

# POTENTIAL CRITICAL SUCCESS FACTORS FOR ENTERPRISE ARCHITECTURE

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## ABSTRACT

*During the past few years, enterprise architectures (EAs) have garnered considerable attention from both practitioners and academics in the fields of information systems and business management. It is suggested that EA is an approach for controlling the complexity and constant changes in the business environment of an organization. Research has mainly focused on the development and modeling of EA, while quality aspects of EA have gained less attention. The aim of this study is to provide insight into the critical success factors for EA representing issues that have to be done exceedingly well in order to achieve a high-quality EA, which in turn, enables the business to gain more success.*

## KEYWORDS

Enterprise Architecture, Critical Success Factors, Quality, Maturity, Evaluation, Assessment

## INTRODUCTION

During the past few years, enterprise architectures (EAs) have garnered considerable attention from both the practitioners and the academics in the fields of information systems (IS) and business management. It has been suggested that EA is an approach for controlling the complexity and constant changes in the business environment of an organization, enabling a real alignment between the business vision, business requirements and information systems (Armour et al., 1999a; 1999b; Kaisler et al., 2005). EAs are generally seen as blueprints which identify the focal parts of the organization (such as people, business processes, technology, information, and information systems), as well as the means that identify how these different parts collaborate to achieve the desired business objectives (Hoogervorst 2004; Kaisler et al., 2005). An ideal EA provides a holistic, enterprise-wide and consistent view of the organization instead of looking at it from the point of view of a single application or system (Kaisler et al., 2005; Lankhorst, 2005).

It seems that EA studies have mainly focused on the development and modeling of EA (Zachman, 1987;

Armour et al., 1999a; The Open Group, 2002; Lankhorst, 2005; Halttunen et al., 2005; Pulkkinen & Hirvonen, 2005), while the quality and assessment aspects have only recently gained attention, especially in the form of maturity models and assessments (U.S. Department of Commerce, 2003; U.S. Government Accountability Office, 2003; Industry Advisory Council, 2005; National Association of State Chief Information Officers, 2003; Office of Management and Budget, 2003). The maturity models do have their roots in the field of quality management (Fraser et al., 2002; Chrissis et al., 2003), but it seems that they are considered as simpler tools than the “traditional” quality management systems to assess the stage of the organization’s EA and to enhance its maturity.

The maturity of the EA refers to the organization’s capability to manage the development, implementation and maintenance of architecture that consists of various viewpoints (van der Raadt et al., 2004). Usually, these viewpoints include business, information, systems, and technical architecture (e.g., The Open Group, 2002). Furthermore, the idea of these maturity models is that the maturity evolves over time from one level to the more advanced level – without skipping any level in between – towards an

idealistic ultimate state (Klimko, 2001). Therefore, we consider these maturity models as one means of advancing the quality of EA by providing at least an initial EA quality management system.

What does high quality mean in the context of EA, then? There seems to be a lack of scientific studies in which the quality of EA has been discussed. In our research project we have suggested that a high-quality EA conforms to the agreed and fully understood business requirements, fits for its purpose (e.g. a more efficient IT decision making), and satisfies the key stakeholder groups' (the top management, IT management, architects, IT developers, and so forth) expectations in a cost-effective way understanding both their current needs and future requirements (based on Lecklin, 2002 and Dale, 2003). In addition, the quality of EA may also refer to the quality of EA specifications or the quality of the EA development or governance processes.

Additionally, the concept of critical success factor (CSF) has been utilized in Total Quality Management (TQM) (Badri et al., 1995, Claver et al., 2003; Lecklin, 2002; Tarí, 2005) to indicate those issues that must be done exceedingly well in order to succeed. Originally, the CSFs were used to determine precisely what information is most needed by the top management representing the "key areas where things must go right in order to successfully achieve objectives and goals" (Bullen and Rockart, 1981; Rockart, 1982). In order to ensure that favorable results have been gained in these key areas, it is important that the current status of performance in each of the areas should be measured on a continual basis (Bullen and Rockart, 1981). While the idea of CSF has later on found its way to many other areas as well (such as project management), it awakened our interest for studying the CSFs in the context of EA: what are the factors that have to be carried out exceedingly well in order to attain a successful EA – a high-quality EA – which in turn enables the business to reach its objectives and gain more value.

