



## **Evaluating the Benefits of Architectural Work**

### **AISA Project Report**

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## Summary

This report is one of the results of the second phase of the AISA project's second year. The objective of this phase was to chart possible evaluation criteria and metrics for the four architectural work (encompassing architectural planning, development and management on all levels of architectures in an enterprise) evaluation sub-targets defined in the previous phase of the project, namely 1) Communication and Common Language, 2) Commitment, 3) Models and Artifacts, and 4) Architectural Work Benefits, representing the evaluation of the whole Enterprise Architecture program (see Ylimäki and Niemi 2006 for more details).

This report describes the organizational benefits of architectural work, and evaluation criteria and metrics for quantifying the realization of benefits in an organization. The benefits, metrics and evaluation criteria were charted by an extensive literature review and two focus group interviews of practitioners. As the benefits are great in number, the focus group (Interview 2) suggested a classification for them, based on the basic needs of a business enterprise. Moreover, a practical view of architectural work benefits and their evaluation developed by the focus group (Interview 2) is introduced, since the evaluation criteria and metrics provided by the research did not seem to suit practice on their own, without a guiding reference model. Additionally, the contribution of this study to practice, and themes for further research are discussed.



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# 1 Introduction

Architectural work encompasses architectural planning, development and management on all levels of architectures in an enterprise. Enterprise Architecture (EA), on the other hand, contains all models needed in developing and managing an organization, and takes a holistic view of an enterprise's structure, business processes, information systems and technological infrastructure (see e.g. de Boer, Bosanque et al. 2005; Kaisler, Armour et al. 2005; Jonkers, Lankhorst et al. 2006). It has become one of the major interests of both business and academia, and is claimed to provide a vehicle for realizing a multitude of benefits in organizations. Nonetheless, a great number of investments need to be made to support architectural work (see e.g. Kaisler, Armour et al. 2005) and be justified by demonstrating its positive effects to the key stakeholders (see e.g. Morganwalp and Sage 2004).

However, presenting the organizational benefits of architectural work is difficult since measuring its effects is demanding and the EA itself is constantly changing (Morganwalp and Sage 2004). Academic research has almost omitted the subject of architectural work benefit and value realization, focusing instead mostly on architecture frameworks (see e.g. Sowa and Zachman 1992; Greefhorst, Koning et al. 2006; The Open Group 2006), and architecture development methods and tools (see e.g. Bernus, Nemes et al. 2003; Lankhorst 2005; Fatolahi and Shams 2006). Recently, a few contributions have been made in the domain of EA evaluation (see e.g. Morganwalp and Sage 2004; Niemi 2006a; Ylimäki 2006c). However, the evaluation and measurement – and even the definition of – the organizational benefits and value of architectural work seem so far to have escaped the attention of academic research.

Nevertheless, the need for defining the potential benefits of architectural work is evident. It might even be the prerequisite for selecting the architectural work objectives, measuring the realized benefits and value of architectural work, and thus providing a rationale for the key stakeholder support and investments in architectural work (see e.g. Kamogawa and Okada 2005). One of the aims of the AISA project (Quality Management of Enterprise and Software Architectures) is to provide a contribution for this field of research.

This report is one of the results of the second phase of the AISA project's second year. The objective of this phase was to chart possible evaluation criteria and metrics for the four Evaluation sub-targets defined in the previous phase of the project, namely 1) Communication and Common Language, 2) Commitment, 3) Models and Artifacts, and 4) Architectural Work Benefits, representing the evaluation of the whole Enterprise Architecture program (see Ylimäki and Niemi 2006 for more details). This report pursues to describe the organizational benefits of architectural work, and to present evaluation criteria and metrics for quantifying the realization of benefits in an enterprise. Evaluation criteria and metrics for Models and Artifacts are presented by Hämäläinen (Hämäläinen 2006), and the evaluation of Communication and Common Language, as well as Commitment is reported by Ylimäki (Ylimäki 2006a).

The remainder of this report is organized as follows. In the next section, we describe the research method used in this study. In Section 3, we briefly discuss the architectural work benefits and present a categorization for them proposed by the focus group. In Section 4, we discuss the evaluation of architectural benefits and present a practical view of architectural work benefits and their evaluation. Finally, Section 5 summarizes the report.



## 2 Research Process

In the following, the research process of this study is described as steps. A research paper (Niemi 2006b) was written from the first three steps (architectural work benefit research), in which the benefits and their categorization are described in more detail.

- 1. Literature review on architectural work benefits.** Literature on EA and architectures in general was charted for references of benefits using both academic and general search engines on the Internet. Moreover, additional literature was found by studying the references sections of the found papers. Literature by both academia and practitioners was included in the review for a more diverse view of benefits. Subsequently, closely related benefits were combined for a more compact list of benefits by the discretion of the author. Based on reviewing the literature, a preliminary list of 27 architectural work benefits was composed.
- 2. Focus group interview on the architectural work benefits.** A focus group interview (see e.g. Krueger and Casey 2000) of seven practitioners from the five co-operating organizations (Table 1) was organized in August 2006 as a workshop (later referred as Interview 1). Each organization provided one or two persons to the interview. The objectives of the interview were 1) to review the literature review results, and 2) to collect additional, experience-based information. The interview was carried out in a group, because group influence was thought to stimulate the discussion; however, confidential information may thus be undisclosed. The interview was moderated by one researcher, while the other two took notes. In addition to the notes taken, the interview was also audio-recorded.

Table 1. Focus group companies

Case company	Number of employees (year 2005)	Industry
Company 1	28 000	Retail and service
Company 2	14	IT consultation and service
Company 3	1 500	Business & IT consulting and development, part of an international company with over 300 000 employees.
Company 4	12 000	Banking, finance and insurance
Company 5	5 000	Telecommunications

- 3. Composing a categorization of architectural work benefits.** The results from the literature review and the focus group interview were analyzed and combined into a categorization of EA benefits.
- 4. Literature review on architectural work benefit evaluation.** Literature on EA, information systems (IS), architectures in general, and managerial accounting was charted for references of evaluation criteria and metrics using search engines on the Internet and references sections of papers. After studying the papers found and the lack of a guiding evaluation model or framework noted, the architectural work benefits were selected as a starting point for charting metrics and evaluation criteria. The criteria and metrics found were analyzed for defining the architectural benefits they could be used to evaluate or measure. In a number of cases, the criteria and metrics could be assigned according to the literature, but some had to be assigned by the discretion of the author. As a result, metrics and evaluation criteria for 23 architectural work benefits could be defined. Seven of these were emphasized on the basis of anticipated



focus group interests. To further categorize the criteria and metrics, they were assigned to a variety of Evaluation sub-targets. Moreover, their types were defined. As a result, a list of evaluation criteria and metrics assigned to the architectural work benefits (Appendix 1) was constructed. Additionally, a Powerpoint-presentation including the categorization of the benefits, and the seven emphasized benefits and their related metrics and evaluation criteria, was produced for the next step.

