

Preface

The foundation of anything enduring is its architecture and design, enterprises included. Enterprise architecture (EA) is an important and evolving discipline that is becoming more discussed and talked about with every passing day. Nevertheless, to my knowledge, there exists very little guidance that rank high both on practical relevance and academic rigor. This book, along with my first book *Handbook of Enterprise Systems Architecture in Practice* has emerged out of my strong belief that ‘well architected’ enterprises consistently perform better. However this aspect has not been well explored and documented.

This is not a general book on EA. There are several books already covering the subject. But the caveat with current EA literature is that most available materials tend to overly focus on a specific framework or methodology thus limiting their utility. I have attempted to address some of these issues through my first book. That one, released in March 2007, has received several accolades and excellent feedback.

Over the past two decades, the largest implementations of EA have occurred in the government sector. This is natural as typically governments are the largest organizations in almost every country. It is further characterized by complex federated structures where individual government organizations work in their respective silos. Often this leads to and amplifies the fragmentation of business processes and duplication of systems and technologies, creating obstacles in cross agency interoperability. Government-wide architecture allows end-to-end business processes, standard technologies, rationalized data structure and modular e-services that can be assembled as required to deliver e-services. EA is a critical success factor for all types, scale and intensities of e-government programmes. The key goal of EA in government organizations is to make them citizen-centered, results-oriented and market-based. However at this point there are no books addressing this area. There is a very big gap in the current literature, and this book expects to address the current gap. This is a seminal book that will popularize the term GOVERNMENT ENTERPRISE ARCHITECTURE and trigger several other publications in the same subject area. This book, unlike any other available today, aims:

- To present and bring forth the current and future developments, issues and trends in EA for Government organizations.
- To integrate EA theory and concepts to field-tested methods, practical strategic issues and implementation challenges in the context of e-government.
- To illustrate development methods and the process cycle through case studies and detailed examples.
- To demonstrate the criticality of EA for e-government programmes.
- To provide insights into the impact of effective EA on IT governance, IT portfolio management, IT risks, IT outsourcing and service oriented architecture.

This book is a compilation of 18 chapters on government enterprise architecture written by practitioners and practicing academics from countries including Australia, Germany, Greece, Ireland, The Netherlands, Singapore, South Korea, United Kingdom, and United States of America. The chapters in the book have been selected with the intention to address professionals with a wide variety of interests and with different levels of EA knowledge. The book has a very strong practical orientation and is primarily targeted at:

- Government CIOs, IT/IS managers, architects, analysts and designers seeking better, quicker and easier approaches to respond to needs of their internal and external customers.
- Line-of-business managers concerned with maximizing business value of IT and business competitiveness.
- CTOs of business software companies interested in incorporating EA to differentiate their products and services and increasing the value proposition to their customers in the government sector.
- Consultants and practitioners desirous of new solutions and technologies to improve the productivity of their government clients.
- MIS and IT educators interested in imparting knowledge about this vital discipline.
- Researchers looking to uncover and characterize new research problems and programmes.
- IT professionals involved with organizational technology strategic planning, technology procurement, management of technology projects, consulting and advising on technology issues and management of total cost of IT ownership.

The book is structured logically into three sections.

- **Section I: Frameworks and Methodologies** focuses on approaches and mechanisms that organizations in the government use to develop their architecture blueprints. In the past two decades a lot of effort has been expended by several countries in developing their own frameworks, guidebooks, toolkits and methodologies. Section I intends to provide a glimpse of these activities.
- **Section II: Leadership, Governance and Management** shows how government agencies and organizations initiate and sustain their EA practices. Beyond frameworks, methodologies and artifacts, it takes good leadership, innovative governance and flexible management to sustain EA programme. Section II shows how these play a role and impact of these on the overall programme success.
- **Section III: Realization and Deployment** provides insights into how organizations employ EA to drive their transformation programmes, gain tighter business-IT alignment and realize business value out of their IT investments. This section consists of descriptions of the adoption of EA in large and small organizations with insights on key practical challenges they face and how the whole EA programmes are sustained.

