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ENTERPRISE ARCHITECTURE STAKEHOLDERS – A HOLISTIC VIEW

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Abstract

The importance of identifying and managing stakeholders and their needs has been emphasized in literature from various fields, including management, Information Systems (IS), Enterprise Architecture (EA) and Software Architecture (SA). The concept of stakeholder has been extensively discussed especially in management literature, but in the domain of EA, no comprehensive and generalizable view of stakeholders has yet been introduced. In this exploratory study, a holistic and generic view of EA stakeholders is constructed by identifying the stakeholders and their EA-related concerns through an extensive literature review, supplemented and validated by a focus group interview of EA practitioners. Moreover, a classification scheme for the stakeholders is suggested. The results are applicable by a wide range of academics and practitioners alike, potentially in other related contexts as well.

Keywords: Enterprise Architecture, EA work, stakeholder, concern, classification

Introduction

Recently, Enterprise Architecture (EA) has gained considerable attention in academia and industry alike. It is suggested to be an approach for supporting and improving communication, decision-making and change management in organizations (see e.g. de Boer et al. 2005). In brief, EA can be seen as a collection of all models needed in managing and developing an organization. It takes a holistic and consistent view of the organization rather than a view of a single application or information system (see e.g. Kaisler et al. 2005; Lankhorst 2005; Jonkers et al. 2006). Being a relatively new concept, research on EA has attempted to define the concept itself (see e.g. Kaisler et al. 2005; Lankhorst 2005). However, the research is still fragmented, predominately focusing on frameworks (see e.g. Sowa & Zachman 1992; The Open Group 2006), and modelling and development methods (see e.g. Lankhorst 2005). Recently, EA evaluation aspects, such as maturity evaluation (see e.g. Niemi 2006; OMB 2006) and critical success and failure factors (see e.g. van der Raadt et al. 2004; Rehkopf & Wybolt 2003; Ylimäki 2006) have gained increasing attention.

The commitment of key stakeholders, such as top management, is crucial to EA success (see e.g. Syntel 2005; Ylimäki 2006). As well as in the EA domain, the significance of identifying, involving and managing key stakeholders is emphasized in numerous other domains, such as software architecture (SA), information systems (IS), requirements engineering, and management (see e.g. Pouloudi 1999; Sharp et al. 1999; Boehm 1996; IEEE 2000; Mitchell et al. 1997). Stakeholders have different, sometimes even conflicting needs and perspectives (Kaisler et al. 2005; Morganwalp & Sage 2003; Jonkers et al. 2006), which should be identified and utilized in EA work. For example, communication is essential in EA work (see e.g. Ylimäki 2006; Lankhorst 2005), and thus the key stakeholders and their requirements for EA content and its representation need to be identified (see e.g. Armour et al. 1999; Lankhorst 2005).

Although general stakeholder theory is extensively documented in management literature (see e.g. Mitchell et al. 1997), the view of stakeholders in the EA context is considerably more inconsistent, even with the great number of stakeholders

identified in literature. Majority of the literature discusses EA stakeholders from the viewpoint of a particular stakeholder (such as the Architecture Group), a sub-area of EA (such as SA), or a specific organization, resulting in a distorted – non-holistic and not generalizable – view of stakeholders. Moreover, although a few models have been proposed particularly in the management (see e.g. Mitchell et al. 1997) and IS (see e.g. Preiss & Wegmann 2001) domains, there is no extensive, established model for classifying the variety of stakeholders in the EA context.

This paper presents an exploratory study which aims at constructing a holistic view of the stakeholders of EA and EA work, encompassing EA planning, development and management (see e.g. Ylimäki et al. 2005). Since the variety of stakeholders and their needs is organization-specific to some extent (see e.g. Clements et al. 2002; Pouloudi 1999), we also aim to provide a view generally applicable in the EA context by an extensive range of EA practitioners and researchers alike. This view provides researchers with a foundation for further research on EA stakeholders, and assists practitioners in identifying and managing 1) the key stakeholders of their EA programs, and 2) the stakeholders' needs, providing a vehicle for better informed EA work planning, and potential for increased stakeholder support. Moreover, because of the generic character of the results and the holistic nature of EA, the results could be applied in other related contexts as well.

