Bahrain Governance Framework: Towards Efficient Use of IT

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Abstract: The objective is to improve the alignment between information technology (IT) and business by enhancing the ability of the organization to better control IT-related changes in a manner that supports the overall business strategy. Building on the believe that there exists a positive correlation between the desired level of e-government capability and maturity and the required level of architectural maturity, the eGovernment Authority (eGA) embarked Bahrain enterprise architecture (EA) governance framework associate with national enterprise architecture program. To do this, the organization is required to map its current and future EA states of the organization in relation to the business and IT perspectives and consequently prepare a transition plan that closes the gap between the two states - in other words, a blueprint for the organization’s IT.

Bahrain enterprise architecture governance is the set of mechanisms through which architecture is enacted in the enterprise. Governance is essentially about ensuring that business is conducted properly. It is less about control and strict adherence to rules, and more about guidance and effective and equitable usage of resources to ensure sustainability of an organization’s strategic objectives. The governance structure is a federated architecture governance model and it provides advantages in cost, schedule, autonomy, scalability and robustness. The enterprise architecture governance structure maintains a good balance between enterprise-wide standards, reference architecture and frameworks, and localized business-area driven innovation. Bahrain national enterprise architecture team has primary responsibility for reference architecture, standards and frameworks that are common across the Kingdom of Bahrain, which minimizes the duplication efforts and investment.

Enterprise architecture governance ensures the principles of enterprise architecture are well applied to both systemarchitecture and design of the underlying informationsystems. It also ensures organizations meet businesssand IT objectives and standards. Architecture governance enables effective alignment of businesssand information technology, manages risk byreducing probability of failures in transformation projects and incorporates elements of cost effectiveness and value.

Keywords: Bahrain Governance Framework; Bahrain IT efficiency; Bahrain towards Efficient Use of IT; Bahrain Enterprise Architecture; Bahrain National Enterprise Architecture Framework.

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Introduction
The enterprise architecture group is responsible for overall architecture planning and oversight, including reviewing technology plans, establishing standards and guidelines, providing directional input into the enterprise-wide technology plan, and reviewing technology acquisitions. Through the enterprise architecture process, business leadership will guide the future direction of information technology. The success of this highly collaborative process will depend on the strength of its governance structure and the commitment of the participants to its goals and guiding principles.

The purpose of an enterprise architecture organization is to develop and enable adoption of design, review, execution and governance capabilities around EA. The capabilities for successful execution of an EA initiative comprises of number of key elements, including:

Bahrain National Enterprise Architecture Framework: A set of standards, procedures and operating protocols that guide and direct the decisions around the adoption, reuse, reporting, and retirement of information technology. These include guiding principles, methods, procedures, metrics, best practices and reference models.

Enterprise Architecture Governance: A cross-organizational, multi-disciplinary EA review committee with the backing of IT executive management to oversee the implementation of the technology governance strategy and framework definition.

Enterprise architecture governance is one of critical constituent of Bahrain National Enterprise Architecture Framework.

Bahrain Enterprise Architecture
Bahrain Enterprise Architecture is an aggregation of models and meta-models, governance and compliance mechanism and technology standards and guidelines put together to guide effective development and implementation of Enterprise Architecture by different government bodies across Kingdom of Bahrain.

The eGovernment Authority initiated a National enterprise architecture strategy program in the early January 2009 to ensure the alignment of business and IT towards the Vision 2030 of Kingdom of Bahrain. It was designed to transform the provision of government services to every member of Bahraini citizens, expatriates, businesses, public sector employees and visitors. A key aspect of the program was to work as partners with identified thirty (30) government organizations in kingdom of Bahrain, to study their current state of the business - IT alignment and redundancy in architecture implemented across the ministries through a customized The Open Group Architecture Framework (The open Group a, 2009) (ToGAF) concept (Aurenmalik, 2010). To do this, as exhibited in Figure 1, the government organizations are required to map its current and future EA states of the organization in relation to the business and IT perspectives and consequently prepare a transition plan that closes the gap between the two states - in other words, a blueprint for the organization’s IT.
EA could serve different objectives; to lower the cost of IT, fix its effectiveness, fix its strategic value, use IT to generate new strategic value or in many cases to transform the business with IT. For instance EA could help with coping legacy complexity and cost, reintegrating the supply chain, integrating public services, enhancing channel capabilities or even delivering a better customer services.