5. **Focus group interview on architectural work benefit evaluation.** Another focus group interview (later referred as Interview 2) was organized in October 2006 with seven practitioners from the co-operating companies (Table 1) using similar conventions as previously. As before, the interview pursued 1) to review the literature review results, and 2) to collect additional, experience-based information.
6. **Reporting.** The focus group interview results were analyzed and presented with the architectural work benefits, and benefit evaluation criteria and metrics.



### 3 Architectural Work Benefits

In this section, we briefly discuss the result of the research on architectural work benefits. Moreover, we present the focus group’s perception on the categorization of the benefits. In the following, the variety of benefits is presented. More detailed analysis and the composed categorization of the benefits are included in (Niemi 2006b).

The architectural work benefits identified in the study are displayed in Table 2. As can be seen, the benefits range from abstract, high-level benefits such as integration or agility of the enterprise, to more concrete, lower-level benefits such as shortened cycle times or cost savings. Moreover, the items listed in the table can be seen as being either architectural work benefits, characteristics of EA or architectural work, or areas of architectural work from which benefits could be gained. For example, standardization and integration activities may lead to cost savings, and all of these are mentioned as architectural work benefits in the literature. Despite these challenges, there is no established model for organizing or classifying the architectural work benefits. One possible classification has been proposed by (Giaglis, Mylonopoulos et al. 1999) and applied to the area of architectural work in (Niemi 2006b). Despite the classification divides the benefits into four categories on the account of their measurability and the potential to attribute them to EA or architectural work, it does not assist in defining relationships between the benefits.

Table 2. Architectural work benefits, in alphabetical order

	Architectural Work Benefit		Architectural Work Benefit
1	Evolutionary EA development & governance	15	Improved staff management
2	Provides a holistic view of the enterprise	16	Improved strategic agility
3	Improved alignment to business strategy	17	Increased economies of scale
4	Improved alignment with partners	18	Increased efficiency
5	Improved asset management	19	Increased interoperability and integration
6	Improved business processes	20	Increased market value
7	Improved business-IT alignment	21	Increased quality
8	Improved change management	22	Increased reusability
9	Improved communication	23	Increased stability
10	Improved customer orientation	24	Increased standardization
11	Improved decision making	25	Reduced complexity
12	Improved innovation	26	Reduced costs
13	Improved management of IT investments	27	Shortened cycle times
14	Improved risk management		

The focus group generally agreed with the proposed architectural work benefits and considered the variety of benefits sufficient in the both interviews. However, in the second interview, the group considered the definition of interdependencies between benefits even more important: the direct and connected indirect benefits of architectural work should be identified. Moreover, distinguishing the benefits realized from EA and architectural work from other potential factors affecting the realization of benefits was regarded as a significant challenge by the focus group.



From practical point of view, the focus group (Interview 2) proposed three main categories into which the proposed architectural work benefits could be categorized. They are based on the basic targets and needs of a business enterprise and its owners. In the second interview, the group also proposed several interdependencies between the categories and benefits, which could be studied further. The categorization was considered to suit enterprise's needs better than the classification of the benefits proposed by the author (Niemi 2006b). The categories proposed by the focus group are

- **Costs,**
- **Growth,** and
- **Flexibility.**

By flexibility, the focus group meant the enterprise's ability to respond to changes in the business environment, and the speed of enterprise's changes compared to the swiftness of the changes in the environment. Flexibility is vital in ensuring future profit potential for the enterprise. Depending on market trends, either costs or growth is the most essential benefit category. However, there may be a conflict between growth and flexibility: the enterprise may grow without having flexibility, but if the market situation changes, great challenges arise since the enterprise is difficult to manage without enough flexibility.

According to the focus group, flexibility is also connected to complexity. Practically, reducing the complexity of an enterprise's systems, processes or structure is difficult. Even when it is possible, the complexity may merely be reduced by replacing multiple components with a larger one, or hiding the complexity behind larger components. These methods do not necessarily save any costs, and also make the components more difficult to modify when needed. In fact, reducing complexity may decrease flexibility and even increase costs.





## 4 Benefit Evaluation and Measurement

In this section, the results from the research on architectural work benefit evaluation and measurement are discussed. Also, the focus group's (Interview 2) practical view of architectural work benefits and their evaluation is presented.

### 4.1 Architectural work benefit evaluation in literature

Generally, literature does not propose guiding evaluation models or frameworks for evaluating architectural work benefits, with the exception of qualitative metrics developed for business-IT alignment (Luftman 2000). However, a few models have been proposed for quantifying some benefits or the business value of architectural work in general. For example, EA Value Realization model (Kluge, Dietzsch et al. 2006), EA Effectiveness Framework (Kamogawa and Okada 2005), Real Options (Saha 2004; Schmidt 2005) and Return on Investment (ROI) (Saha 2004; Schmidt 2005; Rosser 2006) are all proposed as models or frameworks for calculating the business value of architectural work. Still, these approaches do not seem to provide enough detail for using them in practice. For example, the components and metrics of ROI are not presented in detail, possibly because of their organization-dependence. On the other hand, multiple generic business performance metrics are proposed in managerial accounting literature, and EA and IS literature also proposes some metrics for performance evaluation.

For these reasons, the benefits identified in the previous step of the study were selected as a basis for charting metrics and evaluation criteria for quantifying architectural work benefits and business value. In a number of cases, the criteria and metrics could be assigned to the benefits according to the literature, but some had to be assigned by the discretion of the authors. To further categorize the criteria and metrics, they were assigned to the following of evaluation sub-targets by the discretion of the authors:

- Customer
- Decisions
- Documentation
- Employee base
- Finances
- Inventory
- IT Assets
- Organization
- Process (with examples of various processes such as production, delivery and R&D)
- Product/Service
- Product/Service base
- Project
- Standards
- Value Chain

Also, the benefit in question was included as an evaluation sub-target. In business-IT alignment, the targets proposed by (Luftman 2000) were used. Moreover, the types of metrics were defined as either objective (quantitative) or subjective (qualitative), and producing information related to finance, time or numbers in general (e.g. amounts or classes). The benefits and their assigned evaluation criteria and metrics are presented as an appendix in alphabetical order. In this study,



evaluation criteria and metrics were assigned to 23 benefits of the total 27. From these, seven were emphasized on the account of anticipated focus group (Interview 2) interests, and thus include a greater number and more detailed criteria and metrics. The emphasized benefits were:

- Improved business-IT alignment
- Improved customer orientation
- Improved decision making
- Improved strategic agility
- Increased efficiency
- Increased reusability
- Increased standardization

## **4.2 Practical View of Architectural Work Benefits and Their Evaluation**

Presenting evidence on realized architectural benefits to management was considered a vital condition to architectural work by the focus group (Interview 2). In the second interview, the focus group familiarized themselves with the metrics related to improved business-IT alignment, increased efficiency and increased reusability. Moreover, they addressed the evaluation of complexity. The focus group suggested that the efficiency metrics would encompass the category of costs well, but stated that the proposed metrics are too great in number and would not suit practice without a guiding reference model. During the second interview, the focus group members developed a more practical view of the architectural work benefits and their evaluation (later referred as the practical view), based on the three categories of benefits (costs, growth, and flexibility). In the following, the practical view is discussed according to the second focus group interview results.