Management literature proposes several definitions for a stakeholder (see e.g. Mitchell et al. 1997), including the substantially cited one by Freeman (1984): “A stakeholder in an organization is (by definition) any group or individual who can affect or is affected by the achievement of the organization’s objectives”. However, as we aim at a holistic, generalizable view of EA stakeholders, we adopt the following, even broader definition from the IEEE standard 1471-2000 (IEEE 2000, adapted):

Stakeholder is an individual, team, or organization with interests in, or concerns relative to, an EA.

Although the standard originally describes a recommended practice for architectural descriptions of software-intensive systems, a system by definition encompasses information and communication technology (ICT) platforms, applications and systems, and even whole enterprises, making the definition appropriate in the EA context. Moreover, we adapt a definition for a concern from the standard (IEEE 2000, adapted):

Concerns are interests related to the development of EA, its use and any other aspects that are important to one or more stakeholders.

The study was conducted in four stages and the paper is organized accordingly. First, a literature review was carried out to identify the stakeholders of EA and their typical EA-related concerns. Second, a focus group interview was organized to validate the literature review results and to supplement experience-based information. Third, the initial list of stakeholders from the literature review was supplemented and modified according to the information from the interview. Moreover, a potential classification for the stakeholders was proposed. Finally, the last section concludes the paper.

Literature review

This section describes the method and results of the literature review.

Method

Literature was charted for references of stakeholders using high-quality academic databases (Academic Search Elite, Electronic Journals Service, Science Direct and Web of Science), Google Scholar and Google. Since EA holistically encompasses an organization – involving architectures on various levels and relating to management activities and ICT development as well – the review was aimed to be extensive, including literature on architectural levels (e.g. EA, SA and system architecture), software and system development, requirements engineering, and management. In the search, the keyword “stakeholder” was used simultaneously with terms “enterprise architecture”, “software architecture”, “architecture” and “system”. In addition to the initial literature provided by the search, additional literature was found by forward and backward search of references (see e.g. Levy & Ellis 2006). Literature by both academia and practitioners was included in the review for a more diverse perception.

Results

The review identified 24 references including conference papers, journal and magazine articles, books, research reports, and white papers. The notion of stakeholder roles (such as Architect or Acquirer), that can be filled with various individuals, teams and organizations (IEEE 2000), was used as a basis for mapping synonymous or closely related stakeholders under representative initial roles (Table 1). Some of the stakeholders mentioned in the references could be mapped to initial roles in

a fairly straightforward manner, as e.g. the stakeholder roles suggested by Armour et al. (1999). However, a number of them had to be derived by the discretion of the author. For example, Sowa & Zachman (1992) present five architectural perspectives, from which five roles were derived.

Subsequently, the initial roles were used as a starting point for defining stakeholder individuals, teams/groups and organizations. The stakeholder individuals were directly derived from the roles. Some of the team/group and organization-level stakeholders were also identified from other literature or added by the author. A preliminary list of stakeholders was constructed from the results, including the identified stakeholders, their brief descriptions and typical EA-related concerns. For clarity, a graphical representation of the results was composed for the next step, including the stakeholders and a suggestion of their hierarchy, adapted from literature (Syntel 2005; NASCIO 2004).

