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AISA Project

In this section, the following topics are covered:

- Project Themes and Objectives
- Research Approaches and Methods
- Organization

Project Themes and Objectives

In this project conducted by the Information Technology Research Institute (ITRI), we focused on studying the quality management and evaluation aspects of both **enterprise architecture (EA)** and **software architecture (SA)**. Architectures are built to depict the structure of an enterprise and its components, such as processes, information systems (IS), information and IT platforms. They enable enterprises to understand and improve their complex structures, and thus more quickly and efficiently develop information systems that truly support the business, and react to changes in the business environment. EA and SA share the same fundamental idea but differ in scope.

To put it briefly, EA is a holistic approach for managing and developing whole enterprises and typically describes the following four interdependent architectural dimensions:

- business architecture,
- information architecture,
- application architecture, and
- technology architecture.

SA, on the other hand, depicts information from all of the dimensions of EA in more details from the viewpoint of information systems. Thus, it has significantly narrower scope than EA. SA is a tool for planning, developing and managing software-intensive systems. It describes the components of a system, their interrelationships, external connections, and essential principles of development. Typically, SA includes the following viewpoints:

- functional
- information
- development / external
- deployment
- operational.

More precise definitions of EA and SA can be found in the section of Enterprise and Software Architecture Work.

The AISA project focused on **two main research questions**:

- What are the characteristics of architecture planning and development **processes** of high quality and maturity?
- What are the characteristics of enterprise and software **architectures** of high

quality and maturity?

To tackle these questions, research and development in the AISA project was divided into several themes. Research was conducted during three years (2005-2008). In the following, the areas studied in each year are presented.

During the first year of the project the focus was on

- architecture success from the viewpoint of architecture maturity and quality,
- architecture quality management processes, and
- architecture work status and development needs in ICT-provider and user organizations.

During the second year of the project we studied

- architecture quality evaluation criteria and metrics, and
- architecture quality management/evaluation methods and practices.

The last project year dealt with

- architectural decision-making and
- architectural risks.

The **primary outcomes** of the project consist of (see Results section for more details)

- success factors for EA and SA
- quality management activities for EA and SA
- current status of architecture work in companies
- stakeholders and benefits of EA
- role of architecture evaluations in organizations
- EA evaluation planning components
- current state of EA evaluation methods and practices
- metrics for evaluating architectures and architecture processes, especially

  - architecture documentation,
  - communication and commitment, and
  - architecture benefits

- aspects of compliance and business-IT alignment in the EA context
- architecture related decision-making and risk management.

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Research Approaches and Methods

The project utilized the **design science paradigm** (see e.g. Hevner et al. 2004). According to this paradigm, information from both literature and the real world is combined by researchers to build theories and artifacts which are then evaluated. Design science research contributes to both research and practice via additions to the scientific knowledge base and practical applications. For such a novel topics as EA and SA, this paradigm was considered feasible since only few established theories and models exist, and a great amount of the knowledge is situated in the practical domain.

Following the design science paradigm, both empirical and theoretical data was utilized in the project. The most used means of data collection were literature review and focus group interview. Literature reviews were carried out systematically. In a typical literature review in the project, a keyword search was first carried out in four high-quality academic databases (Academic Search Elite, Electronic Journals Service, Science Direct and Web of Science) and Google Scholar using typical keywords related to the research topic in question. A preliminary set of potentially relevant literature was identified by this search. Subsequently, the found literature was charted for references, and forward and backward search (see e.g. Levy and Ellis 2006) utilized to obtain deeper and wider literature background.

Focus group interviews (see e.g. Krueger and Casey 2000) in the project were typically carried out after literature reviews to

- to validate the literature review results, and
- to collect additional, experience-based information.

Generally two persons from each of the participating companies were invited to the interview. The company representatives were allowed to invite the most suitable interviewees for each of the interview topics as they had the best knowledge about the fields of know-how of their personnel. Group interview was considered a feasible method of data collection, because group influence was thought to stimulate the discussion and thus bring out as much information as possible related to the novel topics covered in the project. However, confidential information may have remained undisclosed for the same reason.

The focus group interviews were moderated by one researcher, while the other one or two took notes. In addition to the notes taken, the interviews were audio-recorded. The duration of a focus group interview on one research topic in the project was from two to three hours. Each interview was succeeded by an analysis and consolidation phase, were the results from the literature review and the focus group interview were combined and examined against each other.

In the company-specific research on the status of architecture work in companies, semi-structured interviews were carried out to collect company-specific data. In these interviews, a guiding interview framework constructed according to literature was utilized to structure and analyze the results. From one to three architecture experts were interviewed in each company.

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Organization

Project conducted by:	Information Technology Research Institute (ITRI), University of Jyväskylä
Duration:	1.2.2005 - 31.3.2008
Funding:	- The Finnish Funding Agency for Technology and Innovation (Tekes) - The participating companies
Project Board:	- Markku Sakkinen (University of Jyväskylä), Scientific Director (1.2.2005 - 31.8.2006) - Kari Kärkkäinen (ITRI, Scientific Director (1.9.2006 -

	1.4.2007) ● Hannakaisa Isomäki (ITRI), Scientific Director (1.4.2007 - 31.3.2008) ● Niina Hämäläinen (ITRI), Project Manager (1.2.2005 - 31.12.2007) ● Eetu Niemi (ITRI), Project Manager (1.1. - 31.3.2008) ● Jaakko Viitanen (A-Ware) ● Ari Andersin (Elisa) ● Petri Ahveninen (IBM) ● Stina Carlsson (IBM) ● Jouko Poutanen (IBM) ● Markku Korhonen (OPK) ● Tapani Vertanen (SOK) ● Sakari Olli (Tieturi) ● Jari Kovanen (Tekes) ● Timo Taskinen (Tekes)
Project team:	The following researchers have participated in the project: ● Martin Hoffman (1.1. - 31.6.2007) ● Niina Hämäläinen (1.2.2005 - 10.2.2008, Project Manager 1.2.2005 - 31.12.2007) ● Denis Kozlov (1.5. - 30.6.2006) ● Eetu Niemi (1.2.2006 - 31.3.2008, Project Manager 1.1. - 31.3.2008) ● Tanja Ylimäki (1.2.2005 - 11.3.2008)
Participating companies:	● A-Ware Oy - www.aware.fi ● Elisa Oyj - www.elisa.fi ● IBM Finland - www.ibm.com/fi ● Osuuspankkikeskus, OPK (OP Bank Group Central Cooperative) - www.op.fi ● SOK (S Group) - www.sok.fi ● Tieturi - www.tieturi.fi

Results - papers, reports, and presentations - can be found in the Results section, and the Lessons Learned section covers the discussion of the project outcome.

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