

Enterprise Architecture Performance Management

A Context based Approach to EA Metrics Definition

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Abstract: Management scholars suggest that if you can't measure something, you can't improve or manage it. The same applies to Enterprise Architecture (EA). Surveys related to EA suggest that organizations find it difficult to measure EA and in some cases it is not even measured. Although, EA metrics have been proposed in literature but not all are practical and most do not measure the true essence of EA. The situation becomes even more complicated in the absence of a structured approach to EA performance management. Additionally, organizations often limit EA performance management to identifying and measuring the potential benefits of EA and don't measure the real value of EA. In this paper we propose that before establishing EA metrics organizations should clearly understand the context of EA from three perspectives, i.e. the scope of EA for the organization, its usage in the organization and the purpose of its measurement. We subsequently present a model for defining EA metrics based on the context of EA.

1 INTRODUCTION

It is said that if you can't measure something, you can't improve or manage it. As resources are limited, organizations cannot afford to lose sight of the performance of their investments. So performance management has gained significant importance for organizations. This applies to every action that the organization undertakes.

Enterprise Architecture (EA) is being increasingly adopted by organizations for various purposes. Adopting and establishing EA requires significant investments, and although most organizations are aware of the benefits of EA they find it challenging to ascertain the performance of EA (Espinosa, 2011). Published research in the areas of EA measurement, EA quality and EA benefits do not specifically consider the context in which EA is adopted in an organization. Considering the context provides 'the circumstances that form the setting for an event, statement, or idea, and in terms of which it can be fully understood' (dictionary definition). Thus considering the context of EA adoption in the organization would provide a better understanding of the circumstances and conditions that form the adoption EA in the organization. We believe that this would provide significant information for

guiding EA performance management.

So before venturing into ascertaining the performance of EA, organizations should clearly understand the context of EA in the organization. In this paper we propose that the context of EA should be understood from three perspectives, namely, 'the perspective of scope', 'the perspective of role' and 'the perspective of measurement'. Section 2 provides a brief literature review. Section 3 defines the importance of considering context and what we mean by the term Enterprise Architecture. Section 4 provides details of the three perspectives. In section 5 we propose a model for identifying EA metrics based on these three perspectives.

2 LITERATURE REVIEW

Although EA has its roots in information system management, the concept has evolved from IT architecture to architecture at the level of the entire organization (Jonkers, 2006). The understanding of organization wide scope of EA exists in the industry yet a lot of existing research relates EA performance management mainly to information system management areas such as IT investment management, change management, agility and

business-IT alignment. As mentioned earlier EA is being adopted by organizations for multiple purposes, thus we have to define the meaning of the term 'Enterprise Architecture' and what could be the possible adoptions of EA in an organization. We refer to these set of adoptions as identifying the 'context of EA'. A summary of the literature review is presented below.

EA Benefits: Two studies (Niemi, 2006) and (Tamm, 2011) provide a comprehensive review of the literature on Enterprise Architecture benefits and provide models for categorizing EA benefits. These studies show that the benefits of EA vary depending on the definition of EA and how it is used. This reflects the importance of defining the context of EA in order to clearly understand and gauge the benefits of EA in the organization.

EA Quality and Maturity Model: Traditionally EA research was more focused on the development and modelling of EA, but over time the quality aspects of EA have also gained attention. This has primarily driven the focus towards using EA maturity models for the evolution and improvement of EA. (Schekkerman, 2004) also provides an EA scorecard to measure and monitor the status and quality of various EA elements. (Reekum, 2006) suggests metrics for measuring quality of EA. But we contend that quality is only one set of possible measurements for EA. Thus, the perspective of measurement also plays an important role in determining the metrics for measuring EA.

EA Metrics: Identifying quantifiable measures for EA is a challenging task as it is not simple to express the real value of EA in technical oriented metrics (Schelp, 2007). Although (Schelp, 2007) provides a comprehensive model for identifying EA metrics, it does not provide a structured way of establishing the context of EA. (Velitchkov, 2009) and (Vasconcelos, 2007) both provide a suggestive list of EA metrics but only from the scope of IT. We believe that "empirical approaches are not suitable to define a general metric" for EA, as the adoption of EA is context driven.

