

# Towards a National Enterprise Architecture Framework in Iran

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**Abstract:** National Enterprise Architecture (EA) is regarded as a catalyst for achieving e-government goals and many countries have given priority to it in developing their e-government plans. Designing a national EA framework which fits the government's specific needs facilitates EA planning and implementation for public agencies and boosts the chance of EA success. In this paper, we introduce Iran's national EA framework (INEAF). The INEAF is designed in order to improve interoperability and deal with EA challenges in Iranian agencies.

## 1 INTRODUCTION

E-government for every country, developed or developing, that aim at not only taking advantage of technology but also achieving better governance is a necessity (Gupta and Jana, 2003). In developing countries, the main reason for e-government failures is a huge gap between the current reality and the design of the e-government system (Dada, 2006). From EA point of view, this challenge is interpreted as problems in transforming the current (as-is) state to the future (to-be) state. Besides adopting EA at a national level can have a great impact on e-government success since EA is a blueprint for defining the current and desired environment as well as the transition plan (Bellman and Rausch, 2004). In fact, EA is an effective means of transforming and modernizing the government and acts as a catalyst for e-government by improving interoperability, reducing costs, and avoiding duplicated effort (Lee et al., 2013, Saha, 2012).

In recent years, There is an upward trend towards national EA (Christiansen and Gotze, 2007), which is also called government-wide EA (Lee et al., 2013), in both developed and developing countries. Surveys on national EA show that most of the developed countries have taken EA plans into consideration (Christiansen and Gotze, 2007, Liimatainen et al., 2007).

By gaining an understanding of the decisive role of EA in bringing e-government success, the demand for planning and implementing EA at a national level was crystallized. In this regard, we designed an EA framework based on the government's special needs and characteristics. In this paper, after reviewing the history of EA and its challenges in Iran, we will explain the ins and outs of Iran's National Enterprise Architecture Framework (INEAF).

## 2 OVERVIEW OF EA IN IRAN

The official launch of EA activities in Iran was in 2002 when the National Enterprise Architecture Committee had formed. Since then, acquiring a full understanding of EA challenges in Iran and responding to them have been a top priority. As a result of the committee's activities, Iran ranked 9<sup>th</sup> in 2004 EA activities (Schekkerman, 2005).

Moreover, many doctoral and Master's dissertations were completed and dozens of research papers were published on e-government such as (Yaghoubi et al., 2011, Atashak and Mahzadeh, 2008, Sharifi and Zarei, 2004, Jayashree et al., 2016, Shahghasemi et al., 2013) as well as EA including (Fatolahi and Shams, 2006, Razavi et al., 2011, Khoshnevis et al., 2009, Khayami, 2011). These

publications reflect a research trend toward both e-government and EA in Iran. In addition, Shahid Beheshti University offers EA master's degree with the purpose of providing students with EA skills and knowledge.

Aside from academic achievements, almost a hundred EA projects were carried out in public and private agencies, but most of them were not successful. In the following, we are going to identify some of the most common causes of EA failure in Iran.

## 2.1 EA Challenges in Iran

EA projects in Iran have faced many challenges. First of all, a majority of chief officers and decision makers misinterpreted EA as a panacea for all the enterprise's problems. This unrealistic expectation led to defining a false project domain which result in project failure.

Another important EA barrier in Iran is a lack of skilled staff who are qualified in enterprise information architecture as well as business process engineering, information resource management, and strategic information systems planning.

Furthermore, problems in EA knowledge transfer and sharing within or between agencies made best practices inaccessible and unusable.

A lack of a standard framework, deficiency of capacity building and empowerment, insufficient incentives and legal regulations, a paucity of training on EA, and a sheer lack of EA assessment seem to be other reasons behind the failure of EA projects.

## 2.2 The Demand for National EA Framework

Since EA projects were launched in Iran, both public and private agencies have chosen freely whichever frameworks fit their enterprise's needs. As a result of developing EA projects without considering specific standards, practical guidelines, and e-government regulations and policies, the outcomes were inconsistent, not able to interoperate, and even in some cases infringe e-government regulations. Seeking for an ideal solution for dealing with challenges of EA projects, designing a national EA framework is an important step.

By exploring e-government top leading countries, we find out that there exists a positive correlation between success of e-government and establishing national EA frameworks. Therefore, it gets clear for us that promoting EA and designing a national framework in our country is vital.