EA helps to Align business and IT objectives and resources, Speed up decision-making - Principles, models, standards, and processes, Reduce integration problems - Compliance with architecture, Reduce costs - Retiring duplicative or outdated assets. Improve communication, prioritization, and governance of initiatives. Speed time-to-market - Have the technology ready before it is needed. Provide a foundation for skills development; Follow an established roadmap for infrastructure development.

Improve the effectiveness and efficiency in using Information technology. Institute and communicate vision, charter and strategic directions for EA based on vision 2030, Improve IT project management process. Ensure alignment of IT projects to main strategic objectives of vision 2030, eGovernment strategy and individual Government entity business objectives.

**Enterprise Architecture Domain**

Enterprise Architecture defines the business, the information necessary to operate that business, the technology necessary to support the business operations, and the transitional process necessary for implementing new technologies in response to the changing needs of the business.

As illustrated in Figure 2, EA is simply defining the four layers of Business, Information, Application and Infrastructures.
These layers are usually called domains and can be described as follows:

**Business Domain:** represents the functions and processes that support the business, the organizations that perform the business process and the locations where the business is performed, and the factors that could cause the business to change.

**Information domain:** identifies the major types of information needed to support the business functions. It identifies and defines the information model, data sets, metadata repositories, and their relationship to the business functions and to application systems.

**Application domain:** Identifies and describes application and modules, as well as their relationship to business processes and other applications systems and modules. The application architecture identifies the major applications needed to support the crosscutting business processes of the enterprise.

**Infrastructure domain:** identifies the major technologies, or platforms, necessary to support the enterprise’s applications and data systems, and associates those platforms with various applications in the architecture.

In every EA project, the above a current domains (As-is architecture) are first defined to measure their EA maturity of the organization. Then and based on a comprehensive study of the organizations, the target architecture (To-Be) would be developed. The journey of moving the organization’s current to target architecture with sets of action plans is called the transitional plan.

In order to complete the circle such transition plan would be possible without a management and governance process. These processes provide policy guidance, advice and assistance in the definition, design and implementation of the enterprise architecture discipline and practice throughout the entity, an understanding of the process for making co-operative and collaborative IT investment decisions and designate who within entity is responsible for making these decisions.

**Figure (2) Enterprise Architecture Domains**
Finally and order to complete the circle such transitional plan would be possible without a management and a governance process. These processes provide policy guidance, advice and assistance in the definition, design and implementation of the enterprise architecture discipline and practice through the company, an understanding of the process for making co-operative and collaborative IT investment decisions and designate who within Flabella is responsible for making these decisions.

**EA Governance Objectives**

EA Governance enables to focus on achieving desirable levels of IT quality and performance, while making sure that appropriate infrastructure support is in place to deliver the right business solutions. Primary objectives (Hazra, T. 2014) of EA governance include the following:

**Effective Value Creation and Delivery:** Managing, controlling, and monitoring activities that impact or involve the EA team and organization—and subsequently building trust among the business and IT organizations (which ultimately improves the effectiveness of governance in creating and delivering business value).

**Facilitation:** Establishing and promoting standards, best practices, and guidelines for technology adoption and support across organizations in order to advance business and IT strategies; and preparing the process for change management to adopt new technologies.

**Risk Management:** Identifying and managing risks associated with the set strategies and objectives, as well as continuously monitoring the risk levels across projects to ensure visibility into critical situations and enable practitioners to make informed decisions.