SECTION I: FRAMEWORKS AND METHODOLOGIES

Section I is a collection of chapters describing approaches and methods used by organizations to plan and develop their EA blueprints.

Chapter I: Countries across the world are pushing their frontiers in governance in the move to information economy, and governments play a pivotal role in this transformation. These governments employ

modern information and communication technologies to serve the citizens and businesses better. Raising the effectiveness and quality of government services is not only a matter of leading edge technologies; it also involves visionary leadership, clear objectives and sound execution mechanism. The role of Enterprise Architecture in shaping e-government programmes cannot be overstated. Within the context of Singapore's e-government initiative, this chapter, *A Methodology for Government Transformation with Enterprise Architecture* by **Pallab Saha** of the **National University of Singapore** describes the **Methodology for AGENCY ENTERPRISE Architecture (MAGENTA)**, a rigorous, disciplined and structured methodology for development of agency enterprise architectures that enables agencies to align to and fully support the government's transformation objectives and outcomes. Mechanisms for agencies to align to the overall government enterprise architecture are detailed. The chapter concludes with a set of recommendations for future enhancements and research.

Chapter II: *A Service-Oriented Reference Architecture for E-Government* by **Marc Lankhorst** of the **Telematica Instituut, Netherlands** and **Guido Bayens** of **Novius Business and Information Management, The Netherlands** describes the development and future directions of service-oriented reference architecture for the Dutch government. The Dutch government has focused on improving the service level of public agencies for several years. Electronic services play an important part in this, which requires a concerted effort across many organizations. A reference architecture has been created in order to guide the many different programmes and projects. This chapter describes the role of service orientation in e-government, and the creation, structure, and first results of this reference architecture for e-government. Furthermore, the chapter looks ahead at future developments in integrated, demand-driven service provisioning in e-government.

Chapter III: *Role of Beacon Architecture in Mitigating Enterprise Architecture Challenges of the Public Sector* by **Amit Bhagwat** introduces the concept of Beacon Architecture as a formalized and ordered grouping of architectural elements, describing the constituents, their order, correlation and likely evolution of the grouping; and illustrating its specific value to the public sector. The first half of the chapter builds up to the concept, the reasons behind its specific nature, and its value to enterprises, especially in the public sector. For this, the chapter is split into a number of sections that may be studied separately and that also build up to introduce Beacon Architecture. The sections may be broadly divided as concepts, historical overview, illustrative case studies in public sector transformations along with a summary of peculiar architectural challenges they face, and a cyclical pattern to architecture development. After introducing and elucidating on concept and constituents of Beacon Architecture, the chapter delves into its correlation with architecture concepts in currency and its role in mitigating enterprise architecture challenges with examples and illustrations from the British Government, before concluding on an assessment of future trends.

Chapter IV: Quite a good amount of time has been spent seeking appropriate solutions to handle the giant information technology expenditure not only in government sectors but also in private sectors all over the world. Beginning with OMB, which substantially leads the U.S. governmental efforts in ITA/EA area, seems to be on the right path using process improvement concept in its ITA/EA maturity model (OMB, 2007-2). EA community still finds it difficult to introduce quality management concept into its business and practices. This chapter, *Maturity Model Based on Quality Concept of Enterprise Information Architecture*, by **Hong Sik Kim** of the **Korea Polytechnique University** and **Sungwook Moon** of **Component Basis Inc., South Korea** therefore suggests a practical ITA/EA maturity model based on the quality concept of enterprise information architecture (EIA), which is ROI-driven, practical and based on four-phased process improvement approach for the EA community. This approach could bring a substantial reduction in the costs and efforts in the entire ITA/EA area and provide sustainable development environment for the ITA/EA like the argument of the environmentalists.