Table 1. Initial EA stakeholder roles, in alphabetical order

Stakeholder role	(Armour et al. 1999)	(Armour et al. 2003)	(Boehn 1996)	(Bot et al. 1996)	(Clements et al. 2001)	(Clements et al. 2002)	(Greethorst et al. 2006)	(Hay 2003)	(IEEE 2000)	(Kazman et al. 2000)	(List et al. 2005)	(Lung et al. 1997)	(Lyytinen & Hirschheim 1987)	(May 2005)	(McBride 2004)	(Morganwalp & Sage 2003)	(Nightingale & Rhodes 2004)	(Robertson & Robertson 1999)	(Sharp et al. 1999)	(Smolander 2002)	(Sowa & Zachman 1992)	(Syntel 2005)	(The Open Group 2006)	(Zachman 1987)	
Application Developer		●		●		●		●					●	●				●		●	●	●	●	●	●
Architect	●	●		●	●	●	●	●	●	●		●		●	●	●		●	●	●	●	●		●	●
Business User	●	●	●	●			●		●	●		●	●		●		●	●	●			●	●		●
Enterprise Architect	●	●	●	●	●		●	●	●					●	●	●					●	●		●	●
Evaluator					●	●			●	●								●							
ICT Maintainer	●		●	●		●			●	●	●			●		●						●	●		●
ICT Operator																●						●	●		●
Legislator																	●	●	●						
Manager		●		●	●	●					●	●	●	●	●	●		●	●	●	●		●		●
Project Manager					●	●				●	●				●			●	●	●					
Security Specialist																						●			
Sponsor		●	●	●	●	●	●		●	●					●		●	●				●	●		●
System Developer	●	●	●	●		●	●	●	●	●	●		●	●	●	●		●	●	●	●	●	●	●	●

Focus group interview

This section describes the focus group interview methods and results.

Method

A focus group interview (see e.g. Krueger & Casey 2000) of seven practitioners from five Finnish or international organizations was organized. All of the organizations were conducting EA work and thus employed specialists who could contribute to the study. The organizations were either 1) independent companies, or 2) divisions, subsidiaries or other parts of domestic or global enterprises. Moreover, they represented different industries and employed from 14 to several thousand people. The objectives of the interview were 1) to validate the literature review results, and 2) to collect additional, experience-based information. The interview was carried out by three researchers – the author acted as the moderator while the others took notes. The interview was also audio-recorded.

Results

While the focus group generally agreed with the literature review results, they did not see the proposed hierarchy of stakeholders feasible. According to the group, this is mainly because of the organization-specific nature of EA stakeholders and the relatively small size of Finnish businesses – the models for organizing EA stakeholders in enterprises (e.g. Syntel 2005; NASCIO 2004) are usually based on experiences in large US organizations (as measured by the number of employees), and are thus difficult to apply in smaller enterprises. Therefore, the relationships or hierarchy of the EA stakeholders and the organizational position of the entire EA-function are difficult to generalize. Moreover, the focus group suggested additional stakeholders (Research & Design and Internal Communications), as well as several additions to the stakeholder descriptions and concerns.

Classification of EA stakeholders

The results of the literature review and the focus group interview were combined into an extended list of EA stakeholders, included in the appendix. It describes the stakeholders, defines their type (individual, team/group or organization), and addresses their typical concerns related to EA. However, as the entire range of EA stakeholders is extensive, a classification scheme based on some of their common characteristics is needed. Although a small number of classification models are provided (e.g. Mitchell et al. 1997; Preiss & Wegmann 2001), none are validated in the EA context. To propose a simple, practically applicable classification, a model by Liimatainen and Koskinen (2007) was applied. The model originally classifies IS research into three contexts, including the viewpoints of 1) IS producers (e.g. software developers), 2) facilitators (e.g. information management and ICT maintenance) and 3) users. In the EA domain, these roles can be defined as follows:

- **Producers** are defined as the stakeholders carrying out EA planning and development. They differ from facilitators and end-users in the sense that they not usually manage or maintain EA, or use it for any other purpose than their primary work. However, some stakeholders such as architects can also be involved in management, maintenance, and even use of EA.
- **Facilitators** are the stakeholders performing EA governance, management and maintenance. The role also includes stakeholders that sponsor and support EA work by e.g. providing resources, requirements or ideas. This role differs from producers because it does not directly conduct EA planning or development. Facilitators are not EA end-users in the sense that their work directly affects EA.
- **Users** utilize EA work and its products (e.g. EA) in their daily work. The difference between the users and the other roles is that the users do not carry out EA work or directly affect EA. However, they can be involved in EA work by e.g. providing business requirements.