### **4.2.1 Overview**

The practical view (Figure 1) uses the three categories of architectural work benefits as a basis for constructing architectural work and corporate evaluation and measurement system. The view takes into account three viewpoints of evaluation: 1) corporate metrics consulted by the architecture team, 2) metrics of the architectural work itself, and 3) metrics of architectural work results. It illustrates 1) corporate level targets (the three architectural work benefit categories), 2) layered hierarchy of metrics, 3) relationships between architectural and corporate metrics 4) architecture team/unit role and position, and 5) role of architectural work ROI.

### **4.2.2 Basics of Evaluation**

The focus group considered the fundamental fact of evaluation to be its effect on guiding the actions of individuals. By selecting certain metrics for the evaluation of employees, the metrics themselves have an effect on the work of the employees in question. As a result, the whole enterprise is guided by the metrics. However, the metrics that should be used to evaluate employees vary – they could be dependent on e.g. the unit, function, subunit or team of employees in question. According to the focus group, 3-5 metrics would be sufficient per evaluation unit (such as individual, team, subunit, unit or function). However, the metrics should be of high substance and hence be selected carefully, taking into account the goals of the evaluation (e.g. guiding the actions of an enterprise). In addition, it is essential that architectural work metrics are connected to other corporate metrics.



### 4.2.3 Hierarchy of Metrics

The basic idea of the practical view (depicted in Figure 1) is to organize the metrics and benefits according to an enterprise's basic business needs. In the view, the hierarchy of metrics is layered according to the organization structure, and hence the number of layers varies in different organizations. From top to bottom, the view concretizes corporate level targets to lower level metrics. The viewpoints of management and employees are considered in the practical view. Therefore, the measurement system implemented according to the practical view provides information to both evaluators and those being evaluated.

The hierarchy starts from the corporate level, where metrics for the enterprise's most important targets, such as costs, growth and flexibility, are implemented. From there, the management implements the metrics derived from the top level targets to the unit or function level below, which includes business and support functions (e.g. sales, marketing, finance, delivery, human resources and research & development). For example, employee satisfaction could be a metric of human resources, and customer satisfaction represents a metric used in sales.

From the unit or function level, middle management implements metrics for subunits or teams of employees, and from there, metrics are implemented to individual employees. In addition, projects usually have their own metrics as well as the architecture team or unit. For each unit, function, subunit, team and individual, 3-5 metrics should be implemented. In addition to implementing the metrics from top to bottom, feedback from bottom to top is also needed to preserve the links and compatibility between the metrics on adjacent levels.

According to the focus group (Interview 2), managing the integrity of the measurement system as a whole is vital. The hierarchy of metrics should be low enough to preserve the chain of causalities between the metrics on adjacent levels. If the hierarchy grows too high, it may result in inconsistent metrics on the lower levels of the hierarchy. The size of the hierarchy is dependent on the size of the enterprise, 5-6 levels would be a feasible example.

### 4.2.4 Architectural Work Benefit Evaluation

The focus group (Interview 2) suggested a simple approach to architectural work benefit evaluation. The idea is to provide the management of an enterprise with 3-5 metrics which can be used to evaluate architectural work benefits. By using the metrics, the architecture team or unit should rationalize that benefits are received from architectural work in enterprise functions and units. For example, the holistic architectural view of an enterprise, which a high-quality EA can provide, can be used in projects over and over again, without constructing the architecture separately in the beginning of every project and thus resulting in greater efficiency, speed and accuracy.

Moreover, the focus group stated that management could be also interested in architectural work ROI, because normal investment planning basically applies in architectural work. Towards management, the focus group preferred the use of hard, quantitative metrics. Results from the use of qualitative metrics, such as surveys, may be used to support and fine-tune the results from hard metrics to either direction. For instance, the success of architecture related communication or commitment to the architectural work can be evaluated using surveys (see e.g. Ylimäki 2006a).



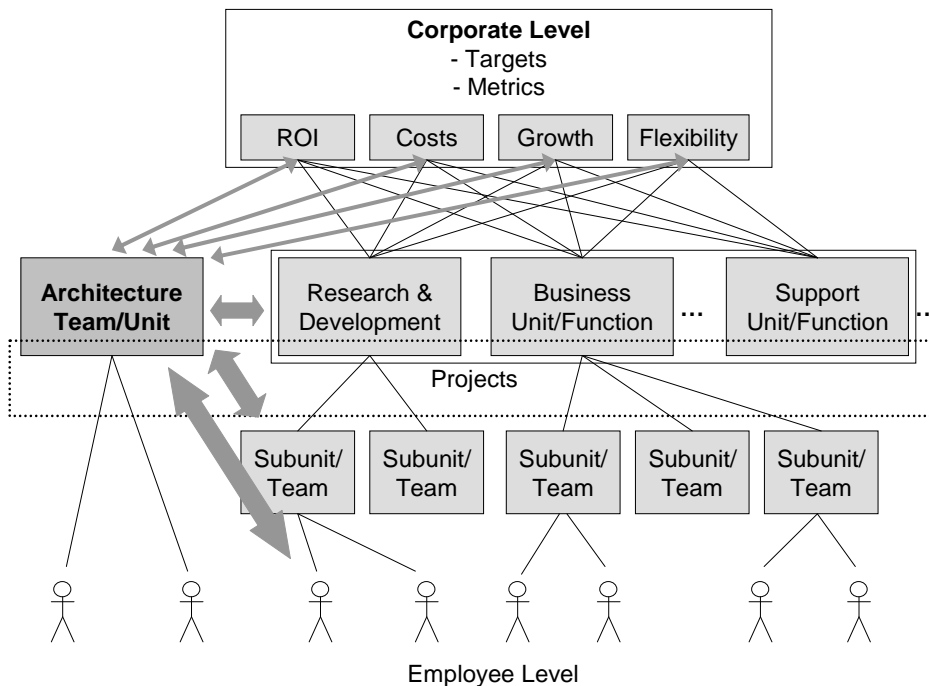


Figure 1. The practical view of architectural work benefits and their evaluation (developed by the focus group)

In addition to rationalizing the architectural work towards management, the focus group also stated that evaluating architectural work benefits is important to the architecture team's motivation as well: if architectural work is not considered relevant in the enterprise, the work itself is probably not of very high quality.

#### 4.2.5 Architectural Work ROI

The ROI of architectural work was considered to be one of the important metrics for presenting architectural work benefits to the management. It can be used to measure whether the architectural work carried out is profitable in the long-term. Basically, it measures how well the architectural work supports the attainment of business goals.

