable to all perceivable situations.
4. Consistent: Each word in a principal statement should be carefully chosen to ensure that the statement is interpreted consistently. However, there may be instances when strict adherence to one principle necessitates a liberal interpretation of another. There must be a balance of principles' interpretations. Principles should not be incompatible to the point where adhering to one principle would constitute a violation of another's spirit.
5. Stable: principles should have an enduring quality and be capable of transcending all foreseeable changes. The fundamental principles of

information and technology management do not need to change in order to keep up with technological advancements.

The national architecture for government should be founded on the principles of trust, sovereignty, asset management, accessibility, consistency, agility, user-centricity, harm minimization, and value for money[18].

### **3. RESEARCH METHODOLOGY**

This is a qualitative study that makes use of secondary data from databases such as Scopus and Google Scholar. The study spans the years 2010–2021. Additionally, this research makes use of the legal frameworks of both Indonesia and Qatar. To analyze this research, we used NVivo as the analytical software. We used data from the sources to determine which variables are relevant and have a correlation with the topics. The data collection aims to determine which values are relevant and implemented in both countries, by analyzing legal fundamentals and secondary data associated with specific study cases in each country.

### **4. RESULT AND DISCUSSION**

Information and communication technology (ICT) has been identified as an unprecedented potential solution for developing countries' economic and social development[19]. Despite of the integrated system context in internal, it may facilitate connectivity to the global economy and foster the emergence of new development contexts. This is a new opportunity for every nation, but it requires the appropriate conception for the circumstances and available resources[20]. This conception could serve as a solid foundation for making a rational and innovative decision about how to connect a developing country to the global information-based economy[21].

The Internet has been instrumental in expanding and improving education in developing countries, as well as disseminating knowledge in the public domain for the ultimate public good [22]. Due to the Internet's unique ability to eliminate inequalities (based on gender, race, creed, or nationality), developing countries that have historically faced numerous barriers to the effective dissemination of information and knowledge throughout their communities may finally be in a position to accelerate economic development through the use of ICTs[23].

#### ***4.1. The Indonesian Government ICT Priorities***

The tasks outlined in Presidential Decree No.1/2014 are also carried out in the context of the development of digital transformation[17]. Formulate the overarching

policy and strategic direction for national development through the advancement of information and communication technology, including infrastructure, applications, and content. Conduct assessments, evaluations, and contributions to the process of determining the steps necessary to resolve existing strategic issues pertaining to the development of information and communication technology[24]. Coordination at the national level with Central/Local Government, State-owned/Regional-owned Enterprises, Businesses, Professional Agencies, and the general public in the development of information and communication technology and empowerment of society; and approve inter-ministerial information and communication technology development programs in order to ensure their effectiveness and efficiency[16].

During this time period, the Internet emerged as a significant alternative media outlet for Indonesians seeking to express, share, and discuss their ideas, concerns, and perspectives on state control and corporate capitalism[4]. Although the government continued to classify the Internet as "non-basic services," the Internet had already enabled information from the outside world to flow more freely into Indonesia, coloring and influencing events. Although a new discourse on the digital economy has emerged in Indonesia, issues surrounding the ICT environment, such as infrastructure and access development, as well as media and Internet literacy, remain unresolved[25].

Civil Society Organization (CSOs) have made critical contributions to the development of ICT policy, for example, during the ITE revision process[26]. However, the process frequently fails to serve the public interest and is driven by dominant political and economic interests. The case study of the ITE revision process demonstrated that the contestations of interests between CSOs, big business, and the government were highly influenced by the actors' resources - their degree of access to information, power, and dominant position within the debates - and the structure of the policy-making process. From 2009 to 2015, the lengthy process of revising the ITE demonstrated that the process was actually a struggle between the state and society. The government appears to have remained averse to direct CSO engagement in the policy-making process[17].