Chapter V: Enterprise architecture is the organising logic for business processes and Information Technology infrastructure, the purpose of which is to create a more effective organisation in the context of the business's strategy and goals. However, the ability to measure the effectiveness of any activities initiated under the guise of enterprise architecture is limited, even more so in those organisations, such as government agencies, that do not recognise financial return on investment. This chapter, *Measuring the Benefits of Enterprise Architecture: Knowledge Management Maturity* by **Alan Dyer** of the **Australian Defence Force Academy, University of New South Wales, Australia** introduces the concept of Knowledge Management, linked to the strategic outcomes of Enterprise Architecture and proposes a maturity model framework for the measurement of enterprise architecture implementation. The chapter aims to provide a basis for discussion of a wider capability maturity profile with architectural frameworks to help develop and measure the benefits of implementing frameworks and architectures.

SECTION II: LEADERSHIP, GOVERNANCE, AND MANAGEMENT

Section II of the book comprises of chapters that are useful in instituting and sustaining the EA practice within the government organizations.

Chapter VI: An effective enterprise architecture capability enables an organization to develop sound enterprise plans, make informed human, material, and technology resource investment and management decisions, and optimize key business processes. Despite U.S. Congressional legislation, U.S. Office of Management and Budget guidance, and U.S. Government Accountability Office reports and recommendations, many U.S. government leaders struggle in advancing EA adoption in their organizations. U.S. Government leaders must embrace transformational leadership to advance EA adoption. This chapter, *The Criticality of Transformational Leadership to Advancing the United States Government Enterprise Architecture Adoption* by William Boddie of the National Defense University, United States of America presents the Vision, Integrity, Communication, Inspiration, and Empowerment Transformational Leadership Model that describes competencies U.S. Government leaders need to advance EA adoption. The chapter also presents the Transformational Leadership and Enterprise Management Integration Framework that describes the relationship between transformational leadership and enterprise management functions.

Chapter VII: Public institutions that are organized in hierarchies find it difficult to address crisis or other unique requirements that demand networked solutions. This chapter, *Adaptive IT Architecture as a Catalyst for Network Capability in Government* by **Jay Ramanathan, Rajiv Ramnath and Anand Desai** of the **Ohio State University, United States of America** first provides a prescriptive transaction-based method for achieving such networking organizations with information technologies (IT) and then discusses how the organization becomes more effective in non-routine responses to citizen requests. The chapter illustrates how the prescriptive transaction-based enterprise architecture framework was used for decision-making in a multi-year interdisciplinary industry-university collaboration resulting in a successful 311 system.

Chapter VIII: *Design Integrity and Enterprise Architecture Governance* by **Chris Aitken** describes a design integrity framework for developing models of any entity of interest at various levels of abstraction. The design integrity framework presented describes and defines contextual, conceptual, logical and physical model types. The framework also defines a set of alignment attributes for each model type and explains how these are to be used to demonstrate alignment from initial concept and requirements through to actual physical implementation. These concepts are then applied in an organisational context to identify the roles necessary to support an EA governance framework and strong alignment from idea to implementation.

Chapter IX: Few government executives can explain the enterprise architecture of his or her agency, and it is rare to find a political executive who is able to explain how their political objectives are furthered by government-wide enterprise architecture. This low level of awareness translates to enterprise architecture efforts that are often undervalued and under funded because the budget priorities of political and functional executives rarely include enterprise architecture. Not surprisingly, many points of tension exist as the CIOs and architects work to translate political goals into resources and architectural plans supporting the agency's programs. This tension, between the rational orientation of enterprise architecture advocated by the CIO and the political nature of policy goals sought by executives, often puts a CIO at odds with his or her organization's political and functional executives. This chapter, *Policy Mapping: Relating Enterprise Architecture to Policy Goals* by **Dwight Toavs** of the **National Defense University, United States of America** discusses that tension, and advocates that CIOs and enterprise architects develop a "policy map" to bridge the gap between the political and the rational perspectives.