In this article, we present a study which aims at determining the potential CSFs for EA – a set of potential key areas from which the organization should choose the most critical factors of its own based on its business objectives, the role of EA in the organization, and so forth. These factors, when carefully addressed, should enable the achievement of a high-quality EA. In the next section, we describe the research process. Following this, the set of potential CSFs for EA are presented. Finally, the last section summarizes the paper.

## RESEARCH PROCESS

In order to identify the potential CSFs for EA the following steps were conducted:

1. Literature Review: There seems to be a lack of scientific research on CSFs for EA. Fortunately, CSFs have been studied in some other domains, closely related to EA, such as TQM (Badri et al., 1995; Claver et al., 2003; Tarí, 2005), business-process re-engineering (Al-Mashari and Zairi 1999), business-IT alignment (Luftman et al., 1999), project management (Clarke, 1999), enterprise resource planning systems (Nah et al. 2001) and software architectures (Bredemeyer Consulting, 2000; Hämäläinen et al., 2006). Based on reviewing these domains in addition to numerous EA literature including, for instance, the existing EA maturity models (U.S. Department of Commerce, 2003; U.S. Government Accountability Office, 2003; Industry Advisory Council, 2005; National Association of State Chief Information Officers, 2003; Office of Management and Budget, 2003), the initial list of CSFs for EA was defined. The list of factors was analyzed in order to organize similar factors into groups (see Figure 1).

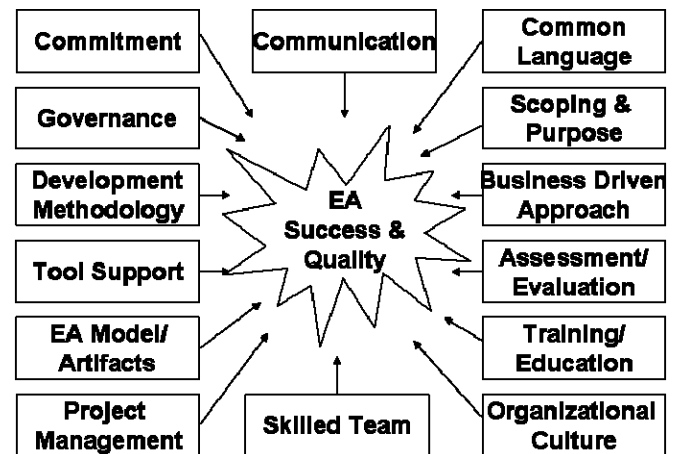


Figure 1. Initial Set of Potential Critical Success Factors for EA.

2. Empirical Research: A focus group interview (Krueger & Casey, 2000) of five architecture practitioners from three IT user and service provider organizations was organized. The objective of the interview was 1) to assess the literature review results, and 2) to collect additional CSFs from the practitioners, based on their personal experience. A group interview was considered as a means to stimulate the discussion by allowing the participants to respond to and comment each others' ideas and

opinions. The downside of this approach would be that the group influence would likely leave confidential information undisclosed. In the interview conducted by two researchers, the results of the literature review were presented, and the interview was structured according to them. In addition to the notes taken, the interview was also tape-recorded and videotaped.

3. Consolidation of the Results: The results from both the empirical study and the literature review were combined and a set of twelve potential CSFs was accomplished (Figure 2). In this step, some factors were also combined. Because 'Communication' is supported by a 'Common Language', these two factors were combined. In a similar basis, also the 'Development Methodology' and 'Tool Support' were combined, as well as 'Skilled Team' and 'Training and Education'. Additionally, even though 'IT Investment and Acquisition Strategies' (U.S. Department of Commerce, 2003; U.S. Government Accountability Office, 2003; State of North Carolina Office of Enterprise Technology Strategies, 2003) can be seen as a part of 'Governance', we positioned it as a separate CSF to highlight the primary objective of EA: the need to develop IT systems that enable and support the organization to achieve its business goals and objectives successfully. Furthermore, the characteristics of each CSF were formulated as questions.



Figure 2. Updated Set of Potential Critical Success Factors for EA

## POTENTIAL CRITICAL SUCCESS FACTORS FOR EA

In the following section of this article, the characteristics of the potential CSFs for EA are

described in the form of key questions assigned to each factor. With the help of this set organizations can select the limited set of CSFs suitable for their purposes, and to assess the extent the CSFs have been taken into consideration in the EA development. While the focus group interviewees agreed on all the CSFs for EA resulting from the literature review, only the interview results that add some information or characteristics to the CSFs for EA are referred to as (Interview, 2005).