**Compliance:** Linking individual projects and initiatives to national, enterprise strategies and objectives, as well as measuring, monitoring, and managing the progress of IT projects in delivering the business goals while following EA guidelines and principles.

**Enforcement:** Defining and enforcing ways to use architecture patterns and information during the entire lifecycle of national application development, integration, and deployment.

**Bahrain Governance Framework**

Bahrain Governance framework is the set of mechanism through which architecture is enacted in the Kingdom of Bahrain (Aziz et al. 2005). It consist of more than process only—it is an integrated set of dimensions providing the mechanism for defining, implementing, managing and measuring the effectiveness of the Bahrain Enterprise Architecture disciplines. Bahrain Governance taps into Bahrain’s technology and business process to provide the direction and control. Ensure that the expected value of its investment in IT is realized.

It is also responsible for taking up external influences—global business drivers, industry trends, and the Bahrain National strategy, but also technology trends and opportunities—and identifies how the Bahrain enterprise architecture needs to adopt in order to accommodate them. To close the gaps between current state and future needs, alignment projects /initiatives are scoped and handed over to the respective program management office for implementation.

We believe as depicted blow Figure 3, Bahrain governance framework which consists of seven dimensions of enterprise architecture governance to be critical constituents of
a successful enterprise architecture effort, this paper mainly explains the dimensions of leadership, organization and investment. Due to most of government organization are in early stage to adopt and comply with the enterprise architecture governance matured process, hence eGovernment authority recently initiated an enterprise architecture maturity program, after successful completion of this program the other dimensions will be explained in detail.

**Leadership**
The leadership dimension is defined by the vision, the mandate and the sponsorship of the Bahrain national enterprise architecture program and it has been endorsed by Supreme Committee of Information Communication Technology (SCICT) of Kingdom of Bahrain.

**Figure (4) Governance Committee Leadership Structure**
(ICT Governance Committee of Bahrain)
This governance committee formerly being called as Information Communication Technology (ICT) Governance committee and it is established in year 2011, as illustrated in the Figure 4, to oversee and act as an advisory board in respect to Information Communication Technology related activities. It consist of the key members from different government entities like eGovernment Authority (eGA), Central Informatics Organization (CIO), Ministry of Education (MOE), Deputy Prime Minister Office (DPMO), Economic Development Board (EDB), Ministry Of Industry and Commerce (MOIC), Ministry of Finance (MOF) those member are under secretariat and above cater level in the government of Bahrain and also an academic advisor from University of Bahrain (UOB). In respect to the governance drive in the Kingdom each members of committee has individual role to play according their Line of Business (LOB). The key responsibilities of the governance committee are as follows:

- Establish and communicate vision, charter and strategic directions for Enterprise Architecture based on Vision 2030
- Direct, oversee and support the vision, direction, and adoption/implementation of Enterprise Architecture based on Vision 2030
- Evangelizes Enterprise Architecture and obtains buy-in from Senior Business Leadership
- Decide and guide on adoption of technology advances
- Review, Approve annual prioritized planned initiatives, projects

Organization
The organization of enterprise architecture defines roles and responsibilities of individual and internal organizations involved in executing the architecture definition, implementation and governance processes. Enterprise Architecture responsibilities cover a broad range of business, technical and managerial activities like

- Understanding business strategies
- Envisioning, leading and guiding the development of the enterprise architecture
- Technology incubation, product evaluation and recommendation
- Management of Exceptions

This requires a sizeable number of skills, represented by individuals and organizational units. An established practice is to structure the architecture team into

- a core national enterprise architecture team as exhibited in Figure 5, responsible for architecture creation and governance
- an extended Enterprise Architecture team from the line of business, bringing in specific needs and evangelizing the architecture in the development groups.
- Vendor partners.

When structuring the enterprise architecture group, experience suggests considering the following practices like:
Enterprise architecture team members require suitable business and behavioral skills in addition to technical competencies.

