

Enterprise Architecture Value Model

Eapen George and George Feuerlicht

School of Software, University of Technology, Broadway, Sydney, Australia

Keywords: Enterprise Architecture, EA Maturity, Business-IT Alignment, EA Value Model.

Abstract: Enterprise Architecture (EA) is gaining acceptability as an approach for strategic alignment of business and IT. While it is widely accepted that EA is essential for optimizing the value of IT in organizations, most IT managers find it difficult to communicate the value of EA using terms meaningful to business decision makers. This paper presents a Value Model for expressing the business value contribution of EA function in organizations. The model aims to communicate the value of EA to stakeholders and senior management using a language that can be understood by business leaders. This simple, two dimensional model relates major Enterprise Architecture activities to key business objectives. High level business metrics are used as a basis of the evaluation of the maturity of Enterprise Architecture function.

1 INTRODUCTION

In today's globalized world enterprises need to be able to rapidly respond to competition and changing needs of the customers. Understanding the complexities of the enterprise and the business environment they operate in is critical for effective management of organizational assets and for creating differentiators essential for long-term survival (Kearns, 2004). An enterprise ecosystem, especially in the context of large enterprises, consists of a number of loosely interconnected business units and entities that may have different business drivers but contribute to a common goal of sustaining competitive advantage (Gam, 2006; 2006a). Business success is often closely related to effective use of Information Technology (IT) and Enterprise Architecture (EA) is gaining acceptability as an approach to strategically align business and IT. While it is widely accepted that EA is essential for optimizing the value of IT in organizations, most IT managers find it difficult to communicate the value of EA using terms meaningful to business decision makers. There is a lack of good models that clearly communicate the business value of enterprise architecture, and this makes it difficult to maintain support for EA programs and activities. In this paper we introduce a simple value model that can be used to define and communicate the value of EA to both IT and business professionals. In the following section (section 2) we discuss the changing role of

EA and the relationship between business objectives and EA activities. In section 3 we propose the EA value model and discuss how it can be used to assess the contribution of the EA function to business objectives. Section 4 presents our conclusions.

2 CHANGING ROLE OF EA

The role of Information Technology (IT) in organizations has been changing from a supporting role to a business partner role (Ross, 2006). Traditionally EA was focused on recording the existing environment, documenting IT assets and attempting to achieve cost reduction through standardization and reuse. Today, Enterprise Architecture is being used as an approach to managing both business and IT at a strategic level (Gam, 2009; 2009b) and forms the basis for achieving agile business-IT environment enabling IT to respond to rapid changes in business requirements as market conditions change (Ross, 2006). At the same time, the building blocks of IT (i.e. infrastructure components, business applications, etc.) are becoming commoditized, reducing the competitive advantage that organizations gain directly from deploying individual IT components. It is the combination of various IT components and business functions in the context of EA framework that can deliver business value and competitive advantage.

2.1 Evaluation of IT Contribution

The function of EA as an instrument for creating and delivering business value needs to be communicated to key stakeholders in the organization (Raad, 2008). Both academic research and IT practitioners have attempted to produce models that clearly characterize the relationship between EA and the business value created by the implementation of EA, but the indirect nature of EA contribution to business makes this process difficult. As illustrated in Figure 1, EA helps IT functions to deliver value indirectly, for example by reducing complexity through standardization of technology platforms, and by improving governance through defining roles and responsibilities.

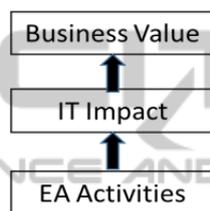


Figure 1: Business impact of EA.

Organizations typically evaluate the contribution of IT functions against a set of business objectives. These objectives can change over time as the focus and needs of the organization evolves. For example, the contribution to the achievement of the following four business objectives can be used to assess the value of IT:

- a) Management of costs
- b) Management of risk
- c) Increased innovation
- d) Improved Agility

2.2 Enterprise Architecture Activities

Enterprise Architecture in an organization is achieved through the means of EA activities that cover management activities and analysis and design approaches (Ber, 2012). The activities carried out in the context of EA can vary from organization to organization depending on the scale, maturity and objectives of the organization. However, it is possible to identify a number of core activities that typically occur and can be classified as EA activities. For example, a recent publication identifies eight core activities that include defining IT strategy, modelling EA component architecture, facilitating IT transformation, developing and

enforcing standards and managing IT risks (Ben, 2012). In another classification developed to discuss the efficiency of the EA function, EA activities have been divided into management, delivery and conformance activities (Raad, 2009). In this paper, the EA function is described as having three core activities: 1) Planning, 2) Implementation and 3) Governance.