The stakeholders were classified accordingly by the discretion of the author, on the basis of the stakeholder descriptions and concerns. Several stakeholders were considered to have a more diverse role, and were therefore classified to have two or even three roles. Table 2 displays the classified stakeholders, with rationale for the classification.

Table 2. Classification of the stakeholders of EA, in alphabetical order

Stakeholder	P	F	U	Rationale
Applications Development	●		●	Use architectures in application development. Could also produce architectural descriptions from their work area.
Architect	●	●	●	Carries out planning and development of domain architectures, can also maintain and update them. Use architectures in assuring architectural consistency and completeness.
Architecture Board		●	●	Carries out strategic management and governance of EA and EA work. May also use the product and impacts of EA work in e.g. assessment of EA success.
Architecture Group	●	●	●	Carries out EA planning, development, maintenance and operational management. Use architectures in assuring consistency and completeness of EA.
Board of Directors		●	●	Approves and has the business responsibility of EA work. Use EA work impacts in assessing the success of EA. In higher-maturity EA environments, could use the EA in e.g. decision-making.
Business User		●	●	Use the products of EA work in carrying out their daily work. Could also provide business requirements for EA work.
Competitor / Other Company			●	In special cases, may use the organization's EA and its impacts (if available) in their own EA work, for e.g. benchmarking.
Customer	●	●	●	Compliance between organization's and its customer's EA may be required. Therefore, a two-way relationship between their EA work processes might be needed. Moreover, customers could facilitate EA work with their needs and views, or even directly sponsor EA work.

Stakeholder	P	F	U	Rationale
Development Project Group	●		●	Either carry out architectural planning and development in the project area, or be guided by EA for assuring compliance between project results and EA.
Enterprise	●	●	●	In the enterprise, EA planning, development, management and maintenance are carried out, as well as the EA is used.
Enterprise Architect	●	●	●	Carries out EA planning and development, can also maintain and update domain architectures. Use architectures in assuring architectural consistency and completeness.
Evaluator			●	Use EA in assessment.
ICT Maintenance			●	Use architectures in ICT maintenance.
ICT Operations			●	Use architectures in ICT operations.
ICT Organization	●	●	●	Use architectures in e.g. ICT maintenance and operations. May also produce and maintain architectures. In some organizations, the whole EA-function may be situated under the ICT organization.
Internal Comms.			●	Use products and impacts of EA work in communication.
Investment Board		●	●	May approve investments related to EA work and use products of EA work in assessing investments.
Legislator	●	●	●	Carry out architectural planning, development and facilitation in the form of e.g. reference architectures and standards. Use products and impacts of EA work for feedback.
Manager / Management		●	●	May support and sponsor EA work in their areas of responsibility. In higher-maturity EA environments, could use the EA in e.g. decision-making.
Owner		●		Approves EA work via the board of directors.
Partner	●	●	●	Consultants and other partners may guide or carry out EA planning, development and maintenance in the organization. In the same sense, the organization may provide EA work or work products to partners.
Program Management Office		●	●	May carry out high-level management of projects related to EA, and use products of EA work in e.g. assuring EA compliance of project results.
Project Manager	●		●	Either manage architectural planning and development in the project area, or take into account EA for assuring compliance between project results and EA.
Project Steering Group		●		May require a project to produce architectural descriptions from the project area and thus facilitate EA work.
Public				Typically are not interrelated with EA or EA work.
Research & Design	●	●		Use EA work products for maintaining EA compliance in R&D. Could facilitate EA work with new ideas and research contacts.
Security			●	Use architectures in assuring security.
Sponsor		●	●	Sponsors and supports EA work by e.g. providing resources. Use EA work impacts in assessing the success of EA. Could also use EA in e.g. decision-making.
System Development	●		●	Use architectures in system development. Could also produce architectural descriptions from their work area.