### Scoping and Purpose

Scoping and Purpose relate to the extent the organization has addressed the following issues right from the beginning of the EA development:

- Holistic EA (Lankhorst, 2005), specific to the enterprise (Ashmore et al., 2004): What is the definition of EA in the organization? Are all the key EA stakeholder groups defined and documented?
- A clear mission, goals and direction (Belout & Gauvreau, 2004; Pinto & Mantel, 1990; Reel, 1999; Turner & Müller, 2005) and the declaration of will (Interview, 2005): Why the organization wants to apply the EA approach (definition of the business case)? What are the organization's objectives (Somers & Nelson, 2001)? What are its EA objectives? What are the existing problems (Bredemeyer Consulting 2000) or future problems (Interview 2005) it wants to solve through EA? To what extent are the objectives and importance of EA understood and approved by the organization members (also other than IT organization)?
- Value and benefits of EA (Ambler, 2005; Boster et al., 2000; Buchanan & Soley, 2003): What benefits (financial or other) are to be reached via the EA approach? Do different stakeholder groups have contradictory or competing opinions about the possible benefits? To what extent are the benefits of EA understood and approved in the organization?
- A clearly defined EA scope (Clarke, 1999; Lam, 2005): How wide organizationally, how deep and detailed, and how fast an EA should be developed (Industry Advisory Council, 2005)?

### Communication and Common Language

Effective communication is essential in sharing knowledge, achieving a common understanding, agreement and a shared view of the EA scope, vision, and objectives, as well as of the developed models and other artifacts. Furthermore, communication is an important means of gaining

commitment to the EA effort. Focal issues to be considered about Communication and Common Language are as follows:

- A common, well-defined vocabulary of terms and concepts (Lankhorst, 2005; Motwani et al., 2005; Ylimäki & Halttunen, 2005): Are the key architectural concepts defined, documented and used? On what sources are they based? Which viewpoints do they cover? Are other concepts, such as the (system) development methodology concepts, or concepts related to the development and investment processes of the enterprise defined, documented and used (Interview, 2005)?
- Communications plan and strategy (META Group Inc. 2000; Coronado & Antony 2002; Rehkopf & Wybolt, 2003; Industry Advisory Council, 2005): Is the communication plan or strategy for architectural communication defined and documented? What issues are defined in it?
- Various communication channels (Rudawitz, 2003): What means and possibilities of communication are used? Has the architectural communication been successful? Have any problems been detected?
- Timing: In which phases or situations does architecture-related communication exist? How is the communication timed? Is the communication regular, frequent and proactive (Al-Mashari & Zairi, 1999, Nah et al., 2001; Porter & Parker, 1993)?

### **Business Driven Approach**

Business linkage is elementary in EA development (Baker and Janiszewski, 2005; Carbone, 2004; U.S. Department of Commerce, 2003; META Group Inc., 2000; The MITRE Corporation, 2004; Ramsay, 2004). Business Driven Approach is about ensuring that EA initiatives are traceable to the business strategy indicating clear alignment between business and IT (Schekkerman, 2004; Van Eck et al., 2004).

Key questions, thus, relate to the definition of the business requirements and ensuring that they are also met:

- How are the business strategy and the business requirements taken into account in architectural planning?
- How are the business requirements for the architecture recognized? Are they documented?
- How and when is the equivalency between the requirements and architecture assured?

- Are also the requirements set by external stakeholders (such as legislation, standards, even business owners and partners) taken into consideration in addition to the business requirements (Interview, 2005)?

### **Commitment**

Without long-term top management commitment (also referred to as leadership, sponsorship or involvement) an EA effort will not succeed (Al-Mashari & Zairi, 1999; Badri et al., 2005; Basu, 2004; Bolton, 2004; Perkins, 2003; Quazi et al., 1998). Quarter-based-economy impedes the long-term thinking that EA requires; it is sometimes difficult to justify the top management that the investment that seems expensive at the moment will save money in the future (Interview, 2005). The key questions related to the Commitment are as follows:

- Top management commitment (U.S. Government Accountability Office, 2003; National Association of State Chief Information Officers, 2003; Industry Advisory Council, 2005; Interview, 2005): To what extent is the top management committed to the EA approach? How is the top management commitment expressed? To what extent is the top management involved in the EA development?
- Organizational buy-in (Bredemeyer Consulting, 2000; Industry Advisory Council, 2005; Office of Management and Budget, 2005; Interview, 2005): To what extent are the other stakeholder groups of the organization (such as the CIO, software developers, maintenance, and project managers) committed to the EA approach? How is their commitment expressed? To what extent are they involved in the EA development?