- Regular involvement of extended architecture teams out of LOBs brings in bottom-up feedback on architecture standards, guidelines and process and prevent “unrealistic” syndrome.
- Vendor partners can be used for executing select architecture process. These include architecture content definition, architecture reviews and architecture documentation. Architecture maturity assessments can drive improvement of governance.

One of the prime responsibilities of practice is to analyze the current state of government and provide direction for the future state i.e. technical blueprint. In the year 2009 -2010 EA program had come up with detailed blueprint and report. The below Figure 6, exhibits holistic view of deliverables; To give an input, there are 65 initiatives are been identified to achieve the target model defined by architecture governance in that 30 initiatives are enhancement oriented; 20 initiatives are continual development , 15 initiatives are new to streamline the target model.

Other than that there are key national level initiatives which keenly emphasis the shared service mechanism which are basically National Gateway Infrastructure (NGI), National
Data Set (NDS), Mobile Portal, National Payment Aggregator (NPA), National Authentication framework (single sign-on or e-Key), Unification of Human Resource Management System (HRMS) and Central Financial System (CFS) formerly known as Financial Management Information System (FMIS), National Enterprise Architecture Maturity Program, National Technical and Standards Guidelines, National Financial framework, National Data Center, National Document Management System and Bahrain License Integrated System (BLIS).

**Investment**

The investment dimension defines investment and funding model that drive the adoption and proliferation of architecture principle (The Open Group, 2009) and design practices. Since the functioning governance committee has not own any fund directly from the government. The Governance committee ensures that each government entities allocated fund is being utilized to optimize investment on appropriate IT initiatives. Hence governance council proposed during early year 2010 a mechanism as portrayed below Figure 7. This process underwent multiple approval cycle to supreme leadership in the government and currently visualized as detailed in the below section scenario of value realization: -IT Investment Framework.

![Figure (7) IT Fund Approval and Allocation Mechanism](image)

However the governance committee needs separate investment for its activities, but in real scenario is it is very tedious to get those fund, however eGovernment authority manage to act and evolving till which includes:

- Definition and evolution of the enterprise architecture disciplines
- Compliance: Conducting reviews, standards exceptions tracking and management
- National wide strategic IT initiative, Shared Service Initiatives
- Incubation projects: Tracking and piloting the use of new technologies, architecture concepts
- Subsidizing the development of reusable components (both business and technical)

**Scenario of Value Realization**

It’s a journey to realize value through Bahrain Governance associated with national enterprise architecture, this paper primarily emphasis the area towards efficient use information technology. To highlight few key facts and scenario of value realization before the non-governance functioning and after having governance in place the government has realized the value through emphasizing and utilizing the federal information technology management (Kundra, 2014), reference models, guidelines and frameworks like The Open Group Architecture Framework, an industry standards architecture framework, Control...
Objectives for Information and related Technology (IT Governance Institute, 2005) (COBIT) (IT Governance Institute, 2012) was adopted to develop the Bahrain enterprise architecture governance framework. It was designed to be an extensible and scalable framework, one that would be able to adapt to the changing environments and needs of the Kingdom.

**Architecture Framework**

There was no appropriate framework in place which defines guidelines, standards, reference models, and governance (The National Computing Centre, 2014.) which streamlines eGovernment strategy and vision 2030, the value realized by forming and executing an initiative called Bahrain Enterprise architecture. The below Figure 8 exhibits before year 2009 fact and findings and currently the government has a functioning Bahrain enterprise architecture group.

The Architecture Framework is an aggregation of models and meta-models, governance and compliance mechanisms and technology standards and guidelines put together to guide effective development and implementation of enterprise architecture by different government bodies across Kingdom of Bahrain.

![Architecture Framework Value Realization](image)

**Figure (8) Architecture Framework Value Realization**

**Blue Print of IT**

Year 2009 before Kingdom does not of a consistent framework in place which reflects business IT alignment and isolated IT blueprints by ministries none reflection of vision 2030. Due to this there is sub optimal utilization of national infrastructure as such as National Gateway Infrastructure (NGI), National Portal, National contact center and National payment gateway.