EA Frameworks: None of the EA frameworks provide any specific information on EA metrics. TOGAF 9 only suggests that EA measurement criterion can be developed much like the Capability Maturity Model (CMM). (Zachman, 2001) suggests that organizations should invest in architecture to enable themselves for alignment, integration, change and mass customization. Long-standing EA frameworks such as FEAF and MODAF define their own EA assessment models but they are very specific to their individual requirements and thus

very specific to their context.

Based on the literature study it is derived that it is difficult and unsuitable to define a fixed set of metrics for EA as its implementation depends on the organization and stakeholder requirements. Thus, this reflects the value of understanding and defining the context of EA for driving EA measurement.

3 WHY IS CONTEXT REQUIRED

Context defines the interrelated conditions in which something exists or occurs. Organizational endeavours operate under multiple interrelated conditions. These conditions may change over time. Without a thorough understanding of such conditions and the changes thereof, organizations would operate sub-optimally. Same is true for Enterprise Architecture endeavours. Although, before defining the context for EA, it is important to define EA itself.

EA as a term consists of two words; Enterprise and Architecture. Oxford dictionary defines 'Enterprise' as 'a unit of economic organization or activity' and 'Architecture' as 'a unifying or coherent form or structure'.

Thus, 'Enterprise Architecture' refers to 'a coherent structure of a unit of economic organization'. Simply put EA refers to the description of an enterprise in terms of its parts, their form and their logical structure, where the enterprise could be the entire organization or a unit of the organization (later referred to as domain in this paper). The parts mentioned above are anything and everything that constitutes the enterprise and their form represents their essential nature.

By the explanation given above, EA should ideally deal with anything and everything related to the enterprise which includes apart from other things organizational culture, management styles and people. Industrial application of EA through various frameworks and methodologies do not specifically cover these aspects. Thus the current implementations of EA and its measurement are limited. Most organizations end up defining EA metrics based on benefits such as integration, alignment, agility which are difficult to quantify and even more difficult to justify.

Additionally, the implementation of EA varies from one organization to another and largely depends on some conditions which we refer to as the context. Thus, understanding and defining the context provides the right setting for successful implementation of EA in an organization. This in

turn affects how EA should be measured. We propose that organizations can better manage the identification and establishment of EA metrics by clearly defining the context of EA in terms of the following three perspectives:

- What is the scope of EA in the organization? (For example: organization-wide, business unit, functions, domains etc.)
- What is the role of EA in the organization? (For example: as an information source, as a planning tool, as a practice etc.)
- What is the purpose of measuring EA? (For example: value estimation, activity metrics, measurement and reporting, maturity improvement etc.)

4 SETTING THE CONTEXT OF EA

The three perspectives that define the context of EA are presented in Figure 1.

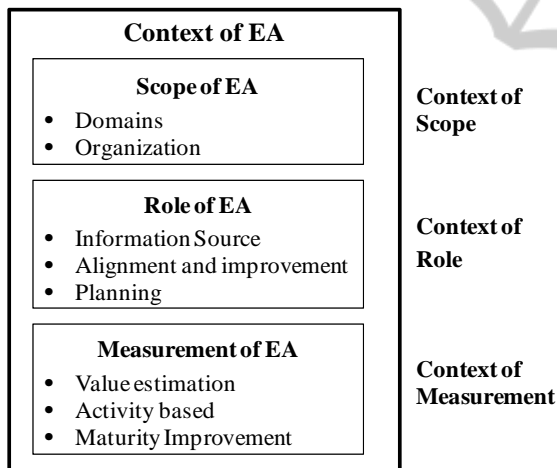


Figure 1: Three perspectives for the context of EA.

It is also important to note that these three perspectives are independent of each other. For example, the scope of EA might be only the IT department, its role could be for planning (IT strategy) or for alignment (business-IT alignment) and its measurement could be value based or activity based. The three perspectives are explained in the subsequent sub-sections.

4.1 The Perspective of Scope

It has generally been observed that most EA implementations are initiated by the IT department

or report to the IT function. In many organizations the scope of EA is limited to information system management or business-IT alignment. While, in some organizations EA is represented across functions. The scope perspective identifies the span of EA in the organization. It can be just one domain, multiple selective domains or organization wide. Since EA has traditionally been very IT-centric, most literature primarily suggests IT-centric metrics, which may satisfy the requirement of EA if the context of scope was only IT. Thus, by defining the scope perspective clearly organizations can gain significant focus and clarity in defining EA metrics.