Internet service provision in public facilities aims to bridge the digital divide, increase access, foster adaptive skills in ICT use, promote e-literacy, and stimulate economic growth in the community. Meanwhile, internet access in government offices is expected to improve public services and help bridge the information divide between rural and urban areas. Indonesia's National Data Center's guiding principles[17]:

1. To carry out President Jokowi's directive of

digital transformation of the government.

2. To integrate government systems using electronic means
3. To improve the efficiency of public services
4. To assist central and local governments in their digital transformation efforts
5. To enhance the quality of the government's online services
6. To safeguard the nation's strategic data
7. To consolidate Indonesia's data into a single repository.

Each citizen must receive adequate digital literacy in order to adopt technology, use it in daily life, and use technology to improve one's quality of life. To be absorbed by industries during the digital era's industrial development, one must possess self-skill and competence[27]. To facilitate the rapid dissemination of information about government policies and programs, the Ministry of Communications and Informatics is responsible for developing a unified narrative that is then disseminated to the public via the various communication channels used by government agencies[17]

#### **4.2. The Qatar Government ICT Priorities**

Qatar is a small developing country in the Middle East, located in the middle of the Persian Gulf[28]. Qatar launched its e-Government initiative in 2000 with the goal of achieving fully integrated paperless government in the future. Qatar is now a regional leader in terms of e-Government and transparency[29]. Qatar's e-Government project has been recognized as a best practice in the West Asia region, and Qatar's e-Government is ranked 53rd in the world by the United Nations Global e-Government readiness report[30]. Additionally, Qatar is regarded as the least corrupt country in the West Asia region. Qatar is ranked fourth on the Asian continent, behind Singapore, Hong Kong, and Japan. Qatar is ranked 22nd in the world by Transparency International's corruption index. Qatar's e-Government has attempted to leverage social media extensively in order to strengthen its relationship with its citizens; however, its efforts thus far have been unsuccessful[29], [31]. Without a formal strategy, Qatar encountered numerous obstacles and setbacks in its efforts to establish new channels of communication and dialogue with its citizens. For example, there have been no posts in the Discussion Forums section of the e-Government portal's E-Participation tab since the portal's inception. While Qatar's National Vision 2030 acknowledges the existence of a knowledge divide in

society, the government has not yet made concerted efforts to enact Freedom of Information (FOI) legislation. Qatar's government must recognize the importance of FOI laws that ensure citizens' access to data and information held by public bodies[32]–[34]. Qatari citizens must be able to hold their government accountable and accountable, which will be possible only with increased access to information about their government's activities. A more sustained and informed campaign for the introduction of FOI laws in Qatar is critical[35], [36].

The Open Data Policy includes policy statements on the following topics[37]:

1. Responsibilities of Government Entities
2. Administration and Planning for Open Data
3. Open Data Publishing Online
4. Access to Data in an Open Format
5. Public Recommendations and Requests
6. Information Release on a Voluntary Basis

Additionally, the Policy contains information on the following[37]:

1. Open Data Principles Roles and Responsibilities for a 5-Star Linked Open Data Model
2. Guidelines for Assessing Open Data
3. Formats for Data and Files
4. Significant Policy Objectives
5. Checklist for Policy Compliance

The Open Data Portal will assist government entities in complying with the Open Data Policy by providing an easy-to-use platform for publishing data in accordance with the Policy[38]. Open data delivery is a process of education in which governments and society learn how to deliver meaningful data and, in turn, how to reap its benefits[18]. The Open Data ecosystem takes time, commitment, and understanding to shape, with public and private sectors sharing data and society developing new and innovative ways to promote economic competitiveness that is quantifiable in the Global Knowledge Society[29].