EA Planning is concerned with the selection and evolution of EA frameworks, tools and artefacts and with planning the products and methodologies used within the IT organization. It deals with resolving conflicts between the various actors and roles within the EA function, and product non-conformance issues, and stakeholder management.

EA Implementation is responsible for creating and maintaining EA products and artefacts, and provides guidance to senior management to assist with EA decision-making. EA implementation also validates projects and operational changes ensuring that they conform to the architectural standards.

EA Governance ensures that projects are executed as per EA policies and guidelines, and that operational changes are implemented as described in the target architectures. EA governance includes developing EA capability across the key teams in the organization.

The purpose of breaking down the EA function into EA activities is to develop a high level model that provides effective decision making guidance to IT and business leadership. Having the EA function categorized into Planning, Implementation and Governance provides focus on the performance measurement of different aspects of the EA program.

3 THE EA VALUE MODEL

Business leadership stakeholders are more likely to understand and appreciate the value of EA when it is expressed in terms of business objectives. Value Model is a model that relates the value delivered by the EA towards the achievement of the business objectives (Figure 2).

The EA Value Model provides a framework to enhance understanding of the relationship between the EA activities and the business objectives. The EA activities through their support of IT programs contribute to the achievement of the business objectives. The following approach can be used for assessing the nature and the extent of the relationships within the EA Value Model:

- a) dimensions relevant to the EA activity

b) Assess the impact of the EA activity on the business objectives.

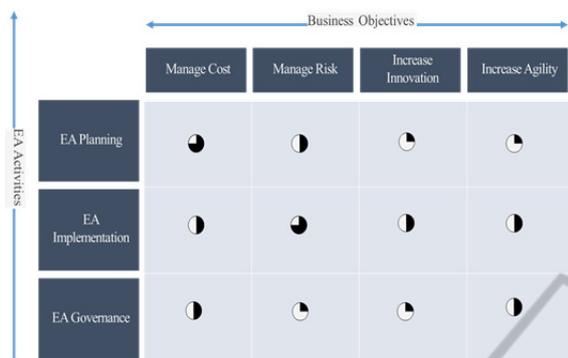


Figure 2: EA Value Model.

In general, the maturity level determines the IT impact and the level of achievement of the corresponding business objectives. In Figure 2 we use circles where the level of fill indicates the magnitude of impact of EA activity on a given business objective. For example, EA Planning has a high impact on the “Manage Costs” business objective since design standardization initiatives will reduce development costs (see section 3.1 below for further discussion of this point).

3.1 Assessment of the EA Activities

The EA value model forms a basis for evaluation of the contribution of EA. In order to determine the impact of EA, the general notion of EA maturity can be used. EA maturity assessment is a useful tool that is not yet widely used in practice. Maturity assessment evaluates EA program status, degree of completion and efficiency, and provides metrics that show progress and highlight the value of EA. In this paper we propose that EA maturity assessment be used to measure the status of EA activities. The approach to the maturity assessment needs careful consideration.

The EA maturity assessment approaches define various stages of maturity for targeted capability areas (dimensions) that are being evaluated. Different EA assessment methodologies currently available such as TOGAF AMM (TOGAF, 2009), OMB EA Assessment guidelines (OMB, 2004, 2005) measure different dimensions and support various objectives, such as architecture compliance (expressed as a percentage of noncompliant systems) and the maturity progression of the EA. For example, OMB (Office of Management and Budget) adopts five maturity levels (OMB, 2004, 2005). The

MIT CISR (Ross 2006) model has four levels of maturity and helps to define the architectural maturity at a macro level.

In this paper we adopt the MIT four level maturity model for assessing EA activities, as we believe that the MIT CISR model is well suited to supporting assessments of business value of EA in practice. The four levels of architectural maturity are characterised by management practices, IT investment patterns and attaining certain defining IT capabilities:

Level 1: (Business Silos) in the MIT model is characterised by individual business unit IT solution deployment enabling specific business unit efficiencies.

Level 2: (Standardised Technology) is characterised by technology standardization and shared infrastructure services

Level 3: (Optimised Core) is characterised by data sharing across the enterprise and adopting standard business processes across the business units

Level 4: (Business Modularity) is characterised by adoption of reusable application and process components to enable agile and flexible operating environment.