## 3 IRAN'S NATIONAL EA FRAMEWORK (INEAF)

To avoid reinventing the wheel, we first studied existing EA frameworks to find the ones provide a good foundation for the national EA framework. As mentioned earlier, some countries have developed and published their national EA frameworks, mostly as a part of their e-government plan. Some of them that we have studied are: FEAF (CIO Council, 2013), Australian Government EA Framework (Australian Government, 2013), Korean

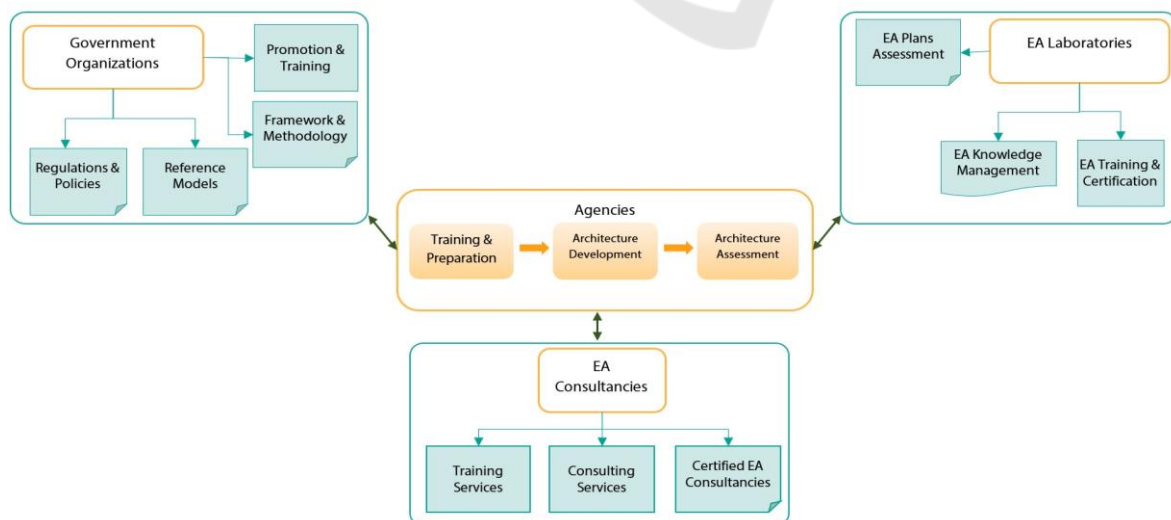


Figure 1: EA ecosystem in Iran.

Government EA (Lee et al., 2013), Singapore Government EA (Saha, 2009), Bahrain National EA Framework (AlSoufi, 2014), OIO EA (Denmark) (Danish Agency for Digitisation, 2014). In addition, we also examined two well-known general-purpose frameworks including the Zachman framework (Zachman, 1987) and TOGAF (Haren, 2011). Although we have inspired by the aforementioned EA framework but we have chosen FEAF and TOGAF as basis for INEAF.

INEAF has four groups of stakeholders including government organizations, EA laboratories, agencies, and EA consultancies. Figure 1 depicts the tasks assigned to these stakeholders and the relationship between them.

INEAF is established regarding Iranian government’s specific needs and features. Providing the public agencies with reliable and practical guidelines for planning and developing EA projects and improving e-government interoperability are the two main purposes of this EA framework.

INEAF deals with EA at two levels: **government EA** and **agency EA**. The agency EA defines guidelines for developing EA projects in agencies. Each agency should develop its EA in alignment with the government EA. However, the agency plans

and implements EA by considering its specific requirements and experiences.

### 3.1 Areas of INEAF

As depicted in figure 2, INEAF has four areas: Framework and Methodology, National Reference Models, Deployment and Promotion Program, and Sector Reference Models. In this section, we are going to explore these areas.

#### 3.1.1 Framework and Methodology

Framework and Methodology area defines how EA is developed. This area contains four components:

**Architecture Development Method (ADM)**, which is derived from the TOGAF methodology, consists of three states including Preparation, Architecture Establishment, and Architecture Implementation.

**Architecture Capability Framework** describes roles, their responsibilities, and required skills for setting up EA projects in public agencies.

