Benefits of Government Enterprise Architecture: Context of certain EA initiatives in India

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Abstract

Enterprise Architecture (EA) is considered as a means for providing more visibility and better strategic vision in an organization. Extensive number of EA frameworks and models have evolved over a period of time. Many such models have been adopted into practice too across the Globe. However, enough thrust has always lied in development of Architectural frameworks and methodologies and least focus has gone towards the analysis on the benefits attained due to EA adoption. This paper describes a study which aims to chart the benefits of EA in Government through a comprehensive literature review, study of Project documentation and Discussions with EA Subject experts. It is followed by proposition of a 4-Pillar model (4-PM) of EA Value Promoters. The 4-PM aids in identifying the benefits derived by the Enterprise due to adoption of EA approach. Further, the paper discusses a case study of BhuSeva EA and applicability of 4-PM to BhuSeva EA.

Key Words: Enterprise Architecture, IndEA, BPR, Resources Optimization, Change Management, 4-PM

I.   INTRODUCTION

Governments in this era are facing demands for enhanced and better-quality citizen service delivery. Major reasons being surge in technology, more awareness towards Customer Relationship Management and accountability towards Citizen Data, and other concerns such as Security and Privacy in servicing. In response, the Government of India (GoI) is keen in leveraging ICT to manage citizen information and government processes more efficiently to achieve greater effectiveness. This commitment is reflected through its initiative of Digital India Programme, with a vision to transform India into a digitally empowered society and knowledge economy [1].

Enterprise Architecture (EA) has been identified as the most appropriate decision making and management framework for enabling government and agencies to collaboratively provide seamless services and maximally leverage existing investments [2]. The primary goal of Government Enterprise Architecture framework is to "support transactional system interoperability, enterprise security, and business-enabling elements such as data services and processes"[3].In continuation to the efforts of Digital India Programme, GoI has come up with an EA framework called India Enterprise Architecture (IndEA) [4], tailoring to the EA needs of Indian Government Enterprises.

II.   RESEARCH PROBLEM

EA aims to define a suitable operating platform to support an organization's future goals and the roadmap for moving towards this vision [5]. Academic research has almost omitted the subject of EA benefit and value realization, focusing instead mostly on EA frameworks and EA development methods and tools [6]. It is essential to project the benefits of Enterprise Architecture, especially in the Government sector. This would attract the attention of Senior Administration to adopt the EA approach and to improvise the functioning of Government systems, which is the ultimate goal.

At the same time, it would be a huge challenge to meet such a goal, for the same reason stated above that there has been very less of research carried out in this area.

The paper begins with a discussion of the current state of EA adoption by Government Enterprises in India followed by a description of the findings of the research. The classification of benefits derived due to adoption of EA approach is then described. A 4-Pillar Model (4-PM) is proposed to evaluate the benefits derived due to EA adoption, which otherwise would not have occurred. It is hypothesized in 4-PM that EA leads to organizational benefits through its impact on four key Value Promoters: Business Process Re-engineering (BPR), Adoption of Data and Technology Standards, Resources Optimization, and Change Management. The paper concludes with recommendations for further research that could build on the 4-Pillar Model and other findings of this study.

III. EA–PRESENT STATUS OF ADOPTION IN INDIAN GOVERNMENT SCENARIO

Of late, EA adoption by Government Enterprises in India has increased. In particular, after IndEA has been published and promoted through the Digital India Programme (refer Fig 1). Information Technology has become an integral function of citizen servicing by Government Enterprises. IndEA has become a guiding and support tool for many recent e-Governance initiatives in the country, which is evident from the initiatives listed in Table 1.

The gaining popularity of IndEA is apparent due to its adoption by Indian Government Enterprises at various levels viz.,

- EA for a State (eg., State EA for Meghalaya)
- EA for an entity (eg., University Enterprise Architecture Framework, UEAF)

- EA for a specific project which is a part of a major EA initiative (eg., BhuSeva under e-Pragati).
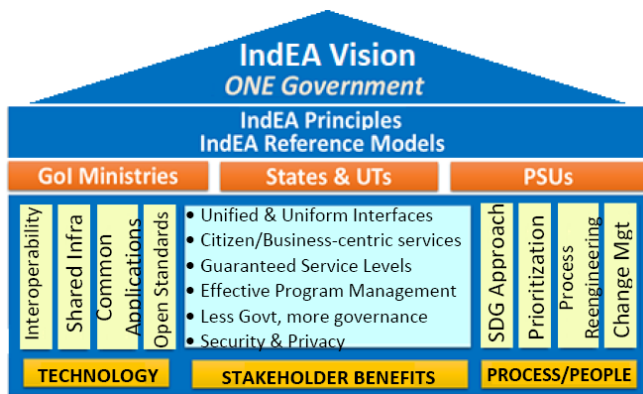

