

Service-Oriented Architecture in Higher Education

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INTRODUCTION

Service orientation has become an accepted concept in how information systems should be exposed and coordinated in higher education. It is important that the learning environments of students and the working conditions of teachers can be planned to provide them appropriate and flexible information systems, data networks, and databases. Appropriate information and communication technology (ICT) tools enable efficient cooperation in networks in a way that they can promote the high quality learning.

The service-oriented architecture (SOA) is the planning method of information systems that uses loosely coupled services to support the requirements of business processes and users. Resources on a network in an SOA environment are made available as independent services that can be accessed without knowledge of their underlying platform implementation (Wikipedia, 2007). The approach is cost-efficient and flexible because it consists of various replaceable applications.

The purpose of this article is to present the framework of the SOA to analyse the service structure in the networked and virtual working environments in higher education. The approach developed in this article is planned to be generic so that it can be applied to various kinds of organisations and networks for the analysis and management of services. This approach helps an organisation to reengineer the architecture of ICT environments. The architecture is useful for the planning of networked learning community. This article is intended for managers and other experts who may wish to familiarise with the benefits and opportunities provided by the SOA.

The empirical context of this article is the Turku University of Applied Sciences (TUAS) and other Finnish profession-oriented higher education institutions. The TUAS is a multidisciplinary higher education institu-

tion founded in 1992. The institution has 9,500 degree students and 800 full-time employees. The TUAS has six faculties and a Continuing Education Centre. ICT is an important field of education and it is mixed with the business, biotechnology, mechanical engineering, health care, performing arts, communication, and many other subjects. The cooperation between the 28 Finnish universities of applied sciences is active.

This article is organised as follows: First the background section introduces the concepts and characteristics of the SOA. The main attention of the article is focused on the information system project of the Finnish universities of applied sciences. Thereafter, some future trends are presented, and the results of the article are summarized in the concluding section.

BACKGROUND

Service orientation

The rise of ICTs shifts people out of manufacturing into knowledge-intensive service industries. The knowledge-intensive service sector has grown to dominate economic activity in most advanced industrial economies (Chesbrough & Spohrer, 2006; Wood, 2002). ICTs are translated to support the many dimensions of internal processes of services and manufacturing. The efforts to offer services have focused on the creation of infrastructure necessary to describe, discover, and access services using the Web (Papazoglou & Georgakopoulos, 2003).

The SOA is a topical issue in ICT, because it has potential to develop Web services (Agrawal, Bayardo, Gruhl & Papadimitriou, 2002; Crawford, Bate, Cherbakov, Holley, & Isocanos, 2005; Huang, 2003). The SOA is a collection of services that communicate with each other. The services are self-contained and do not

depend on the context or state of other services. They work within the architecture of distributed systems. The solutions can be broken into a number of discrete services and then organised into an end-to-end solution. This sounds very similar to the component-based architectures of the late 1990s. The main difference is that the SOA takes a more coarse-grained view of functionality.

Figure 1 describes the main elements of the service orientation in the modern business architecture. In most of the cases, the narrow scope for the applications architecture itself is not sufficient. In the service-oriented approach, the service-oriented organisation (managerial dimension) and the service-oriented network (support processes and cooperative partners) are connected with the service-oriented applications architecture (distributed and communicative systems).

In the 1980s the activity-based models of business broke operations into a number of discrete activities based on the idea of a value chain. Information technologies have leveraged this work to simplify the creation of SOAs with the added feature that the resulting architecture will be meaningful to the business. This can be seen as an attempt to align the strategic plans and internal processes with information technology (IT). Typically, processes drive the Web services and services drive the technology.

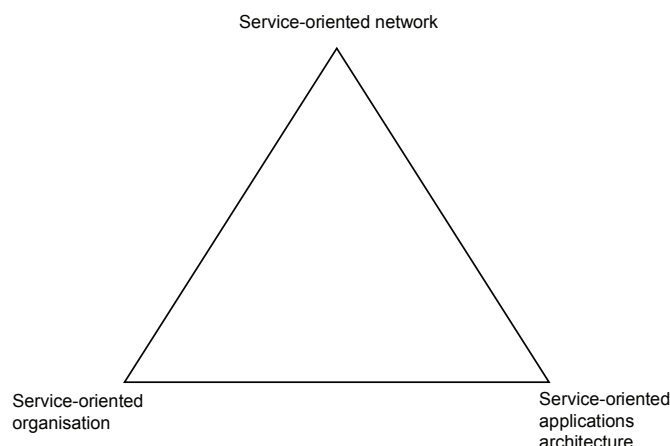
The service orientation can be seen as a means to integrate diverse systems. Each IT resource, whether an application, a system, or partner, can be accessed as

a service that is available through an interface. Service orientation uses standard protocols and conventional interfaces to facilitate access to business logic and information among diverse services. The SOA allows the underlying service capabilities to be composed into processes. Each process is itself a service, one that now offers up a new and aggregated capability (Microsoft, 2007). The SOA reflects the needs of the working environments and services provided for the customers and other stakeholders.

The information systems have typically been planned for the organisation, but they have also been designed for the networked and virtual environments (Bouras, Philopoulos, & Tsiatsos, 2001; Joslin, Pandzic, & Thalmann, 2003; Redfern & Naughton, 2002). The mobile work, including ICT tools, data networks, and increasing amount of cooperation in diverse locations, increases the complexity factors of working environments. Additionally, the common SOA covers both the dimensions of networked and virtual services. In the basic model there are three kinds of organisations including the traditional working organisation, network, and virtual network. The networking and mobility may take place within the organisation or in other places and organisations. The concept of the virtual network overlaps the traditional organised and networked work.

The networked and virtual work can be analysed using the various dimensions that come across the organisation and networked and virtual environments. There

Figure 1. Main elements of the service orientation in the modern business architecture



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