#### 4.2.6 Communicating Evaluation Results

Taking into account the viewpoints and needs of various stakeholders in architectural communication, including also evaluation results, was emphasized by the focus group (Interview 2). Different stakeholders may be interested in receiving different information in different forms. For example, a project manager may not be interested in architectural work benefits on the enterprise level as much as top management. In general, architectural communication should take into account 1) what is to be communicated, 2) to whom the communication is aimed, and 3) when is the right time to communicate (see Ylimäki 2006a for more details).

#### 4.2.7 Evaluation Challenges

The focus group (Interview 2) identified several challenges of architectural work benefit evaluation. Firstly, a baseline or standard for evaluation results does not exist. If architectural work is carried out in an enterprise, this situation cannot be compared with the situation when architectural work



has not been initiated. Secondly, there may be conflicts between being able to present short-term and long-term benefits. On one hand, architectural work benefits should be presented as soon as possible to gain management support, but on the other hand, architectural work is long-term by nature. According to the focus group, management is not interested in matters outside the time scale of the current corporate strategy (e.g. 3-5 years), but the architecture team has to carry out more long-term planning. Some metrics may not show benefits until after five years, which is too long time – a time scale of one year would be more appropriate. However, if the architecture team concentrates only on producing short-term benefits, they end in “extinguishing fires”, without a possibility to plan in the long-term. The challenge is to find a mutual understanding of the time scale of presenting benefits between management and the architecture team, and a balance between producing short-term and long-term benefits.

Since the initial stages of architectural work usually produce least benefits according to the focus group (Interview 2), being able to present quick wins is essential in gaining management support. The focus group considered the presentation of quick wins difficult. If the architecture is flexible, it should be possible to present quick wins. However, if flexible architecture is currently in the initial stages, benefits are received only in the long-term. In fact, architectural work may even decrease efficiency and increase cost in the beginning, because of new and modified processes and methods. The focus group did not present other solutions to this challenge than utilizing the selling skills of architects in rationalizing architecture projects and investments to the management.



## 5 Conclusion

In this report, the organizational benefits of architectural work were described, and evaluation criteria and metrics for quantifying the realization of benefits in an organization presented. The benefits, metrics and evaluation criteria were charted by an extensive literature review and two focus group interviews of practitioners. As the benefits are great in number, the focus group (Interview 2) suggested a classification for them, based on the basic needs of a business enterprise. Moreover, a practical view of architectural work benefits and their evaluation developed by the focus group (Interview 2) was introduced, since the evaluation criteria and metrics provided by the research did not seem to suit practice on their own, without a guiding reference model.

The research described in this report may benefit practitioners in several ways. Firstly, the architectural work benefits may be used as a basis for defining the objectives of architectural work in an enterprise. Secondly, architectural work may be rationalized, specifically to the management, in the initial stages by presenting the potential benefits which could be realized by architectural work. Thirdly, the benefits and their related metrics and evaluation criteria can be used as a basis for developing a measurement system for quantifying the value of architectural work. The practical view not only illustrates on a general level how architectural work benefits may be measured, but also presents a reference model for a generic corporate measurement system.

Moreover, the research provides a multitude of themes for further research theme. Firstly, the architectural work benefits should be further analyzed to classify them and to define their interrelations. The classification suggested by the focus group (Interview 2) could be used as a starting point for defining the interrelationships between the benefits, which would provide a causal chain of benefits and their related metrics. Secondly, the practical view developed by the group provides a basis for attributing feasible metrics to e.g. various levels, functions and units included in the view, for clarifying the role and organizational position of the architecture team, and for committing further research on defining the components of architectural work ROI.

Although these are important directions of further research, the essential question of attributing gained benefits to architectural work remains mostly unanswered. The practical view might be used as a starting point for clarifying this connection between gained benefits and architectural work. However, this seems to be a significant challenge, because a great number of factors affect the realization of benefits (see e.g. Boster, Liu et al. 2000; Ylimäki 2006b). Also, the prioritization of benefits is company-specific, depending on the company strategy. Therefore, defining a generic set of EA benefits with respective metrics is difficult. Moreover, balancing between presenting short-term and long-term benefits is a challenge for the architecture group. Finally, it is even argued that the benefits cannot be directly measured (Rosser 2006). In any case, EA should be communicated effectively to realize the benefits (see e.g. Rosser 2006; Tash 2006).



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## Appendix 1: The Benefits of Architectural Work

Examples of process-related sub-targets are marked with prefix \*.

### Increased efficiency

Evaluation sub-target	Metrics	Type	Sources
<b>Decisions</b>	Time required to make a decision	Objective/ Subjective Time	(Morgan 2005)
<b>Documentation</b>	Costs avoided through elimination of redundant/duplicative/overlapping documentation	Objective Financial	(GAO 2003; SETLabs 2004)
	Number of documents/models/descriptions	Objective Number	
<b>Finances</b>	- Costs of transactions - Overhead costs - Infrastructure costs	Objective Financial	(Drury 1992; Morgan 2005)
	Accordance to budget (organization-level/business-unit level/department-level group level)	Objective Number	(Drury 1992)
	- Revenue growth - Profitability - Cash flow - Return on Investment - Return on Equity - Economic Value Added - Market share	Objective Financial	(Drury 1992; Morgan 2005; Papalexandris, Ioannou et al. 2005)
<b>IT Assets</b>	Number of assets - systems - software products - licenses - servers, etc.	Objective Number	(Rosser 2006)
	Number of overlapping and redundant assets	Objective Number	(SETLabs 2004)
	- All IT costs - Maintenance costs - Operations cost	Objective Financial	(SETLabs 2004; Rosser 2006)
	System/Software performance	Objective Number	
	System/Software Implementation duration	Objective Time	
	Costs avoided through elimination of redundant/duplicative/overlapping assets	Objective Financial	(GAO 2003; SETLabs 2004)
<b>Organization</b>	Number of redundant/duplicative/overlapping - functions, departments, groups/teams and positions	Objective Number	(SETLabs 2004)
	Costs avoided through elimination of redundant/duplicative/overlapping functions/departments/groups/teams/positions	Objective Financial	(GAO 2003; SETLabs 2004)



Evaluation sub-target	Metrics	Type	Sources
<b>Process</b>	Cycle time	Objective Time	(Drury 1992; Morgan 2005; Papalexandris, Ioannou et al. 2005)
	Throughput	Objective Number	(Drury 1992; Morgan 2005; Papalexandris, Ioannou et al. 2005)
	Costs	Objective Financial	(Drury 1992; Papalexandris, Ioannou et al. 2005)
	Errors (number/time/cost)	Objective Number/ Time/ Financial	
	Number of redundant/duplicative/overlapping processes	Objective Number	(SETLabs 2004)
	Costs avoided through elimination of redundant/duplicative/overlapping processes	Objective Financial	(GAO 2003; SETLabs 2004)
<b>*Delivery</b>	Time from order to delivery	Objective Time	(Drury 1992; Morgan 2005)
	Number/% of on-time deliveries	Objective Number	(Drury 1992)
	Cost	Objective Financial	(Drury 1992)
<b>*Production</b>	Time - Total cycle time - Manufacturing time - Processing time - Inspection time - Wait time - Move time	Objective Time	(Drury 1992; Morgan 2005; Papalexandris, Ioannou et al. 2005)
	Production throughput	Objective Number	(Drury 1992; Morgan 2005; Papalexandris, Ioannou et al. 2005)
	Production cost	Objective Financial	(Drury 1992; Papalexandris, Ioannou et al. 2005)
	Manufacturing cycle efficiency (value-adding activities/non value adding activities)	Objective Number	(Drury 1992)