Chapter X: A comprehensive enterprise architecture management has strategic and operative aspects. Strategic tasks cover the identification of appropriate fields of activity for information technology (IT) investments in accordance with business strategy and portfolio management. This chapter, *Enterprise Architecture Management and its Role in IT Governance and IT Investment Planning* by **Klaus Niemann** of **ACT! Consulting, Germany** shows how enterprise architecture management is cross-linked with other IT management processes and delivers the necessary information for sustainable governance. The continuous analysis of the IT landscape, the deduction of measures for optimization and its controlling also belong to the tasks of architecture management. Standards for development and infrastructures are made, e.g. reference architectures and a "book of standards", whose implementation is overseen by solution architects throughout the operative architecture management.

Chapter XI: Departing from the lack of coherent and ready-to-use models and domain descriptions for public administration, this chapter, *The GEA: Governance Enterprise Architecture-Framework and Models* by **Vassilios Peristeras** of the **National University of Ireland, Ireland** and **Konstantinos Tarabanis** of the **University of Macedonia, Greece** presents a set of generic models that serves as a top-level, generic and thus reusable Enterprise Architecture for the overall public administration domain. This set of models is called *Governance Enterprise Architecture* (GEA). GEA has deliberately remained technology independent and following the model driven architecture approach, GEA constitutes a computationally independent model for the domain. GEA has been derived from multi-disciplinary influences and insights and identifies two broad modeling areas, called governance mega-processes: *Public Policy Formulation* and *Service Provision*. These two, together with the *object* versus *process* perspective, form a four-cell matrix that defines four modeling areas for the GEA models. Until now, a large number of services have been modeled using GEA and more recently; an extended modeling effort has started with GEA being chosen for use by a national EU-country project. GEA can be also used as a knowledge infrastructure for applying semantic technologies. In this line, it has been used for creating a public administration specialization of a formal Semantic Web Service ontology, namely WSMO.

Chapter XII: *Enterprise Architecture and Governance Challenges for Orchestrating Public-Private Cooperation* by **Bram Klievink, Wijnand Derks** and **Marijn Janssen** of the **Delft University of Technology, Netherlands** presents an architecture aimed at supporting the coordination of public and private parties for creating a one stop shop and the main challenges therein. Public-private service network poses higher requirements on the architecture of a service network, whereas the variety in systems of the various organizations and different aims make it more difficult to develop such an architecture. Furthermore, it is difficult to isolate architectural challenges from governance aspects, as many architectural issues need to be complemented by governance mechanisms. Architecture and governance cannot

be considered in isolation. Within this setting, a new architecture is created and presented for managing and orchestrating the interactions among governmental and private organizations.

SECTION III: REALIZATION AND DEPLOYMENT

Section III provides insights into how organizations employ EA to drive their transformation programmes, gain tighter business-IT alignment and realize business value out of their IT investments.

Chapter XIII: *People-Led Enterprise Architecture* by **Neil Fairhead** of **Fujitsu Services** and **John Good** of **SERCO Consulting, United Kingdom** provides an approach to enterprise architecture that is people-led, as a contrast to being led by technology or modelling methodology. The chapter identifies the major stakeholders in enterprise architecture and suggests where in the organisation they may be found and how they may be connected with the enterprise architecture. It highlights the roles of stakeholders throughout the process of defining and implementing an enterprise architecture. The view of stakeholders managing the EA effort is described through the complete lifecycle, from setting the EA mission to sustaining the benefits after implementation. In proposing the adoption of such an approach, we aim to encourage a more direct link between enterprise architecture, the needs of the stakeholders it serves, and the public policy outcomes it enables.

Chapter XIV: *Using Enterprise Architecture to Transform Service Delivery: The U.S. Federal Government's Human Resource Line of Business* by **Timothy Biggert, Kunal Suryavanshi** and **Ryan Kobb** of **IBM Global Business Services, United States of America** provides a case study on how the U.S. Office of Personnel Management has led the establishment of the Human Resources Line of Business (HR LOB). It explains how the HR LOB program has used enterprise architecture to drive transformation to a new Human Resources service delivery model across the United States Federal government. The authors propose that the common view and vocabulary that EA artifacts provide, along with the collaborative governance that took place to create the artifacts, has produced a solid business foundation for this extensive business transformation effort.