The value has been realized by forming and executing an initiative called National Bahrain Enterprise architecture based on service delivery framework. The below Figure9, exhibits before year 2009 fact and findings and currently the government has a national level Service delivery based IT Blue Print.
Figures (9) Blue Print of IT

Standards and Best Practice
There were few impact scenarios before year 2009 like unmanaged IT landscape leading to escalated support costs, prolonged procurement cycles leading to increased effort, cost, and schedule non utilization of best practices results in lowered Return on Investments (RoI). The National Enterprise Architecture framework initiative program has conducted a survey on twenty six ministries...

- Study of systems portfolio across various ministries indicates that there are no common standards defined / followed in the areas of implementation technologies, development frameworks and tools, server products, data management tools, reporting tool, server hardware, etc.
- Best practices are not documented and not shared across enterprise.

Figures (10) Standards and Best Practice
The Figure 10 depicts, before year 2009 fact and findings and the value realized, now the government has a national technical standards and guidelines across ten (10) different domains across sixty five (65) technology areas.
Integration
During year 2009 and before, in government, information sharing across ministries became difficult, leading to delayed and poor quality of services delivered to the citizen. Ad-hoc integration led to increased investment in deployment and maintenance costs. Lack of agility in service delivery increases service rollout time. As stated in the Figure 11, governments were not having a centralized integration architecture in place; most of them were point to point integration to achieve individual ministries’ business needs, not a visualized integrated solution.

<table>
<thead>
<tr>
<th>Facts &amp; Findings in Year 2009</th>
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<td>• Business need for <strong>optimal integration has not been realized</strong>, both within and across ministries.</td>
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<tr>
<td>• <strong>Point to point integration adopted</strong> to achieve localized needs of the ministry.</td>
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**Ad-hoc Integration Framework**

**EA’s Integration Architecture**

Figure (11) Integration Architecture

After formalizing the governance council and the framework made ensuring the integrated service delivery architecture which includes key national initiatives like national enterprise bus formerly called National Gateway Infrastructure, National Payment aggregator/gateway, one-time authentication or single sign-on for government services to business and citizen through multiple channels like a one-stop-shop concept.

**IT Investment Framework**

National enterprise architecture group has identified there were non-availability of centralized IT investment framework in place, to highlight few implication issues are

- Unable to cognize government-wide IT spending or spending patterns across entities
- IT expenditure details were not available for all the entities according to the information hierarchical.
- Details provided on IT expenditure were incomplete across project budget, project expenses and recurrent expenses.
- Unable to baseline investments due to lack of IT investment visibility.

Bahrain Governance council has proposed and formalized an appropriate IT Investment approval process and framework to mitigate those issues, as stated in the Figure 12.
Figure (12) National IT Investment Framework

Snapshot of IT Investment

National enterprise architecture group realized that there were

- lack of centralized and collated IT investment plan to analyze
- Ad-hoc prioritization mechanism at national level IT initiatives
- None available of national level IT investment snapshot /dashboard and
- Ad-hoc IT plans approval mechanism.

To overcome and mitigate the issues we exercised an initiative to collect and analysis the IT Plan across government entities in the year (2011-2014). It enables as mentioned below areas in the government

- To ensure alignment of IT investment with eGovernment vision, strategy and objectives
- To avail a holistic national level view of IT investments and associated business benefits
- To identify redundancy / duplication in IT investment across entities
- To Identify IT investment optimization / rationalization opportunity
  - Common IT solution catering similar need across entities
  - Increased use of IT investment towards functional capability development
  - Enable easier integration and interoperability across government ICT environment
- Identify new National initiatives based on common requirements across entities
- Provide high level guidance on IT budgetary requirement.