Evaluation sub-target	Metrics	Type	Sources
<b>*Customer interface (Customer service, marketing and sales)</b>	<ul style="list-style-type: none"> <li>- Cross-selling</li> <li>- Customer Complaints</li> <li>- Complaint resolution</li> <li>- Hours with customer</li> <li>- Segmentation</li> <li>- Query time</li> <li>- Costs</li> </ul>	Objective Number/ Time/ Financial	(Drury 1992; Papalexandris, Ioannou et al. 2005)
<b>*R&amp;D</b>	Product/service development duration	Objective Time	(Drury 1992; Rosser 2006)
	Cost to develop new product/service	Objective Financial	(Drury 1992; Rosser 2006)
	Number of new products	Objective Number	(Papalexandris, Ioannou et al. 2005)
	Number of patents	Objective Number	(Papalexandris, Ioannou et al. 2005)
	R&D costs	Objective Financial	(Papalexandris, Ioannou et al. 2005)
<b>Project</b>	Accordance to budget	Objective Financial	(Rosser 2006)
	Accordance to schedule	Objective Time	(Rosser 2006)
	Number of redundant/duplicative/overlapping projects	Objective Number	(SETLabs 2004)
	Costs avoided through elimination of redundant/duplicative/overlapping projects	Objective Financial	(GAO 2003; SETLabs 2004)
	Scope	Objective Number	
<b>Efficiency in general</b>	Stakeholder opinion on EA's value to improving efficiency of <ul style="list-style-type: none"> <li>-Processes</li> <li>-Projects</li> <li>-Decision making</li> <li>-Communication, etc.</li> </ul>	Subjective e.g. Likert-Scale	

## Increased reusability

Evaluation sub-target	Metrics	Type	Sources
<b>IT Assets</b>	Number of reusable components <ul style="list-style-type: none"> <li>- Systems</li> <li>- Programs</li> <li>- Code</li> <li>- Modules</li> <li>- Methods</li> <li>- Processes</li> <li>- Documentation</li> <li>- Tools, etc.</li> </ul>	Objective/ Subjective Number	(Rosser 2006)
	Number of components currently in reuse	Objective Number	(Rosser 2006)



Evaluation sub-target	Metrics	Type	Sources
	Number of reuses / component	Objective Number	(Rosser 2006)
	Costs avoided through reuse	Objective Financial	(Poulin and Himler 2006)
<b>Process</b>	Number of reused - Processes - Process modules - Work products, etc.	Objective Number	
	Costs avoided through reuse	Objective Financial	(Poulin and Himler 2006)
<b>*Investment process</b>	Number of reused investment process components (establishment) - Documents - Calculations - Decision-making models	Objective Number	
	Costs avoided through reuse	Objective Financial	(Poulin and Himler 2006)
<b>Project</b>	Number of reused - Project models - Project documentation - Project products	Objective Number	
	Costs avoided through reuse	Objective Financial	(Poulin and Himler 2006)
<b>Reusability in general</b>	Stakeholder opinion on EA's value to reusability	Subjective e.g. Likert-Scale	

## Increased standardization

Evaluation sub-target	Metrics	Type	Sources
<b>Documentation</b>	Documentation/model/description compliance to defined EA/standards	Objective Number	
	Costs avoided through use of standards	Objective Financial	
<b>IT Assets</b>	Number of assets - Systems - Software products - Licenses - Servers - Etc.	Objective Number	(Rosser 2006)
	Number of overlapping and redundant assets	Objective Number	(SETLabs 2004)
	Number of standardized/unstandardized interfaces	Objective Number	
	Costs avoided through use of standards	Objective Financial	
<b>Process</b>	Process compliance to EA/defined standards (e.g. methods, documentation, processes, tools)	Objective Number	



Evaluation sub-target	Metrics	Type	Sources
	Process repeatability (level of standardization)	Objective Number	
	Costs avoided through use of standards	Objective Financial	
<b>*Investment process</b>	Number of EA/standard compliant investments	Objective Number	(GAO 2003)
	Feedback/change requests for EA received from the investment process	Objective Number	(GAO 2003)
	Costs avoided through use of standards	Objective Financial	
<b>Project</b>	Project compliance to EA/defined standards (e.g. methods, documentation, processes, tools)	Objective Number	
	Costs avoided through use of standards	Objective Financial	
<b>Standards</b>	Number of standards	Objective Number	
	Number of standards currently used	Objective Number	
	Number of uses/standard	Objective Number	
<b>Standardization in general</b>	Stakeholder opinion on EA's value to standardization	Subjective e.g. Likert-Scale	

## Improved decision making

Evaluation sub-target	Metrics	Type	Sources
<b>Decisions</b>	Documentation and analysis of past decisions after an interval -> quality of decisions	Subjective Number	
	Time required to make a decision	Objective/ Subjective Time	(Morgan 2005)
	Savings through reduced time to make a decision	Objective Financial	
<b>Process</b>	Support/consulting required (times/cost/time)	Objective Number/ Financial/ Time	
	Savings through reduced support/consulting	Objective Financial	
<b>*Investment process</b>	Number of EA/standard compliant investments	Objective Number	(GAO 2003)
	Feedback/change requests for EA received from the investment process	Objective Number	(GAO 2003)



Evaluation sub-target	Metrics	Type	Sources
	Savings through reduced support/consulting	Objective Financial	
<b>Project</b>	Architectural guidance required (times/cost/time)	Objective Number/ Financial/ Time	
	Other support/consulting required (times/cost/time)	Objective Number/ Financial/ Time	(Morgan 2005)
	Savings through reduced support/consulting	Objective Financial	
	Stakeholder opinion on architectural guidance to projects	Subjective e.g. Likert- Scale	
<b>Decision making in general</b>	Stakeholder opinion on EA's value to decision making (e.g. access to information)	Subjective e.g. Likert- Scale	(Rosser 2006)