Table key: P = Producer, F = Facilitator, U =User

Conclusion

This study aimed at developing a holistic and generally applicable view of EA stakeholders by identifying the stakeholders and their EA-related concerns through an extensive literature review, supplemented and validated by a focus group interview of practitioners. Moreover, a classification scheme for the stakeholders was proposed. The classification provides a vehicle for deriving a number of potential shared stakeholder concerns:

- **Producers** could be concerned with carrying out EA planning and development in a way that (to a reasonable extent) satisfies facilitators' and users' requirements for 1) the content, presentation and quality of the work products (e.g. EA), and 2) the impacts (e.g. benefits) of the work or EA.
- **Facilitators** could be concerned with strategic or operational management, maintenance, or sponsorship of EA or EA work. In turn, they may require that 1) certain requirements are taken into account in EA planning and development, and/or 2) certain impacts are realized by EA or EA work.

- **Users** could be concerned with receiving EA work products and/or impacts that satisfy their requirements (e.g. enable or ease their work). In turn, they could be involved in EA work by e.g. disclosing requirements and feedback.

However, it should be noted that as several stakeholders have multiple roles related to EA, their concerns could also be diverse. Furthermore, the stakeholders could be classified differently depending on the organization and the phase of the EA program. For example, the top management and the board of directors may act as facilitators in the initial phases, but begin to use EA as its maturity and quality increases. Finally, the stakeholders and their concerns could be organization-specific. Thus, differences may exist depending on e.g. organizational size, type (e.g. hierarchical or matrix) and industry, and the scope and phase of the EA program. The focus group stated that the hierarchy and the organizational position of the EA-function vary across organizations, potentially affecting e.g. the influence and concerns of the stakeholders carrying out EA work. In organizations worldwide, the EA-function has been commonly situated under CIO or information management, but there seems to be a shift to top business management (Schekkerman 2005). Also the focus group expressed a need to bring the EA-function and business closer together, but still argued that the EA-function should not be situated outside the ICT organization because of the possibility of the EA becoming out of control.

This study contributes to research and practice in several ways. Firstly, it provides a preliminary list of EA stakeholders, their characteristics and concerns. Secondly, it proposes a classification scheme for the stakeholders, with potential for validation. These results can be used to analyze current EA work practices, frameworks and metrics for any deficiencies relating to e.g. stakeholder and concern identification and management. Moreover, practitioners can use the results to assure that all relevant stakeholders and concerns have been taken into account in EA work. Although a few most important stakeholders might already be identified, the results could help identifying other, more unapparent stakeholders potentially crucial to the EA program – according to the focus group, some stakeholders may not even be aware that they are stakeholders of EA. The classification scheme further assists in identifying and managing 1) stakeholders who should be involved in EA work or could provide other support, and 2) stakeholders' requirements for EA work products and impacts. Consequently, the requirements and other concerns of the stakeholders could be more comprehensively and extensively considered in EA work, potentially resulting in increased organizational satisfaction towards the EA program. In turn, this may facilitate the diffusion of the EA approach.

Even though the study resulted in an extensive, holistic perception of EA stakeholders, a few limitations can be found. Due to space limitations, the stakeholder descriptions and concerns had to be addressed concisely, and related important areas such as EA stakeholder management are left to be addressed in future research. Moreover, as the classification is for the most part based on the author's discretion, it still needs further validation. Generalizing the results of this study could also be impeded by the fact that the focus group included members of only one nationality and geographical area. Finally, due to the organization-specificity of EA stakeholders, the results are not exhaustive or in all circumstances valid.

As this is an exploratory study, it provides a multitude of themes for further research and discussion. Firstly, the classification scheme should be further validated, and other classification models applied if considered feasible. Secondly, interrelationships between stakeholders should be charted to discover any generic connections. Thirdly, further research on stakeholder characteristics and concerns should be carried out to discover new generic factors. Fourthly, the hierarchy and organizational position of the EA-function should be studied further – even though the focus group perceived that a generic solution may not even be created, it agreed that adaptable reference models could be constructed. Finally, the stakeholders should be prioritized on the account of e.g. their influence to the EA program or to EA success. Moreover, the stakeholders could be associated with certain phases or areas of EA work, or levels of EA maturity, where they have been discovered to be especially important.

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Appendix

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