### **Development Methodology and Tool Support**

A lot of requirements for methods to develop and maintain an EA in the ever changing business environment are suggested. Methods should be structured, well-defined and documented including, for instance, processes, guidelines, best practices, drawing standards and other means to promote the quality of architectures, as well as support for tracking architectural decisions and changes (Lankhorst, 2005). Moreover, the architecture process should be, among other things, business-strategic-driven, practice-oriented, situational, model-based, disciplined, rigorous, repeatable, and widely usable with reasonable costs (Perkins, 2003; Morganwalp & Sage, 2004; van der Raadt et al., 2004), as well as iterative and incremental (Ambler, 2005; Armour et al., 1999a; Ramsay, 2004). The key questions are as follows:

- Established architecture framework (Office of Management and Budget, 2005; National Association of State Chief Information Officers, 2003; Carbone, 2004; Interview, 2005): Is the framework defined and documented? What views or levels it includes? Is it based on some existing frameworks, such as TOGAF (The Open Group, 2002), Federal EA Framework (FEAF) (Chief Information Officers Council, 1999) or the Zachman Framework (Sowa & Zachman, 1992)? Has it been communicated to the key stakeholders? Is it understood, accepted and complied by them?
- Established architecture process or methodology (U.S. Government Accountability Office, 2003; Lankhorst, 2005): Is the development methodology defined, documented and used? What characteristics does the methodology have (see examples mentioned above)? Does the method include guidance for architectural decision making and documentation? Does the method provide support for the reuse of the processes, instructions, models or other artifacts (Kaisler et al., 2005)?
- Architecture principles (Armour et al., 1999a): Have the architecture principles been defined to guide the architecture development? Are they communicated, approved and used?
- Visualization techniques (Lankhorst, 2005): Which modeling languages are used in the EA development? Are they dependent on the tools used?
- Effective tool support (Chief Information Officers Council, 2001; U.S. Government Accountability Office, 2003; Industry Advisory Council, 2005; Perkins, 2003; Kaisler et al., 2005; Lam, 2005; Lankhorst, 2005): To what extent are tools used in the EA development; are they used in modeling, documenting, communicating or managing the architectures? What kinds of tools are used (data stores, modeling tools, documentation tools, communication tools, and so forth)? How well do these tools fit the needs the organization has? Are the tools compatible with each other or with other tools, such as BPR tools and system development tools (Interview, 2005)?

Several existing methods (processes), frameworks and tools for EA are described, for instance, by Ylimäki et al. (2005).

### **EA Models and Artifacts**

The development method guides the creation of EA models and other artifacts. As the models are a

valuable help in communicating the architecture to the various stakeholders, it is important that the following issues are addressed:

- Documentation plan (Karthä, 2004): Does a documentation plan exist? Is it communicated to the key stakeholder groups, approved and followed?
- Business and architectural requirements (van der Raadt et al., 2004; Armour et al. 1999b; Erder & Pureur, 2003): Are both the business and architectural requirements defined, documented, communicated and approved? Are the requirements extensive enough?
- Models provide a coherent and concise picture of the enterprise (National Association of State Chief Information Officers, 2003; van der Raadt et al., 2004; Kaisler et al., 2005; Lankhorst, 2005): Are all the necessary levels or views of the architecture (such as business, information, application and technology) modeled? Are these models communicated to relevant stakeholder groups (Interview, 2005)? Is the ownership of the models defined indicating who to contact if more information is needed (Interview, 2005)? Are they up to date? Are they extensive and finished enough? Are they clear, readable, comprehensible and including dependencies (Bredemeyer Consulting, 2000; The MITRE Corporation, 2004; van der Raadt et al., 2004)? Do the models address both the current situation (as-is descriptions) and the future situation (to-be descriptions) (Armour et al., 1999a; Industry Advisory Council, 2005; Office of Management and Budget, 2005)? Do models conform to the architecture principles and standards (Armour et al., 1999b; van der Raadt et al., 2004)?
- Traceability: Does the traceability between the business requirements and EA models exist (Armour et al., 1999b), as well as between the business requirements and architectural decisions (Erder & Pureur, 2003)?
- Transition plan (Armour et al., 1999a; Industry Advisory Council, 2005; Office of Management and Budget, 2005): Is there a transition plan telling how and when to get to the target architecture? Is it communicated and approved?
- Architectural decisions: Are the architectural decisions documented?