Based on the National IT plan year 2012-2014 exercise by enterprise architecture governance council collected and analyzed around one hundred and ninety eight (198) initiatives and projects across thirty two (32) government entities in Bahrain, it prioritized high, medium, low projects in the government and highlighted to supreme committee that there is potential tens of millions USD (United States Dollar) cost avoidance on IT
investment and also it has provided significant opportunities for National Shared Service concept which can improve overall IT performance. To emphasis and highlight few areas:

- **Multiple entities have requested similar initiatives which can be better implemented through national level shared service.**

- **Multiple entities proposed huge investment for setting up entity level Infrastructure**
  - Opportunity for Infrastructure As a Service (IaaS) at national level

- **National Level Policies and Programs for Infrastructure Optimization:**
  - Opportunity for centralized licensing policy across all entities
  - Master service agreement (MSA) with infrastructure and product vendors for better cost advantage

### Competency / Skill Development

Developing government capabilities is critical for efficient planning and management of IT portfolio across entities while cross-government communication is the key to enable a positive change culture towards efficient IT environment across government. As exhibited in the Figure 13, governance council managed to develop capabilities in few key area like enterprise architecture skill through The Open Group Architecture Framework (ToGAF), Strategic Planning Skills, IT Strategy (InfoTech Research Group, 2014) Development, Benefit Quantification, Cost and Return on Investment (ROI) computation.

#### Facts & Findings in Year 2009

- **Lack of IT Investment Framework** Process
  - Add-hoc budget and expenditure data available, like inadequate
    - Project budget details
    - Fixed assets details
    - Project ,Recurrent expenses details

#### Value Delivered

<table>
<thead>
<tr>
<th>Conceptual Flow of IT Investment Approval Process</th>
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<tbody>
<tr>
<td>1. Government Entities</td>
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<tr>
<td>2. Ministry of Finance</td>
</tr>
<tr>
<td>3. ICT Governance Committee</td>
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<tr>
<td>4. Review &amp; Approve IT Projects</td>
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<tr>
<td>5. Review &amp; Approve ICT-related Projects</td>
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**Figure (13) Competency Framework**

### Lesson Learned

During the enterprise architecture governance journey there was lot of opportunity to learn and correct many areas in the government. To highlight few key challenges over here are

- Government entities leadership, senior management felt that they would lose credibility on their own line of business; hence it was very challenging period to negotiate and get acceptance of enterprise architecture governance process and mechanism.
• Huge effort and time took place to avail government entities leadership direction and guidance to accomplish strategy and IT alignment through the enterprise architecture governance framework.
• Mid-level management involvement and collaboration across government entities were key challenge.
• Continuous awareness and regular coordination are the key area where continual improvement needed to promote and align with enterprise architecture and governance framework.
• To trade the model of optimal, efficient utilization of information technology in shared service concept were tiresome across government entities.
• Competency to execute the centralized and shared service program across government entities are really challenging factor in the ministries.

Conclusion
Bahrain governance framework is a critical enabler of enterprise architecture. Better business and information technology alignment, efficient utilization of resources, Effectiveness cannot be achieved without having a proper level of maturity in all identified dimensions. It is indispensable to understand the integral dependencies-dimension embedding Enterprise Architecture into the ministry’s leadership buy in executives supports, organization, investment have to be addressed before moving far on operational dimensions-the policies and principles, process, metrics and tools.

Without tight integration into business units and without business architecture being addressed explicitly together with business units, enterprise architecture governance will not work. Government entities top management attention to strategy (business strategy, information technology strategy), and business architecture may be a good starting point to establish business and enterprise architecture efforts. But in the long run, formal processes, structures, and metrics are required to manage enterprise architecture consistently even without permanent top management attention.

To conclude, Bahrain enterprise architecture and governance is long term, continuous effort and is an “living” entity with many parts, it is a model of organization’s enterprise and its future direction, enterprise architecture value to business operation should be more than simply information technology investment decision management, it is a main tool to reduce the response time for impact assessment, tradeoff analysis, reduce time-to-market, strategic plan redirection and tactical reaction, enterprise architecture and governance is not the end but a continuous journey.
References