4.2 The Perspective of Role

EA is evolving as a concept and so is its role in the organization. The survey results in (Thomas, 2009) show that the use of EA outside IT is increasing where EA is also being used for strategy implementation and enterprise transformation. Since EA can play multiple roles in the organization, defining the perspective of EA's role becomes important. We believe that EA can play three kinds of role in an organization, as defined below.

As an 'information source' for multiple purposes such as planning, decision making, standardization, impact analysis etc. This role is only limited to capturing and providing the required information.

As an 'alignment and improvement' agent EA ensures that the scope under consideration of EA i.e. the domain or business-unit under the scope of EA is aligned to the overarching organization. This role deals with and is limited to inter-departmental alignment and alignment with the corporate body. Here the outcomes of EA can very well be a roadmap (limited to the perspective of scope), architecture compliance (IT or non-IT), process management, capability improvement, linking strategy to execution etc. If EA is organization wide then this represents the alignment of the EA roadmap with the organization's goals and the improvement that this roadmap brings to the organization.

As a 'planning' agent EA, either existing as a unit or a practice in the organization, controls and is responsible for defining and implementing the organizational plans. When existing as a unit EA becomes a proxy to the planning department, and when existing as a practice, the concepts of EA (i.e. looking at the wholesome picture of the enterprise) are followed by the planning department. This role of EA is not implausible; as noted in (Thomas, 2009) enterprise architects in 59% of the surveyed organizations are either passively or actively involved

in the strategic planning process. Additionally, since its emergence in IT around the early 1990s, the strategic planning of IT i.e. IT strategy has become one of the primary work areas of EA (Thomas, 2009). Many organizations are also using the concepts of EA within their planning organizations to enable strategic initiatives (Asfaw, 2009).

It should be noted that in the perspective of role, the three roles of EA are not mutually exclusive or independent but are rather hierarchical, i.e. as a ‘planning’ agent EA can also act as an ‘alignment and improvement’ agent or ‘information source’ but not vice-versa. Similarly, as an ‘alignment and improvement’ agent EA can also act as an ‘information source’ but not vice-versa.

4.3 The Perspective of Measurement

The third perspective for EA is the perspective of measurement itself. The concept of organizational performance has evolved over time, ranging from total quality management to value based management. We believe that the measurement of EA is also dependent on what the organization wants to measure, is it the performance of EA activities, quality of EA outcomes or the value that EA brings to the organization? We define the perspective of EA measurement by three kinds of measurement.

Value estimation deals with the estimation of the value that EA contributes to the organization. It can be measured qualitatively by defining value dials based on stakeholder needs and requirements (which would in turn depend on the scope perspective and the role perspective) or quantitatively through established methods such as EVA (economic value added).

Activity based measurement is more of a TQM based approach that can establish measures for EA activities (ex. EA development, EA governance, EA compliance, EA communication etc.)

Maturity improvement would involve using an EA maturity model for gauging the maturity of EA. Additionally; they act as a step by step guide for the development and enhancement of EA.

It should be noted that all these measurements are not analogous i.e. all three can be used together as they represent different types of measurement and would typically address different set of stakeholders.

5 A MODEL FOR EA METRICS

Based on these three perspectives we propose a context based model for establishing EA metrics. Figure 2 shows this model for EA metrics.

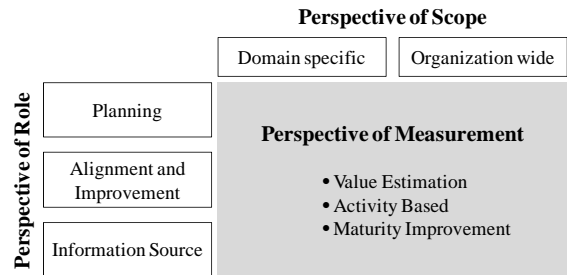


Figure 2: Context based Model for EA Metrics.

Based on the scope and role perspectives, three kinds of EA metrics can be defined; for estimating the value of EA, for measuring EA activities and for improving the maturity of the organization.

5.1 Value Estimation

Table 1 substantiates the EA metrics model given in Figure 2 for the value estimation type of measurement.