Even though the list of requirements for successful models and artifacts seem to be exhausting, in practice they do not need to be 100 % perfect, they just need to be good enough (Ambler, 2005), and

simplification, clarification and minimization are key to long-term architecture success (Dikel et al., 1995).

### **EA Governance**

Governance and management have various definitions in the literature. In general, governance deals with the management and organizational aspects of architecture (van der Raadt et al., 2005), but it can also refer to "how an organization makes decisions, sets priorities, allocates resources, designates accountability, and manages its architectural processes" (Baker & Janiszewski, 2005). Key questions related to EA Governance are as follows:

- Established governance structure (META Group Inc., 2000; Carbone, 2004; Industry Advisory Council, 2005): Is the architecture governance structure defined, documented and complied? Are the roles, responsibilities and authorizations defined, documented and complied?
- Effective governance processes and activities (Rehkopf & Wybolt, 2003; Control Objectives for Information and related Technology, 2000; van der Raadt et al., 2005): Are the processes, activities or tasks (such as definition of the architecture policy, principles or architecture compliance strategy) defined and documented? Does an 'EA Statute Book' exist guiding the EA work (Interview, 2005)? What communication and coordination means are used (e.g. feedback channels, discussion, reports of progress) (The Open Group, 2002; Industry Advisory Council, 2005)?
- Effective change management environment (Bolton, 2004; Kaisler et al., 2005; Office of Management and Budget, 2005): Are the practices for managing both architectural (The Open Group, 2002) and organizational (Dale, 2003; Hermanssen & Caron, 2003) changes defined, documented and complied? Has a consensus been reached on those possible future changes in the business environment (e.g. a future merger) or in the business requirements that need to be taken into account in the ongoing architecture design (Interview, 2005)?
- Effective risk management (Al-Mashari & Zairi, 1999; Belout & Gauvreau, 2004; Pinto & Mantel, 1990): Are the architectural risks defined, documented and complied? Are the risk management practices defined, documented and complied?
- Integration into the organization's business management processes (Ashmore et al., 2004; Control Objectives for Information and Related

Technology, 2000): To what extent is the EA governance processes integrated to the organization's business management processes, such as investment process or strategy refinement process?

### **Project and Program Management**

EA development is usually conducted through projects and project management skills play a crucial role in project success (Pinto & Kharbanda, 1996). Other issues regarded important are as follows:

- Program management (Interview, 2005): How is the coordination between various EA development projects organized and conducted? How is it assured that the projects are compliant with the EA? How is the inter-project communication conducted?
- Milestones and check points (Interview, 2005): Are the project milestones defined? How are they utilized? Is any kind of architectural evaluation done on the milestones?
- Lessons learned (Interview, 2005): Are the lessons learned (best practices), related either to the project work and project management, or to the architectural work and architectures, systematically collected by the end of the project?
- Realistic budgets and schedules (Belassi & Tukel, 1996; Coronado & Antony, 2002; Nah et al., 2001; Turner & Müller, 2005): Is the project budgeting successful? Is the project scheduling successful?

### **Assessment and Evaluation**

Assessment and Evaluation of EA is undertaken as a part of the EA governance. What makes the EA evaluation challenging, is the fact that it may take years before the effects and consequences of, for instance, an architectural decision, can be measured (Interview, 2005). Essential issues in evaluation planning and implementation are, especially, as follows:

- Evaluation targets (Lopez, 2000; Taylor-Powell et al., 1996): What is evaluated? In the following some examples are suggested (Curran, 2005; Hilliard et al., 1996; Industry Advisory Council, 2005; Morganwalp & Sage, 2004; National Association of State Chief Information Officers, 2003): EA models and artifacts, EA processes, EA maturity, value of EA, business value added by EA (business-IT alignment), effectiveness of EA, completeness and correctness of EA, EA adoption (utilization or usage of architectures),

people (competency and skills), or work environment (culture, leadership, structure).