**Architecture Content Framework** defines architecture artifacts, deliverables, and their classification. All the artifacts should be produced in

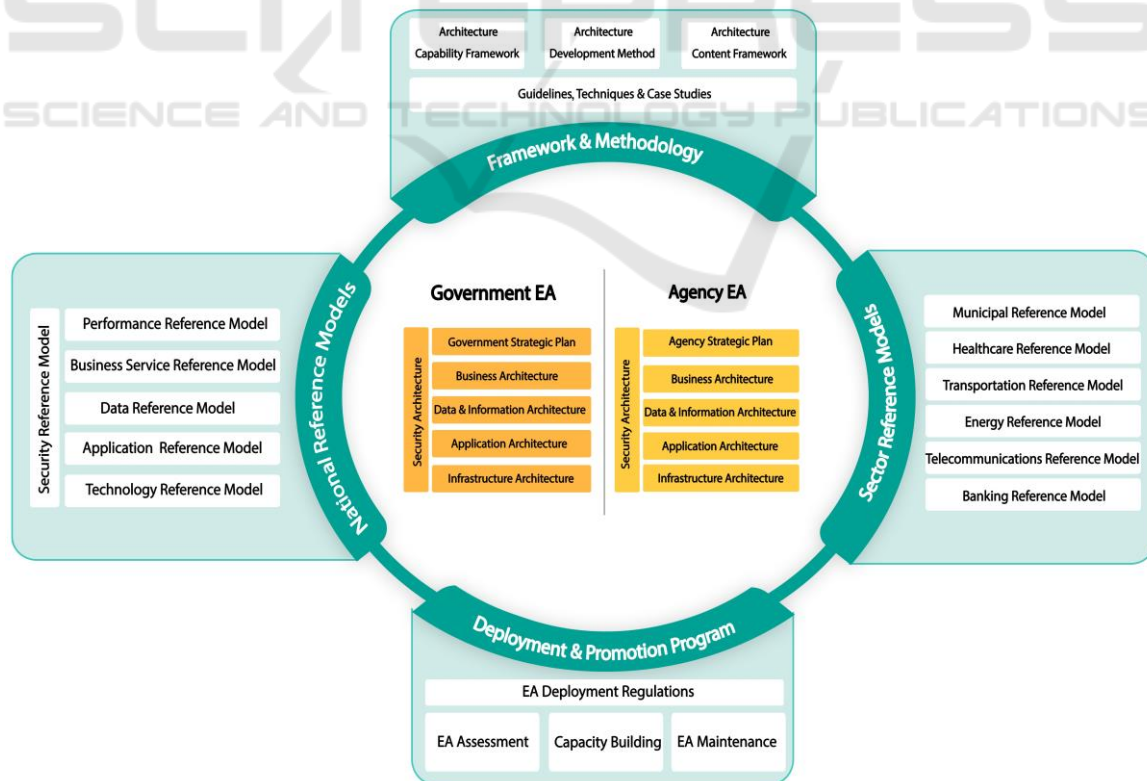


Figure 2: Iran’s National EA Framework.

one of the ADM phases and may be used or updated in other phases.

**Guidelines, Techniques, and Case Studies** provide best practices and practical guidelines for EA planning and development.

### 3.1.2 National Reference Models

INEAF supports six interrelated national models, which define government-wide architecture standards and patterns. The following are the national reference models:

**National Performance Reference Model (PRM)** focuses on performance measurement. It helps the government in performance assessment process by providing a common language for identifying and classifying performance metrics. Figure 3 shows the structure of the national PRM.

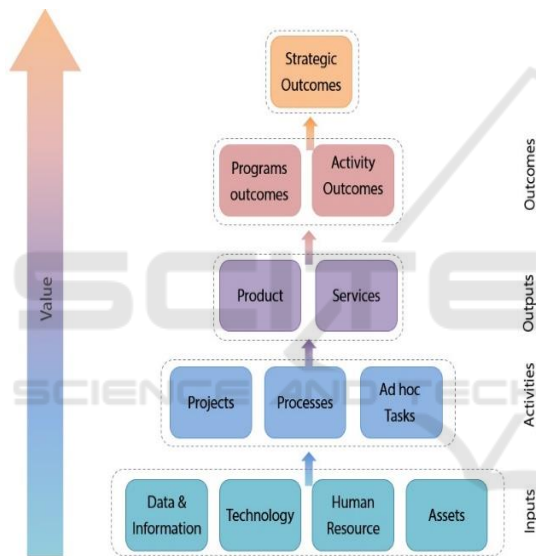


Figure 3: The national PRM structure.