## Improved customer orientation

Evaluation sub-target	Metrics	Type	Sources
<b>Organization</b>	<ul style="list-style-type: none"> <li>- Revenue growth</li> <li>- Profitability</li> <li>- Cash flow</li> <li>- Market share</li> </ul>	Objective Financial	(Drury 1992; Morgan 2005; Papalexandris, Ioannou et al. 2005)
<b>Customer base</b>	<ul style="list-style-type: none"> <li>- Retention</li> <li>- Acquisition</li> <li>- Value</li> <li>- Size</li> <li>- Profitability/Cost of customership</li> <li>- Segmentation</li> <li>- Products/services per customer</li> </ul>	Objective Number/ Financial	(Papalexandris, Ioannou et al. 2005)
<b>Inventory</b>	Inventory level	Objective Number	(Drury 1992; Morgan 2005; Papalexandris, Ioannou et al. 2005)
	Cost	Objective Financial	(Drury 1992; Morgan 2005; Papalexandris, Ioannou et al. 2005)
	Cycle time	Objective Financial	(Drury 1992; Morgan 2005; Papalexandris, Ioannou et al. 2005)
<b>Process</b>	Cycle time	Objective Time	(Drury 1992; Morgan 2005; Papalexandris, Ioannou et al. 2005)
	Throughput	Objective Number	(Drury 1992; Morgan 2005; Papalexandris, Ioannou et al. 2005)
	Costs	Objective Financial	(Drury 1992; Papalexandris, Ioannou et al. 2005)



Evaluation sub-target	Metrics	Type	Sources
<b>* Delivery</b>	Time from order to delivery	Objective Time	(Drury 1992; Morgan 2005)
	Number/% of on-time deliveries	Objective Number	(Drury 1992)
	Cost	Objective Financial	(Drury 1992)
<b>*Production</b>	Time - Total cycle time - Manufacturing time - Processing time - Inspection time - Wait time - Move time	Objective Time	(Drury 1992; Morgan 2005; Papalexandris, Ioannou et al. 2005)
	Production throughput	Objective Number	(Drury 1992; Morgan 2005; Papalexandris, Ioannou et al. 2005)
	Production cost	Objective Financial	(Drury 1992; Papalexandris, Ioannou et al. 2005)
	Manufacturing cycle efficiency (value-adding activities/non value adding activities)	Objective Number	(Drury 1992)
<b>*Customer interface (Customer service, marketing and sales)</b>	- Cross-selling - Customer Complaints - Complaint resolution - Hours with customer - Query time - Costs	Objective Number/ Time/ Financial	(Drury 1992; Papalexandris, Ioannou et al. 2005)
	Stakeholder satisfaction on EA's value to customer interface (sales/marketing/customer service)	Subjective e.g. Likert-Scale	
<b>*R&amp;D</b>	Product/service development duration	Objective Time	(Drury 1992; Rosser 2006)
	Cost to develop new product/service	Objective Financial	(Drury 1992; Rosser 2006)
	Number of new products	Objective Number	(Papalexandris, Ioannou et al. 2005)
	Number of patents	Objective Number	(Papalexandris, Ioannou et al. 2005)
	R&D costs	Objective Financial	(Papalexandris, Ioannou et al. 2005)
<b>Product/Service</b>	Product/service quality as measured by customers	Subjective e.g. Likert-Scale	(Drury 1992; Morgan 2005; Papalexandris, Ioannou et al. 2005)
	Product/service quality as measured by standards/audits	Objective/ Subjective Number	(Drury 1992; Morgan 2005; Papalexandris, Ioannou et al. 2005)
	Brand recognition as measured by customers	Subjective e.g. Likert-Scale	(Papalexandris, Ioannou et al. 2005)



Evaluation sub-target	Metrics	Type	Sources
	Price compared to competitors	Objective Financial	(Papalexandris, Ioannou et al. 2005)
	Segmentation	Objective Number	(Drury 1992)
<b>Customer orientation in general</b>	Customer satisfaction	Subjective e.g. Likert-Scale	(Drury 1992; Morgan 2005; Rosser 2006)

## Improved business-IT alignment

Evaluation sub-target	Metrics	Type	Sources
<b>Communications</b>	Stakeholder opinion on <ul style="list-style-type: none"> <li>- Understanding of business by IT</li> <li>- Understanding of IT by business</li> <li>- Inter/Intra-organizational</li> <li>- Learning</li> <li>- Protocol Rigidity</li> <li>- Knowledge Sharing</li> <li>- Liaison(s) effectiveness</li> </ul>	Subjective e.g. Likert-Scale	(Luftman 2000)
<b>Competency/ Value</b>	Stakeholder opinion on <ul style="list-style-type: none"> <li>- IT Metrics</li> <li>- Business Metrics</li> <li>- Balanced Metrics</li> <li>- Service Level Agreements</li> <li>- Benchmarking</li> <li>- Formal Assessments/Reviews</li> <li>- Continuous Improvement</li> </ul>	Subjective e.g. Likert-Scale	(Luftman 2000)
<b>Governance</b>	Stakeholder opinion on <ul style="list-style-type: none"> <li>- Business Strategic Planning</li> <li>- IT Strategic Planning</li> <li>- Reporting/Organization</li> <li>- Structure</li> <li>- Budgetary Control</li> <li>- IT Investment Management</li> <li>- Steering Committee(s)</li> <li>- Prioritization Process</li> </ul>	Subjective e.g. Likert-Scale	(Luftman 2000)
<b>Partnership</b>	Stakeholder opinion on <ul style="list-style-type: none"> <li>- Business Perception of IT Value</li> <li>- Role of IT in Strategic Business Planning</li> <li>- Shared Goals, Risk, Rewards/Penalties</li> <li>- IT Program Management</li> <li>- Relationship/Trust Style</li> <li>- Business Sponsor/Champion</li> </ul>	Subjective e.g. Likert-Scale	(Luftman 2000)
<b>Scope and Architecture</b>	Stakeholder opinion on <ul style="list-style-type: none"> <li>- Traditional, Enabler/Driver, External</li> <li>- Standards Articulation</li> <li>- Architectural Integration</li> <li>- Architectural Transparency</li> <li>- Flexibility Managing Emerging Technology</li> </ul>	Subjective e.g. Likert-Scale	(Luftman 2000)





Evaluation sub-target	Metrics	Type	Sources
<b>Skills</b>	Stakeholder opinion on - Innovation, Entrepreneurship - Locus of Power - Management Style - Change Readiness - Career crossover - Education, Cross-Training - Social, Political, Trusting Environment	Subjective e.g. Likert-Scale	(Luftman 2000)

## Improved strategic agility

Evaluation sub-target	Metrics	Type	Sources
<b>Decisions</b>	Time required to make a decision	Objective/ Subjective Time	(Morgan 2005)
<b>IT Assets</b>	System/Software Implementation duration	Objective Time	
<b>Organization</b>	Response time to an business demand	Objective Time	(Rosser 2006)
<b>Process</b>	Number of alterations to a process to respond to a business demand	Objective Number	(Drury 1992)
	Cost required to change a process to respond to a business demand	Objective Financial	(Drury 1992)
	Time required to change a process to respond to a business demand	Objective Time	(Drury 1992)
<b>*R&amp;D</b>	Product/service development duration	Objective Time	(Drury 1992; Rosser 2006)
	Cost to develop new product/service	Objective Financial	(Drury 1992; Rosser 2006)
<b>Product/Service</b>	Number of alterations to product/service to fit a new trend	Objective Number	(Drury 1992; Morgan 2005)
<b>Project</b>	- Planned change projects in the organization initiated by business demands - Unplanned urgent change projects in the organization initiated by business demands	Objective Number	(Rosser 2006)
	Successful change projects (if criteria exists)	Objective Number	(Rosser 2006)
	Change project accordance to budget	Objective Number	(Rosser 2006)
	Change project accordance to schedule	Objective Number	(Rosser 2006)
	Change project accordance to planned output	Objective/ Subjective Number	(Rosser 2006)
<b>Strategic agility in general</b>	Stakeholder opinion on EA's value to improving strategic agility	Subjective e.g. Likert-Scale	