- Purpose and audience of evaluation (Taylor-Powell et al., 1996): Why are these objects evaluated? By whom and how are the evaluation results used?
- Evaluation process and criteria (Lopez, 2000; Taylor-Powell et al., 1996): How and when is the evaluation done? Is the evaluation conducted in each step of the development process (Bredemeyer Consulting, 2000)? Is it a continuous process (Claver et al., 2003, Tarí, 2005)? Which evaluation methods are used? Which metrics or criteria are used? Which tools are used – benchmarking, reviews, quality function deployment (Erder & Pureur, 2003), scenarios (Interview, 2005), maturity models or other tools?

### **IT Investment and Acquisition Strategies**

IT Investment and Acquisition Strategies refer to the extent to which the EA influences the IT investment and acquisition strategy of the organization; whether EA guides IT investments or not (U.S. Department of Commerce, 2003; U.S. Government Accountability Office, 2003). Key issues that need to be addressed are as follows:

- Investment process in the organization: What sort of investment process model is used? How are IT investments executed?
- Architecture decisions vs. IT investment decisions (U.S. Government Accountability Office, 2003): What is the relationship between architectural and investment decisions? Is an investment decision unavoidably also an architectural decision? Do architectural plans have an effect on investments? Are investments done on the basis of architectural planning? How and when are architectural plans used in the investment planning and execution?

### **Skilled Team, Training and Education**

EA development requires teamwork between the key stakeholder groups; architects, business domains, top management, and even business partners (Schekkerman 2004). The following issues to be addressed are as follows:

- Architecture team (Chief Information Officers Council, 2001; U.S. Government Accountability Office, 2003): Is the architecture team established? How many persons are working in the team? Are the roles and responsibilities of the team members defined, documented and

used? Has a chief architect been named (Akella & Barlow, 2004; Passori & Schafer, 2004)? Is the team working full-time? Does the team have necessary facilities and equipment (Reel, 1999)?

- Sufficient training (Chrissis et al., 2003): To what extent are both the team members and other key stakeholder groups trained in architectural work? Has a training plan been done for these groups? Do the architecture team members have the necessary skills; both business and technical skills (Boster et al., 2000; D'Souza & Mukherjee, 2004)? Is the competence of the team members evaluated? To what extent do the architects train other stakeholders (Interview, 2005)? Is the training considered as a continuous process allowing people to receive appropriate information and training courses at appropriate level of detail for their need (Al-Mashari & Zairi, 1999; Porter & Parker, 1993; Tarí, 2005)?

Training and education are needed at least in the following levels: 1) General EA information, including the strategies of the organization, the common EA framework, the EA vision and objectives, and the target architecture, should be provided to all stakeholders (Interview, 2005), 2) training in new technologies, best-practices, methods, tool usage, and so forth should be provided for architects (Basu, 2004; Coronado & Antony, 2002; Curran, 2005; Interview 2005), 3) IT information should be provided to business managers, and 4) business information should be provided to the IT managers (Morganwalp & Sage 2004).

### **Organizational Culture**

While developing an EA, the organizational culture should also be taken into consideration aiming at good organizational and cultural fit (Lam, 2005; Sumner, 2000) because in many cases cultural changes are inevitable (Coronado & Antony, 2002). Especially, the organization's readiness to develop and utilize the EA is an essential issue (META Group Inc., 2000). It includes aspects like attitudes towards changes both by the management and the employees, communication environment, risk management and so forth (Mann & Kehoe, 1995; Motwani et al. 2005; Rudawitz, 2003). Moreover, the organization culture, particularly the organizational structure, has an impact on the success of an EA; if the EA issues are discussed only within a department or other profit center the perspective is too narrow to accomplish good and sustainable architecture solutions (Interview, 2005). Key questions related to cultural issues are as follows:

- Attitudes towards architecture approach: What is the role of the architecture within the organization; is the EA seen as a mentor and a guide helping business and IT decision making, or merely as an auditing or controlling mechanism (Interview, 2005)? How are the attitudes towards architectures and architects?
- Attitude towards changes (Luftman, 2000; Rudawitz, 2003; van der Raadt et al., 2004; 2005): How is the organization's capability to accept and adapt to changes in general? How are the attitudes towards architecture-driven changes?
- Trusting environment (both socially and politically) and open communication (Rudawitz, 2003; van der Raadt et al., 2004; 2005): Are different opinions or criticism allowed to be expressed within the organization? Are the architects encouraged to challenge each others' views and opinions and to debate the possible architectural solutions with each other (Interview, 2005)? Do the architects have the courage to question things without being branded as troublemakers (Interview, 2005)?
- Organizational constraints: Have any organizational constraints for architectural work been detected? How are they handled and resolved? Particularly, silo thinking and strict profit responsibilities may be barriers to EA success, if each department in an organization acts on a stand-alone basis, not interacting or co-operating with other departments, focusing only to the departmental bottom line (Interview, 2005).

## CONCLUSIONS

In this study, we described the potential CSFs for EA derived from the literature review and the focus group interview. When evaluating our study, it should be remembered that the empirical data was collected during a single group interview session participated by five practitioners from three companies and, as such, strong generalizations cannot be made. Additionally, the literature review results presented to the interviewees may have influenced their response. We believe, however, that our study has exposed some important aspects of reaching a high-quality EA.

First, the quality of EA is a concept that does not yet have an established definition. We suggested a preliminary definition for the quality of EA. To put it simply, an EA has high quality if it is understood, accepted and used, and the EA is measured in order

to ensure that the quality requirements are met. Furthermore, we consider the maturity models as one means of advancing the quality of EA.

Second, the success and quality of EA are influenced by several – and to some extent interrelated – factors. For instance, communication can be regarded as a focal issue, because it enables carrying out many of the other factors successfully. Especially, commitment seems to be dependent on communication (and the common language): if the communication practices are just about shaping up, it is unlikely that a strong top-management commitment, or organizational buy-in, has yet been reached. It also seems that if the EA objectives are defined and they support the business objectives, it will be easier to gain both the top management commitment and the organizational buy-in. The detailed dependencies between the potential CSFs, however, were not analyzed in this study.

Third, the potential CSFs for EA provide a selection of important issues to be taken into consideration in EA efforts. From this set, as suggested by Bullen and Rockart (1981) a limited set of the most critical factors for a particular organization at a particular point of time can be determined depending on the needs of the organization: in different organizations different factors may be regarded as the most critical ones.

Fourth, the potential CSFs can also be used as a checklist by which practitioners both in the IT user and service provider organizations undertaking, or planning to undertake, EA efforts can ensure that the efforts are comprehensive, well-implemented, and have the minimum chance of failure. Additionally, CSFs can be regarded as possible targets for which EA evaluation criteria, metrics and methods can be developed.

Consequently, this study raises some additional research questions, such as:

- What kind of dependencies there are between the CSFs? How interrelated the factors are? Furthermore, an interesting question is, whether there are any contradictory factors.
- How can an organization prioritize or weigh the CSFs to select the most critical factors of its own? How the phase of the organization's EA development, or the maturity of its EA, affects the prioritization needs and possibilities?
- How can the CSFs for EA be utilized in evaluating the maturity, and thus, the quality of



--- First published in the Journal of Enterprise Architecture, Vol. 2, No. 4, 2006 pp. 29-40 ---  
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EA, in the organization? Which simple and usable evaluation criteria and metrics are suitable to measure the extent each CSF has been taken into account? Are there any other possible targets for which the criteria and metrics should be defined? How many criteria and metrics should be used in evaluating the organization's EA? How can an organization choose the most suitable ones for its purposes among these different criteria and metrics? Which metrics suit to a particular EA maturity level?

The next steps of the research project will focus on studying 1) how well the set of 12 CSFs for EA can be utilized in the initial EA assessment – how holistic and extensive view of the state of the organization's EA do they provide?, 2) whether these factors are the essential targets for evaluating an EA?, and 3) which metrics are suitable for each factor? Answering these questions will result in a more detailed EA evaluation model.

#### ACKNOWLEDGEMENTS

The study was conducted as part of an ongoing three-year research project focusing on the quality management of enterprise and software architectures. The project is orchestrated by the Information Technology Research Institute (ITRI), University of Jyväskylä, Finland, and funded by the Finnish Funding Agency for Technology and Innovation (TEKES) and the participating companies. I wish to thank the representatives of the companies for their co-operation, as well as my colleagues Veikko Halttunen, Niina Hämäläinen and Eetu Niemi for their contribution in reviewing this paper.

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