**National Business service Reference Model (BRM)** defines the government services and functions from the stakeholders' points of view. It also provides a taxonomy of these services and articulates a big picture of the service architecture. Figure 4 demonstrates the hierarchal structure of the national BRM.

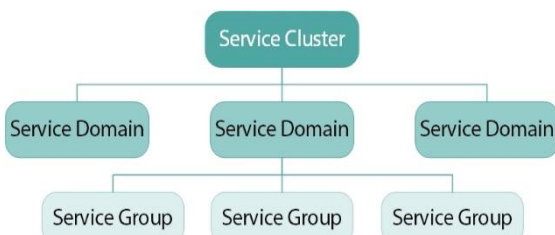


Figure 4: The national BRM structure.

To make service classification a straightforward task, ten patterns of the government services are identified (figure 5), which cover government-to-government (G2G), government-to-business (G2B), and government-to-citizens (G2C) services. To determine the type of a service, it should be matched to one of the patterns. The patterns also can be used as a template for service specification.

**National Data Reference Model (DRM)** provides a taxonomy of government data and information and enables inter- and intra-agency data sharing. Iranian Government Interoperability Framework (IGIF) (Shahkoo et al.) is a supplement to the national DRM.

**National Application Reference Model (ARM)** models the services defined and classified in the SRM. It also classifies applications and systems provided by the government.

**National Technology Reference Model (TRM)** provides a classification of technologies, IT standards, and IT tools. Moreover, it gives agencies a set of guidelines about using technology. Structure of the national TRM is shown in figure 6.



Figure 5: Patterns of the government services.

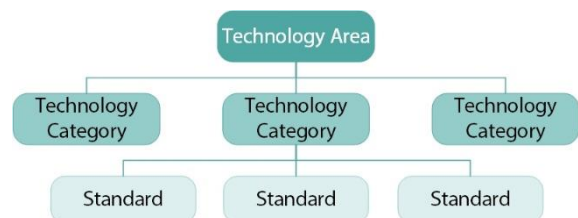


Figure 6: The national TRM structure.

**National Security Reference Model (SRM)** provides a framework for classifying security risks

and vulnerability. As shown in figure 2, the SRM is the only reference model linked to all other reference models.

### 3.1.3 Deployment and Promotion Program

Deployment and promotion program mainly focuses on EA infrastructure and EA rules and legislations. It has four main components:

**Enterprise Architecture Regulations** are introduced by the government. EA plans and development process have to comply with these regulations. Therefore, the possibility of producing inconsistent and not interoperable outcomes will be eliminated.

**Enterprise Architecture Assessment** is done with the help of Iran’s National Enterprise Architecture Maturity Assessment Framework (INEAMAF), which provides two different assessment methods: self-assessment and EA assessment by laboratories.

**Capability Building** focuses on EA empowerment, promotion, and training.

**INEAF Maintenance** should be carried out in order to satisfy new government’s needs and respond to the changing knowledge and technology. This will be done by continuous maintenance of the framework components.

### 3.1.4 Sector Reference Models

Sector reference models contain off-the-shelf EA patterns and standards for an industry or a business area. Development of these models is assigned to the industries.

## 4 CONCLUSIONS

EA in Iran is still in its early adolescence and the path of reaching maturity is a critical one. By designing INEAF, we take the first step towards maturity and further pursue e-government objectives.

For the next step, the government will mainly focus on the deployment and promotion program. To comply with EA regulations, agencies should plan their EA program in accordance with INEAF.

As mentioned earlier, INEAF is adopted from both TOGAF and FEAF. Table 1 draws a comparison between these frameworks.

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Table 1: Comparison between FEAF, TOGAF, and INEAF.

	EA Domain	EA Methodology	Levels of Scope	EA Principles	EA Tools	EA Assessment
<i>FEAF</i>	Strategy, business, data, application, infrastructure, security	CPM	8 levels (international, national, federal, sector, agency, segment, system, application)	Architectural principles, domain principles	Recommends web-based tools	EAMMF
<i>TOGAF</i>	Business, data, application, infrastructure	ADM	3 levels (strategic architecture, segment architecture, capability architecture)	Domain principles	Provides guidelines for tool selection	No exclusive method
<i>INEAF</i>	Business, data, application, infrastructure	Customized and agile ADM	5 levels (national, sector, agency, segment, system)	Architectural principles, national regulations, domain principles	Provides guidelines and recommendations	INEAMAF

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