Chapter XV: Government agencies are committing an increasing amount of resources to information security and data privacy solutions in order to meet legal and mission requirements for protecting agency information in the face of increasingly sophisticated global threats. Enterprise architecture (EA) provides an agency-wide context and method that includes a security sub-architecture which can be used to design and implement effective controls. EA is scalable, which promotes consistency and alignment in controls at the enterprise, program, and system levels. EA also can help government agencies improve existing security and data privacy programs by enabling them to move beyond a system-level perspective and begin to promote an enterprise-wide view of security and privacy, as well as improve the agility and effectiveness of lifecycle activities for the development, implementation, and operation of related security and privacy controls that will assure the confidentiality, integrity, and availability of the agency's data and information. This chapter, *Enterprise Architecture as Context and Method for Designing and Implementing Information Security and Data Privacy Controls in Government Agencies* by **Scott Bernard of the **Carnegie Mellon University** and **Shuyuan Mary Ho** of **Syracuse University, United States of America** presents the EA³ “Cube” EA methodology and framework, including an integrated security architecture, that is suitable for use by government agencies for the development of risk-adjusted security and privacy controls that are designed into the agency's work processes, information flows, systems, applications, and network infrastructure.**

Chapter XVI: With a plethora of architectures, modeling techniques and methodologies on offer, it is difficult to decide how to begin building an enterprise and achieve seamless integration. This difficulty is most noticeable in consortia that need to deal with government participation. Various government projects have different objectives and agenda. In addition, changes in business environment as well as government policies impose extra conditions onto the project. Failure to comply with the project requirement can lead to loss of business and sometimes unexpected penalty. The chapter, *Architecture Based Engineering of Enterprises with Government Involvement* by **Laszlo Nemes** and **John Mo** of the **RMIT University, Australia** uses three case studies to show various ways of government involvements in projects. Based on the experiences of these cases, the chapter discusses how enterprise engineering can help creating and managing the enterprise that can engage government services successfully.

Chapter XVII: E-government evolves according to strategic plans with the coordination of central governments. This top-down procedure succeeds in slow but sufficient transformation of public services into e-government ones. However, public agencies adapt to e-government with difficulty, requiring holistic guidance and a detailed legal framework provided by the government. The setting up of common enterprise architecture for all public agencies requires careful analysis. Moreover, common enterprise architecture could fail to cover the special needs of small or municipal agencies. This chapter, *Collaborative Enterprise Architecture for Municipal Environments* by **Leonidas Anthopoulos** of the **Hellenic Ministry of Foreign Affairs, Greece** uses data from various major e-Government strategies, together with their enterprise architectures, in order to introduce a development model of municipal Enterprise Architecture. The model is based on the experience collected from the Digital City of Trikala, Greece, and results in “Collaborative Enterprise Architecture”.

Chapter XVIII: *Government Enterprise Architectures: Enabling the Alignment of Business Processes and Information Systems* by **Nigel Martin, Shirley Gregor** and **Dennis Hart** of the **Australian National University, Australia** describes the development and use of government enterprise architectures for the framing and alignment of the core business processes and enabling information systems at the Australian Bureau of Statistics (ABS) and the Centrelink Social Services agency. The chapter focuses on the construction and ongoing maintenance of public enterprise architectures that enable the alignment condition. An established research model has been used to guide the analysis and explication of the government business processes, enabling systems and architectures, and the resulting agency alignment. While the discussion acknowledges the existence of other formal and informal enablers of alignment, this chapter concentrates on the enterprise architecture enabler. The functionally integrated government business processes and information systems that are established within the instantiated enterprise architecture are examined.

In conclusion, I hope that this book makes its contribution to the evolving discipline of EA, which is only going to gain importance in organizations. I would like to invite readers to share their comments about the book in addition to their success stories that may well spawn of future editions of this book.

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