## Provides a holistic view of the enterprise

Evaluation sub-target	Metrics	Type	Sources
<b>Holistic view of the enterprise in general</b>	Stakeholder opinion on EA model/description	Subjective e.g. Likert-Scale	

## Improved alignment to business strategy

Evaluation sub-target	Metrics	Type	Sources
<b>Customer base</b>	- Turnover - Increase - Value - Size - Especially profitable customers	Objective Number	
<b>Customer</b>	Customer satisfaction	Subjective e.g. Likert-Scale	(Drury 1992; Morgan 2005; Rosser 2006)
<b>Inventory</b>	Cost	Objective Financial	(Morgan 2005)
<b>Investment process</b>	Costs	Objective Financial	(Morgan 2005)
<b>IT Assets</b>	- IT costs - Maintenance Costs - Operation Costs	Objective Financial	(SETLabs 2004; Rosser 2006)
<b>Organization</b>	- Costs of transactions - Overhead costs - Infrastructure costs	Objective Financial	(Morgan 2005)
<b>Production</b>	Production time	Objective Time	(Morgan 2005; Papalexandris, Ioannou et al. 2005)
	Production throughput	Objective Number	(Morgan 2005; Papalexandris, Ioannou et al. 2005)
	Production cost	Objective Financial	(Papalexandris, Ioannou et al. 2005)
<b>Product/Service</b>	Product/service quality as measured by customers	Subjective e.g. Likert-Scale	(Morgan 2005; Papalexandris, Ioannou et al. 2005)
	Product/service quality as measured by standards	Objective Number	(Morgan 2005; Papalexandris, Ioannou et al. 2005)
	Product/service revenue	Objective Financial	(Morgan 2005)
	Product/service profit margin/net profits	Objective Financial	(Morgan 2005)



Evaluation sub-target	Metrics	Type	Sources
<b>Project</b>	Accordance to budget	Objective Number	(Rosser 2006)
<b>R&amp;D</b>	Product/service development duration	Objective Time	(Rosser 2006)
	Cost to develop new product/service	Objective Financial	
<b>Alignment to business strategy in general</b>	Stakeholder opinion on EA's value to alignment with business strategy	Subjective e.g. Likert-Scale	

### Improved alignment with partners

Evaluation sub-target	Metrics	Type	Sources
<b>Value Chain</b>	Throughput time	Objective Time	
	Costs	Objective Financial	
<b>Alignment with partners in general</b>	Stakeholder opinion on - EA's value to alignment with partners - The organization as a partner	Subjective e.g. Likert-Scale	

### Improved asset management

Evaluation sub-target	Metrics	Type	Sources
<b>Inventory</b>	Inventory level	Objective Number	(Morgan 2005; Papalexandris, Ioannou et al. 2005)
	Cost	Objective Financial	(Morgan 2005; Papalexandris, Ioannou et al. 2005)
	Cycle time	Objective Financial	(Morgan 2005; Papalexandris, Ioannou et al. 2005)
<b>IT Assets</b>	- IT costs - Maintenance Costs - Operation Costs	Objective Financial	(SETLabs 2004; Rosser 2006)
	- Number of assets - systems - software products - licenses - servers, etc.	Objective Number	(Rosser 2006)
	Number of overlapping and redundant assets	Objective Number	
<b>Asset management in general</b>	Stakeholder opinion on EA's value to asset management	Subjective e.g. Likert-Scale	



## Improved business processes

Evaluation sub-target	Metrics	Type	Sources
<b>Organization</b>	New capabilities, features and services implemented	Objective Number	(Rosser 2006)
<b>Process</b>	Cycle time	Objective Time	
	Costs	Objective Financial	
<b>Processes in general</b>	Stakeholder opinion on EA's value to improving business processes	Subjective e.g. Likert-Scale	

## Improved change management

Evaluation sub-target	Metrics	Type	Sources
<b>Project</b>	Successful change projects (if criteria exists)	Objective Number	(Rosser 2006)
	Change project accordance to budget	Objective Number	(Rosser 2006)
	Change project accordance to schedule	Objective Number	(Rosser 2006)
	Change project accordance to planned output	Objective/ Subjective Number	(Rosser 2006)
	Stakeholder opinion on EA's value to change management in projects	Subjective e.g. Likert-Scale	
<b>Change management in general</b>	Stakeholder opinion on EA's value to change management	Subjective e.g. Likert-Scale	

## Improved innovation

Evaluation sub-target	Metrics	Type	Sources
<b>Customer</b>	Customer satisfaction	Subjective Number	
<b>IT Assets</b>	System/Software implementation duration	Objective Time	
<b>Organization</b>	New capabilities, features and services implemented	Objective Number	(Rosser 2006)
<b>Product/Service</b>	Product/service quality as measured by customers	Subjective e.g. Likert-Scale	(Morgan 2005; Papalexandris, Ioannou et al. 2005)
	Product/service quality as measured by standards	Objective Number	(Morgan 2005; Papalexandris, Ioannou et al. 2005)



Evaluation sub-target	Metrics	Type	Sources
<b>Product/Service base</b>	- Size - Increase - Decrease	Objective Number	
<b>R&amp;D</b>	Product/service development duration	Objective Time	(Rosser 2006)
	Cost to develop new product/service	Objective Financial	(Rosser 2006)
	Number of new products	Objective Number	(Papalexandris, Ioannou et al. 2005)
	Number of patents	Objective Number	(Papalexandris, Ioannou et al. 2005)
	R&D costs	Objective Financial	(Papalexandris, Ioannou et al. 2005)
<b>Innovation in general</b>	Stakeholder opinion on EA's value to innovation	Subjective e.g. Likert-Scale	

### Improved management of IT investments

Evaluation sub-target	Metrics	Type	Sources
<b>Investment process</b>	Costs	Objective Financial	(Morgan 2005)
	Time	Objective Time	
<b>IT investment management in general</b>	Stakeholder opinion on EA's value to management of IT investments	Subjective e.g. Likert-Scale	

### Improved risk management

Evaluation sub-target	Metrics	Type	Sources
<b>Risk management in general</b>	Stakeholder opinion on EA's value to risk management	Subjective e.g. Likert-Scale	

### Improved staff management

Evaluation sub-target	Metrics	Type	Sources
<b>Employee base</b>	- Number of employees - Acquisition - Turnover	Objective Number	(Papalexandris, Ioannou et al. 2005)
	- Skill pool - Skill variance - Skill overlap	Subjective/ Objective Number	
	Employee costs	Objective Financial	