Business value derived from IT is steadily increased as the architectural maturity progresses from level 1 through to level 4. A key finding of the MIT CISR research project (Ross, 2006) was that organizations typically go through the four levels of maturity in a sequential progression (i.e. not jumping over levels). Adopting this approach the maturity level of each of the EA Activities (i.e. EA Planning, EA Implementation and EA Governance) can be assessed and a value assigned to it. The various EA maturity assessment approaches define dimensions or topic areas in which the assessment takes place. For example, the U.S Government OMB EA Assessment framework has twelve dimensions (OMB 2004, 2005).

In this paper the key dimensions (topic areas) where the assessment takes place in order to establish the business value contribution of EA are introduced. Some dimensions are common across all EA activities while other dimensions are specific to a given EA activity. Standardization, integration, simplification and agility are common dimensions. Stakeholder management in the context of EA Planning and conformance in the context of EA Governance are dimensions that are specific to an EA activity. The validity of the choice of the dimensions will be further researched as part of continuing work on the model.

For example, Figure 3 illustrates the progressive stages of maturity that the EA Implementation activity can deliver for the standardization dimension. Higher levels of maturity also imply the achievement of the lower levels, so that Level 2 implies Level 1, and Level 3 implies Level 1 and 2, etc.

Level 1	Level 2	Level 3	Level 4
Basic guidance for individual solutions	Standards and practices for solutions and infrastructure	Standards for data and data management	Standards for functional interoperability

Figure 3: EA Implementation activity assessment for the standardization dimension.

The maturity level characterization will vary with the dimensions and the approach will be to determine the maturity in each of the dimensions. This is illustrated in the guidelines shown below for EA Implementation (Integration) and EA Governance (Conformance).

EA Implementation - Integration Dimension

- Level 1: Solution architecture focused
- Level 2: Shared infrastructures
- Level 3: Enables data integration between multiple core IT programs
- Level 4: Enables modularization and reuse across the enterprise

EA Governance - Conformance Dimension

- Level 1: EA Governance is individual project focused
- Level 2: Ensures conformance to infrastructure standards and processes
- Level 3: Data quality and data model conformance
- Level 4: Conformance to reuse standards

The next step in the model is to assess the impact on the business objectives. For example, EA Planning at level 1 has limited impact on reducing the cost or the risk associated with of IT programs. As EA Planning progresses into level 2 (Standardized Level) the impact on cost and risk is more significant. Shared infrastructures will reduce costs and facilitate risk mitigation efforts. Figure 4 illustrates how moving from level 1 to level 2 in the dimension of standardization provides improved business value in the area of managed costs.

Not all EA activities will have a significant impact, with some even having no impact on the achievement of business objectives. For example,

advancing the level of EA Governance may not increase Innovation business objective significantly.

EA Activity	IT Impact	Business Objective Impact
EA Planning Design standards	Standard development tools and environment	Reduce development costs (Manage Costs)
EA Implementation Applications inventory	IT Portfolio rationalization	Reduce total cost of ownership (Manage Costs)
EA Governance Enforce conformance to enterprise asset standards	Reuse existing solutions	Faster delivery of new business capability (Increase agility)

Figure 4: Business value impact of increasing maturity of EA activities.

3.2 Application of the EA Value Model

The EA Value Model can be used in a number of different ways to assess the contribution of the EA function. It can be used to assess the progress that specific EA activities have achieved in meeting business objectives. If the organization is focusing on specific business objective, for example increasing agility, the current contribution of EA activities on agility can be assessed and focused investment made to improve agility.

The EA Value Model provides a framework for assessing the contribution of the EA function towards achieving business objectives. The model provides a framework that organizations can use in their specific context. A typical approach to using the model in an organization involves the following steps:

- a) Validate the business objectives of the organization. If changes or additions are necessary, these can be incorporated into the EA Value Model.
- b) Validate the EA activities as appropriate for the organization.
- c) Define an assessment and maturity framework for assessing the EA activities. (Start with one of the publicly available EA maturity assessment frameworks and customize it to suit the objectives being addressed.)
- d) Review the model and assessment at fixed periodic times to ascertain progress.

- e) Review the model and assessment when business objectives and focus areas change.

4 CONCLUSIONS

Most available value models focus on the efficiency of the EA function. Ross (Ross, 2004) has highlighted that greater business benefit comes from increased level of maturity. Ragowsky et al. (Rag, 2012) emphasize in their OITM (Organizational IT Maturity) model the need for an organization-wide integrated approach to derive maximum benefit from IT. The OITM presents a 5 level maturity model with increasing benefit as organizations progress to higher levels.