5.1.1 Perspective of Role - Planning

Table 1: Value estimation measures in the EA metrics model.

		Perspective of Scope	
		Domain Specific	Organization Wide
Perspective of Role	Planning	Planning Effectiveness	Planning Effectiveness
	Alignment and Improvement	EVA of Roadmap projects Domain Roadmap contribution to organization goals	EVA of Roadmap projects
	Information Source	Value of the information	Value of the information

Planning Effectiveness measures how effective the plans are in meeting the needs of the domain or organization. A balanced card approach can be taken here by measuring the effectiveness of plans in the financial, customer, internal process and learning & growth perspectives. Effectiveness refers to producing a desired result, where the desired results

are captured through the KPIs and measures.

5.1.2 Perspective of Role - Alignment and Improvement

The EVA of projects identified in the roadmap for a domain or organization provide the value of EA when EA is acting as an ‘alignment and improvement’ agent. Since roadmap is the value-adding outcome in this role, EVA provides a true measure of the value added by EA.

Additionally, in case of a domain the contribution of the projects identified in the roadmap to the organizational goals can also provide measures for domain to organization alignment.

5.1.3 Perspective of Role - Information Source

The value of information is amount someone would be willing to pay for the information available. Currently, we do not have any suggestive methods or metrics for estimating the value of information, and it would be taken up as an area of future research. But the areas of value of information (VOI) theory and decision theory can be explored further. Additionally, organizations can develop qualitative models for ascertaining the value of the information that EA provides.

5.2 Activity Based

Table 2 substantiates the EA metrics model given in Figure 2 for the activity based type of measurement.

Table 2: Activity based measures in the EA metrics model.

		Perspective of Scope	
		Domain Specific	Organization Wide
Perspective of Role	Planning	Planning Efficiency	Planning Efficiency
	Alignment and Improvement	Architecture Compliance Level of standardization Process metrics	Architecture Compliance Process Metrics
	Information Source	Information quality Information completeness	Information quality Information completeness

5.2.1 Perspective of Role - Planning

Planning Efficiency measures how efficiently the plans are prepared for the domain or organization. Efficiency refers to the degree of economy and thus relates to the resource based view. The metrics that can be measured here are the cycle time of planning, the cost of planning, planning response to change (agility in planning) etc.

5.2.2 Perspective of Role - Alignment and Improvement

The metrics presented in Table 2 are only example metrics and are not necessarily comprehensive. The activity based measurement can provide metrics for process improvement, standardization etc. Level of architecture compliance also ensures that the organizational activities or changes are aligned with enterprise architecture, whether it is in a domain or organization wide.

5.2.3 Perspective of Role - Information Source

The primary activity in EA an information source role is the gathering and maintenance of information in the EA repository. Thus the metrics are related to the quality of EA information, its frequency of updating and its completeness.

5.3 Maturity Improvement

As mentioned earlier the maturity model can be defined independently. But the EA scope and role perspectives inform the maturity model and vice versa. Maturity models guide by providing means to develop the practice fully and can thus influence organizations to study and expand the perspectives of scope and role for attaining higher maturity levels. How these perspectives apply to the maturity model would largely depend on how the maturity model is defined. For ex. a CMM kind of maturity model (initial, managed, defined, optimized) can be developed and it can be applied in a similar way whether the scope of EA is a domain or the entire organization. Whereas maturity levels could also be defined based on how EA is used in the organization or where EA is represented in the organization (Peter, 2009), and in such a case the scope and role perspectives would have a bearing on the maturity model and vice-versa.

6 CONCLUSIONS

For continuous improvement and evolution of EA in the organization it is critical to measure it. In the past many EA metrics have been proposed but no fixed or well accepted set of metrics exist. Surveys have also revealed that many organizations find it difficult to measure EA and many organizations don't even measure EA.

Since EA is an evolving concept and different organizations adopt EA differently, we believe that before establishing the metrics for EA organizations should define the context of EA. In this paper we propose that organizations should define the context of EA from three perspectives, namely, the perspective of scope, the perspective of role and the perspective of measurement. Using these three perspectives the paper provides a comprehensive model for organizations to define and establish proper and focused measures for EA.

The paper also provides scope for further research to identify valuable methods or measurement techniques for estimating the value of information provided by EA.

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