Evaluation sub-target	Metrics	Type	Sources
	Training/education costs	Objective Financial	(Papalexandris, Ioannou et al. 2005)
	Training/education time	Objective Time	(Papalexandris, Ioannou et al. 2005)
	Safety & Health - number of days absent - number of work injuries - health costs - insurance costs	Objective Number/Financial	(Papalexandris, Ioannou et al. 2005)
	Employee opinion on staff management - work satisfaction - salary - training - career possibilities - safety&health - etc.	Subjective e.g. Likert-Scale	
<b>Staff management in general</b>	Stakeholder opinion on EA's value to staff management	Subjective e.g. Likert-Scale	

### Increased market value

Evaluation sub-target	Metrics	Type	Sources
<b>Finances</b>	Market value	Objective Financial	

### Increased quality

Evaluation sub-target	Metrics	Type	Sources
<b>Documentation</b>	Documentation quality as measured by standards	Objective/Subjective Number	
	Documentation quality as measured by stakeholders	Subjective Number	
<b>Decisions</b>	Documentation and analysis of past decisions after an interval -> quality of decisions	Subjective Number	
<b>Process</b>	Number of disruptions, failures and delays	Objective Number	(Rosser 2006)
<b>Product/Service</b>	Product quality as measured by customers	Subjective Number	(Morgan 2005; Papalexandris, Ioannou et al. 2005)
	Product quality as measured by standards	Objective Number	(Morgan 2005; Papalexandris, Ioannou et al. 2005)
<b>Project</b>	Successful projects (if criteria exists)	Objective Number	(Rosser 2006)
	Project accordance to budget	Objective Number	(Rosser 2006)



Evaluation sub-target	Metrics	Type	Sources
	Project accordance to schedule	Objective Number	(Rosser 2006)
	Project accordance to planned output	Objective/Subjective Number	(Rosser 2006)
<b>IT assets</b>	- Downtime - Availability	Objective Time	(Rosser 2006)
	Performance	Objective Number	
<b>Quality in general</b>	Stakeholder opinion on EA's value to different aspects of quality	Subjective e.g. Likert-Scale	

### Increased stability

Evaluation sub-target	Metrics	Type	Sources
<b>Organization</b>	Response time to an business demand	Objective Time	(Rosser 2006)
	Market share	Objective Number	
	General financial metrics (e.g. profitability)	Objective Financial	
	Short-lived products/services	Objective Number	(Rosser 2006)
<b>Project</b>	- Planned change projects in the organization initiated by business demands - Unplanned urgent change projects in the organization initiated by business demands	Objective Number	(Rosser 2006)
<b>Stability in general</b>	Stakeholder opinion on EA's value to stability	Subjective e.g. Likert-Scale	

### Reduced complexity

Evaluation sub-target	Metrics	Type	Sources
<b>Decisions</b>	Time required to make a decision	Objective/Subjective Time	(Morgan 2005)
	Documentation and analysis of past decisions after an interval -> quality of decisions	Subjective Number	
<b>Documentation</b>	Costs avoided through elimination of redundant/duplicative/overlapping documentation	Objective Financial	(GAO 2003; SETLabs 2004)
	Number of documents/models/descriptions	Objective Number	
<b>IT Assets</b>	- Number of assets - systems - software products - licenses - servers, etc.	Objective Number	(Rosser 2006)



Evaluation sub-target	Metrics	Type	Sources
	- Number of redundant/duplicative/overlapping assets - Number of interfaces	Objective Number	(SETLabs 2004)
	- IT costs - Maintenance Costs - Operation Costs	Objective Financial	(SETLabs 2004; Rosser 2006)
	Costs avoided through elimination of redundant/duplicative/overlapping assets	Objective Financial	(GAO 2003; SETLabs 2004)
<b>Organization</b>	Number of redundant/duplicative/overlapping - functions - departments - groups/teams - positions	Objective Number	
	Costs avoided through elimination of redundant/duplicative/overlapping functions/departments/groups/teams/positions	Objective Financial	(GAO 2003)
<b>Process</b>	Number of processes	Objective Number	
	Number of redundant/duplicative/overlapping processes	Objective Number	(SETLabs 2004)
	Costs avoided through elimination of redundant/duplicative/overlapping processes	Objective Financial	(GAO 2003; SETLabs 2004)
<b>Project</b>	Successful projects (if criteria exists)	Objective Number	(Rosser 2006)
	Project accordance to budget	Objective Number	(Rosser 2006)
	Project accordance to schedule	Objective Number	(Rosser 2006)
	Project accordance to planned output	Objective/ Subjective Number	(Rosser 2006)
	Number of projects	Objective Number	
	Number of redundant/duplicative/overlapping projects	Objective Number	(SETLabs 2004)
	Costs avoided through elimination of redundant/duplicative/overlapping projects	Objective Financial	(GAO 2003; SETLabs 2004)
<b>Complexity in general</b>	Stakeholder opinion on EA's value to reducing complexity of - processes - projects - documentation - models - methods - tools	Subjective e.g. Likert-Scale	

## Reduced costs

Evaluation sub-target	Metrics	Type	Sources
<b>Finances</b>	- Costs of transactions - Overhead costs - Infrastructure costs	Objective Financial	(Morgan 2005)





Evaluation sub-target	Metrics	Type	Sources
<b>Process</b>	Costs	Objective Financial	
<b>Inventory</b>	Cost	Objective Financial	(Morgan 2005; Papalexandris, Ioannou et al. 2005)
<b>*Investment process</b>	Costs	Objective Financial	(Morgan 2005)
<b>IT Assets</b>	- IT costs - Maintenance Costs - Operation Costs	Objective Financial	(SETLabs 2004; Rosser 2006)
<b>Project</b>	Accordance to budget	Objective Number	(Rosser 2006)
	Costs	Objective Financial	(Rosser 2006)
<b>Cost reduction in general</b>	Stakeholder opinion on EA's value to reducing various costs	Subjective e.g. Likert- Scale	

### Shortened cycle times

Evaluation sub-target	Metrics	Type	Sources
<b>Finances</b>	Cash flow metrics - average days for collection - age of account receivable - cash-to-cash cycle time	Objective Time	(Morgan 2005)
<b>Inventory</b>	Cycle time	Objective Financial	(Morgan 2005; Papalexandris, Ioannou et al. 2005)
<b>IT Assets</b>	System/Software implementation duration	Objective Time	
<b>Process</b>	Cycle time	Objective Time	
<b>*Delivery</b>	Time from order to delivery	Objective Time	(Drury 1992; Morgan 2005)
<b>*Production</b>	Production time	Objective Time	(Morgan 2005; Papalexandris, Ioannou et al. 2005)
<b>*R&amp;D</b>	Product/Service development duration	Objective Time	(Rosser 2006)
<b>Project</b>	Accordance to schedule	Objective Number	
<b>Cycle time reduction in general</b>	Stakeholder opinion on EA's value to reducing various cycle times	Subjective e.g. Likert- Scale	