The development of government infrastructure consists of eight critical components[39]:

1. Enhancing the government network and deploying broadband across government agencies;
2. Establishing a data center to house government data packages;
3. Establishing a crisis response center to handle government data;

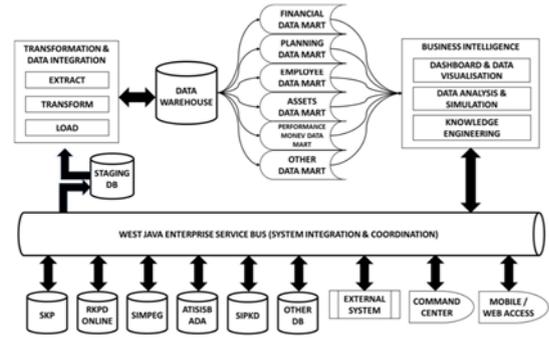
4. Establishing a cloud technology infrastructure;
5. Expanding the government call center; and
6. Establishing the necessary infrastructure to activate the us.

29 government agencies are connected to a common technological platform that provides all government services in this context[40]. Additionally, related policies have been developed. Four entities have already benefited from the host center's current configuration. Twenty government services have been deployed and received technical support from the Government Call Center[41]. A platform for the sharing of government data has been established in accordance with industry standards and best practices. It provides nine fundamental data packages from six ministries/agencies[37], [41], [42]: the Ministry of Economy and Trade, the Ministry of Justice, the Ministry of Public Health, the courts, the Kahramaa, and the Ministry of the Interior[43].

#### 4.3. The Government Architecture Technology: Learnt bases Indonesia and Qatar

The architecture enables government and agencies to provide seamless, integrated services to the public, to maximize the value of digital investment, to increase efficiency, and to invest in strategic capabilities such as emerging technology. As a critical component Government architecture framework[44]:

- a. Provides guidance to agencies on how to deliver capabilities more quickly and in a consistent, interoperable manner that encourages reuse, minimizes risk, and maximizes value for money. establishes clear signals for industry by describing the manner in which capabilities will be delivered.
- b. Publishing standards and patterns for digital and ICT capabilities, it assists agencies in making decisions and promotes transparency.
- c. Identifies capability gaps and emerging technologies that require investment.
- d. The architecture establishes a connection between strategies, policies, and architecture artifacts – providing clear direction to agencies considering digital investments.



Source: [45]

**Figure 3** Integration System for Architecture Technology

The concept of integration system faces a good governance in earliest level that existence of transaction and online interactions between a government institution and the community[24], [46]. The integrated system is not only requiring online collaboration between several institution and community, but also involves how it could increase complex the technical architecture is. Where the government has provided packaged information according to the needs of the community. The government have to push some information which is oriented to the community.

The following are the relationships:

- a. Strategies – existing whole-of-government and whole-of-economy strategies establish a clear course of action, backed up by a series of strategic outcomes that serve as the architecture's foundation.
- b. Policies – existing whole-of-government policies establish clear requirements for agencies to follow in order to ensure that digital investments contribute to the achievement of strategic objectives and the vision for these strategies. The architecture articulates the following policies:
  1. Intent – a description of the policy's strategic alignment and rationale;
  2. Applicability – a description of when the policy will be applicable;
  3. Requirement – a description of the set of requirements that agencies must adhere to.
- c. Architecture guidance – standards and frameworks, such as blueprints, patterns, reference architectures, and statements of guidance, that define and specify how capabilities should be designed, built, and delivered in accordance with overarching policies and strategies.

## 5. CONCLUSION

The integration system concept is based on the premise of good governance at its most fundamental level, which is the existence of transactions and online interactions between a government institution and the community. Not only does an integrated system necessitate online collaboration between multiple institutions and communities, but it also entails how it could complicate the technical architecture. The model government architecture is taken into consideration throughout the process of building and managing data architecture in order to enable standardization, modulation, and data communication to be carried out by the government, and this is done from an overall perspective. Data redundancy should be eliminated, data management should be centralized in order to eliminate unnecessary duplication, and data standards should be followed when data management standards and data standards are established. The architecture government might also assist the government in unifying data input, data input must occur only once, primary data must be maintained in a single location, and data duplication must be kept to a minimum, among other things. To be able to observe the accuracy and synchronization of data, it is necessary that replication happens since the function and availability of the data are both high-priority considerations.

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