Other authors evaluate EA contributions using the balanced scorecard approach. De Vries (De vries, 2012) has argued that intangible assets such as EA programs do not have a value isolated from the organizational context and strategy. EA, used in conjunction with a balanced scorecard creates the strategic context to enable intangible assets, such as value creating processes as EA, to integrate with other intangible assets.

The EA Value Model presented in this paper is designed to evaluate the EA contribution in the context of the organization. The maturity assessments are focused on this. The strategic context of the organization is enabled through the business objectives alignment. The EA Value Model is based on the validated assumption (Ross, 2004) that EA delivers a greater value as its maturity increases. The value delivered is assessed in the context of the business objectives to be achieved by the IT function. The model provides a high level view of the EA value and provides management with insight into how the value is being delivered, which EA activity makes the contribution, what progress has been made and where focus needs to be in the future. The model can also be used to highlight the current and future strategy needs. Achievements of the current strategy are highlighted by the assessment, and strategy can be adjusted based on investment needs. The overall goal of the Value Model is to provide top IT management with a tool and a method for evaluating the business value of the EA and for making informed decisions about future investments into the EA program based on business needs. Future work will directed towards validation of the choice of dimensions that characterize various EA activities and determining the magnitude of impact of EA activities on business objectives.

ACKNOWLEDGEMENTS

This research was supported by GAČR (Grant Agency, Czech Republic) grant No. P403/11/0574 and the Research Centre for Human Centered Technology Design at the University of Technology, Sydney.

REFERENCES

- Bernard, S. A. 2012. *An introduction to enterprise architecture*. AuthorHouse.
- Bente, S., Bombosch, U., Langade, S. 2012. *Collaborative Enterprise Architecture*. Morgan Kaufmann
- De Vries, M, Van Rensburg, A.C. 2012. Enterprise Architecture – New Business Value Perspectives. *South African Journal of Industrial Engineering*, 2012, Vol.19(1)
- Kearns G, Lederer, A. 2004. The impact of industry contextual factors on IT focus and the use of IT for competitive advantage. *Inform Manage* 41(7):899–919
- Gammelgård, M. 2006. Dimensions of benefits from IS/IT. EARP Working papers series. *Dept. of Industrial Information and Control Systems, Royal Institute of Technology*. Available online at <http://www.ics.kth.se>
- Gammelgård M, Ekstedt M, Gustafsson, P. 2006. A categorization of benefits from IS/IT investments. In: *Proceedings of the 13th European conference on IT evaluation (ECITE)*
- Gammelgård M, Närman P, Ekstedt M, Nordström L 2006. Business value evaluation of IT systems: developing a functional reference model. In: *Proceedings at the Conference on Systems Engineering Research, Los Angeles, USA*
- OMB FEA Program Management Office, 2004: *OMB Enterprise Architecture Assessment v1.0 Guidelines*. The Office of Management and Budget, The Executive Office of the President, USA
- Office of Management and Budget(OMB) 2005. "Federal Enterprise Architecture Program EA Assessment Framework 2.0"
- The OpenGroup 2009. *TOGAF version 9*. <http://www.opengroup.org/togaf>.
- Ragowsky, A, Licker P.S. & Geen, D. 2012. Organizational IT Maturity (OITM): A Measure of Organizational Readiness and Effectiveness to Obtain Value from Its Information Technology. *Information Systems Management*, 29:2, 148-160
- Ross, J. W., Weill, P., & Robertson, D. 2006. *Enterprise architecture as strategy: Creating a foundation for business execution*. Harvard Business Press.
- Ross, J. W., & Beath, C. M. 2006. Sustainable IT outsourcing success: Let enterprise architecture be your guide. *MIS Quarterly Executive*, 5(4), 181-192
- Ross, J. 2004. Maturity Matters: How Firms Generate Value From Enterprise Architecture. *Research*

Briefing, CISR, Sloan School of Management, MIT, 4(2B).

van der Raadt, B., & van Vliet, H. 2009. Assessing the efficiency of the enterprise architecture function. In *Advances in Enterprise Engineering Ii* (pp. 63-83). Springer Berlin Heidelberg.

van der Raadt, B., Schouten, S., & van Vliet, H. 2008. Stakeholder perception of enterprise architecture. In *Software Architecture* (pp. 19-34). Springer Berlin Heidelberg.