Fig. 1. IndEA Framework

Table 1. Instances of adoption of EA in Indian Government Enterprises

S. No.	EA Initiative	Effected Period	EA Frame work used
1	State wide Enterprise Architecture for Meghalaya	Work in Progress	IndEA
2	SFMS EA (State level EA for Financial Management for Kerala)	Work in Progress	IndEA
3	DRS-EAF (National Generic Document Registration System Framework)	2018	IndEA
4	BhuSeva Enterprise Architecture (Under e-Pragati EA of Govt of Andhra Pradesh)	2017-18	IndEA
5	UEAF (involving 107 universities of India) a generic Architectural Frame work for Universities across the country	2017-18	IndEA
6	PSC-EAF (Public Service Commission-Enterprise Architecture Framework) for Public Service Commission's nationwide.	2017-18	IndEA
7	Digital NIC Architecture for NIC	2017-18	IndEA
8	e-Pragati, State EA of Andhra Pradesh	2015-16	ToGAF
9	MDWS EA(EA for Ministry of Drinking Water and Sanitation)	2015-16	ToGAF
10	PEAF 1.0 (Panchayat EA Framework for Ministry of Panchayati Raj)	2011-12	ToGAF

With increase in number of Government Enterprises adopting EA as a methodology to deal with complex, real-life problems and for achieving major objectives in Government like effective citizen-servicing there is an inherent need to chalk out the benefits derived due to adoption of EA.

IV. RESEARCH METHODOLOGY

To understand the benefits EA can bring due to its adoption in Government Enterprises, the following methods of data and information gathering were conducted.

IV.I. A thorough review of literature has been carried out at general and academic search engines. Key Phrases and words such as Enterprise Architecture, Benefits of Enterprise Architecture, EA Benefits, Enterprise Architecture Value Proposition. Additional literature was identified and studied through the references section of the found papers.

IV.II. A Study of available project documentation in-house of the primary author of the paper.

IV.III. Focused discussions on the subject with experts heading the Enterprise Architecture development teams.

IV.IV. The findings from the literature review and the focused in-house discussions were analyzed and classified. This classification has helped in devising a model viz., 4-PM which is thoroughly discussed under section VI.

V. BENEFITS DUE TO EA IN GOVERNMENT ENTERPRISES

EA implementation offers many benefits, more so in Government Enterprises. The classification of benefits that can be delivered by EA, as derived due to the research study is given below.

V.I. Enhancing the Citizen Service Delivery
V.II. Refining the Systemic Processes and Competencies
V.III. Standardization and reducing the Risk
V.IV. Providing Common Insights and Overviews
V.V. Communicating and Handling the effect of Change
V.VI. Enabling Modernization / Improvement / Innovation

VI. THE 4-PILLAR MODEL (4-PM)

The 4-PM model essentially speaks about 4 major EA Value Promoters (There could be many more promoters, and not brought in as part of this proposed model). A detailed description of the model is presented below. Fig 2 gives a visual representation of the 4-PM. Each of the four pillars in Fig 2 illustrate one Value Promoter, viz. the BPR, Adoption of Standards, Resources optimization and Change Management.

VI.I. BPR

IndEA advocates 8 reference models to build architecture for an Enterprise. BPR is one of the Principles on which the Business Reference Model of IndEA is developed.

Re-engineering of the business processes leads to multitude of benefits, such as

- Reduction in Process turn-around time
- Reduction in Process Cost (ex: lesser man-power to process)

- Reduction in Service Cost (ex: citizen service made online)

In Government scenario, it is essential to re-visit the processes, especially those dealing with servicing citizens. Re-architecting businesses would lead to identification of pain areas and taking corrective measures to smoothen the servicing. Since Government enterprises are aiming at computerizing the processes, it would be a right approach to transform the processes by re-engineering them, instead of translating a manual process to a blind automated one.

VI.II. Adoption of Standards

Establishing a proper Data Governance with Data Strategies, Data Policies, Data Standards, i.e., having Data Architecture in place would help enterprises to effectively and efficiently manage their important asset - Data [7]. Adoption and Implementation of Standards [8] lead to Integration and Interoperability within and beyond the enterprise, facilitating seamless exchange of information across different environments.

VI.III. Resources Optimization

Reusability emphasizes on making maximum use of existing assets within the organization. The EA artefacts and building blocks help in identifying the current assets in the Enterprise. The architectural artefacts help in identification of duplications, re-application and re-use of existing assets and resources.

Reusability promotes optimal use of resources and plays a key role in overall cost reduction and improvement in Quality of final outcomes envisioned by the organization.

VI.IV. Change Management

Change Management in an Enterprise focuses on managing changes as a Standard Operating Procedure at an organization level. i.e., change management is institutionalized in the capabilities, processes and practices of the Enterprise. It is treated a second nature at work, and all the employees and staff internalize their roles in leading the changes.

In Government, Change Management needs to be embedded across the entirety of the enterprise and needs enduring attention ALWAYS!

Fig. 2. The 4 – Pillar Model

VII. BHUSEVA – THE CASE STUDY FOR APPLICABILITY OF THE 4-PM

BhuSeva, a software system for delivery of Land services to the citizens of Andhra Pradesh State has been developed through an Enterprise architectural approach [9]. IndEA, the EA framework for Indian Government Enterprises has been adopted for the development of EA for BhuSeva.

The Enterprise Architecture for BhuSeva defines the methodology for development of BhuSeva Software application. It gives an integrated perspective of the services to emanate from BhuSeva application. It enables quick alignment of all the stakeholder-departmental IT systems to cater to the reforms in Government Processes and for effective citizen servicing. BhuSeva Architecture has become a solid foundation for the entire BhuSeva Enterprise. It serves as a guiding source for design, development, maintenance of the BhuSeva application software and also for effective implementation, change management and governance.

The previous section of this paper had given a detailed description of the 4-PM, indicating each of these 4 pillars as EA Value Promoters. Table 2 provides an inside view of the EA work of BhuSeva for the applicability of the 4-PM.

Table 2. Results of 4-PM applicability to BhuSeva EA

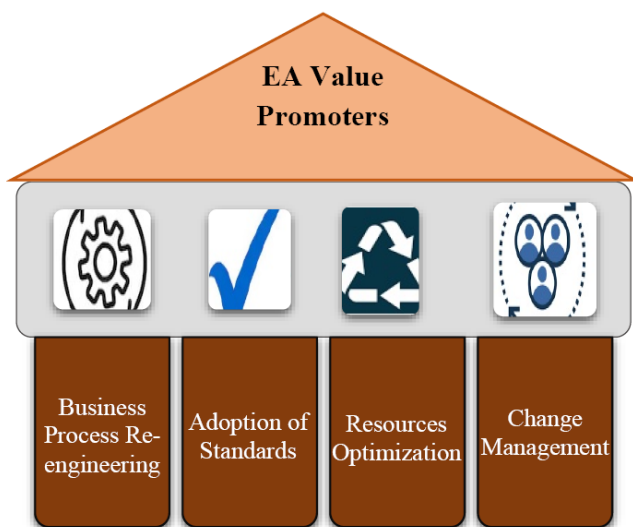| The 4-PM Value Promoter	Outcome / Benefit derived
a. Business Process Reengineering	I. **Identification of broken links in the current Software Systems at Process Level.** This activity has helped in understanding the need for inter-operable systems for effective citizen servicing. II. **Design and Build Software Application modules to reengineer such business processes for smoother exchange of data to aid in effective decision making**
b. Adoption of Standards	I. **Data Standards** The Master data for identification of Location Codes is obtained from the Government-Certified repository called Local Government Directory [10]. Similarly, the Coding Standards for Nature of Land, as certified by the Digital India Land Records Modernization Programme have been adopted [11].

The 4-PM Value Promoter	Outcome / Benefit derived
	II. **Application & Technology Standards** • Promotion of Open standards, Open formats and Open sources • Cloud First and Mobile First Approach. • Development of design criteria for Open API based Micro services/SOA based architecture for seamless interoperability across applications.
c. Resources Optimization	I. The BhuSeva EA Artefacts aid and guide in a Systematic method for development of Software II. Scalable, outcome-oriented platform, avoiding duplication and optimizing costs of development and implementation. III. The EA for BhuSeva has aided in Identification and development of Reusable application snippets
d. Change Management	I. Changes in Business Processes and day-to-day operations are communicated through Executive circulars by competent authorities in the department II. Such changes are brought into practice by the way of modifications in the IT systems (BhuSeva and other interoperated software systems) that are aligned with the Business Processes III. Capacity Building Programmes are conducted from time to time to employees and staff using these systems

VIII. SCOPE FOR FURTHER RESEARCH

The present attempt of devising a Value Promoter Model opens up scope for research in various specific areas.

a. All the key promoters need to be clearly and unambiguously identified.
b. The benefits derived due to each of these promoters need to be consistently defined.

c. Metrics and Evaluation criteria should be evolved for assessing and quantifying the value derivation due to EA adoption.

IX. CONCLUSION

In this Paper, the benefits of EA were classified through a literature review, discussions with experts. The Value Promoters due to Adoption of EA are identified and classified into a model, named as 4-PM. It is understood from the analysis that there is an imperative need for clarity in description of benefits due to adoption of EA methodology. Government Enterprises are required to be watchful to learn more from the research side.

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