



Service Engineering for the Future Internet: The S-Cube Research Vision

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Research Framework

S-Cube's research goals are to:

- Define a broad future research vision and perspective for services and service-based systems.
- Address the broad research and technology requirements and the barriers that cut across the multiple scientific disciplines involved.
- Create a unified, international, multidisciplinary and vibrant research community in the field of service-oriented computing.
- Help shape the software-service-based Future Internet.

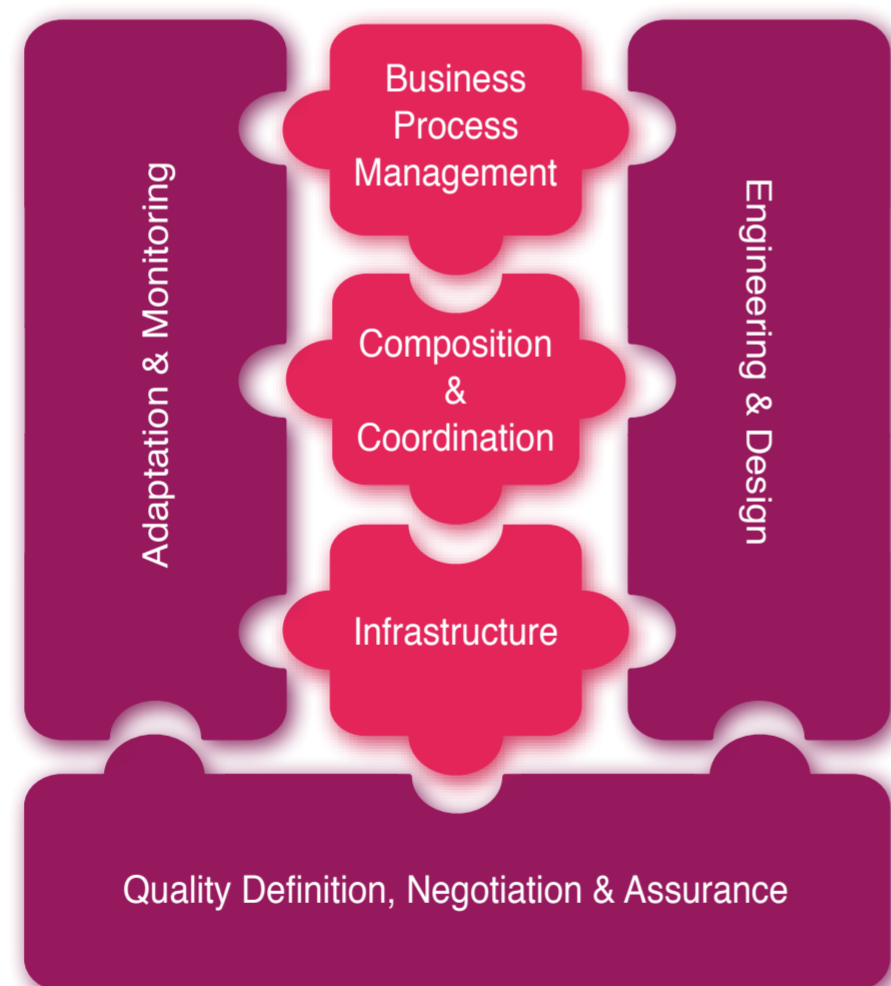
Research is organised around 6 interconnected fields in two areas:

Service Principles, Techniques and Methods

- Adaptation & Monitoring** supports the observation, prediction and management of the activities of a distributed system and performing control actions to adapt the entire services technology stack.
- Engineering & Design** provides the principles, techniques and methods that exploit mechanisms provided by the technology stack with the aim of developing consistent service-based applications
- Quality Definition, Negotiation & Assurance** techniques allow the non-functional properties of a service to be described, agreed and guaranteed between service providers and consumers

Service Technologies

- Business Process Management** gives mechanisms for expressing, understanding, representing and managing enterprises organised in large, dispersed networks of collaborating and transacting value-add services
- Composition & Coordination** encompasses the functions required for the aggregation of multiple services into a single offering by specifying workflow models and using a workflow engine for runtime control
- Infrastructure** provides the basic physical and organisational structures and facilities for service-based computing such as the description, publishing, finding and binding of services



Research Integration

The subject of service-based systems is vast, complicated and spans many research areas, such as: **Grid, BPM, Software Engineering and HCI**. S-Cube aims to build a cohesive research group from European Institutions specialising in these areas. Continual integration of research results produced by the 6 research activities shown above is necessary to avoid fragmentation and non-aligned results. In addition, integration of results in S-Cube is fostered by:

Education Integration Activities

- SSAI&E 2009 Summer School
- Joint Masters Program
- Virtual Campus

Industrial Integration Activities

- Dedicated Workpackage to align research with industrial practices
- Industrial Advisory Board
- Strong links with NESSI

Research Community Activities

- Researcher Mobility Program
- Associate Member Program
- Community Outreach Strategy

Challenges

Research challenges S-Cube will address include:

1. Concepts, Languages & Mechanisms for Agile Service Networks

Concepts, mechanisms and languages to describe, model, simulate and analyse end-to-end business processes carried out in Agile Service Networks (ASNs) will be produced by S-Cube to provide a common, service-focussed toolbox for future work.

2. Dynamic Service Infrastructures

When making changes to service-based systems, reductions in the cost of change and an improvement in reliability are desired. S-Cube will introduce new methods and techniques to support the automated, dynamic system adaptation via self-configuring architectural service models linked to the monitoring of Key Performance Indicators (KPIs) for the system in order to help reduce costs and increase reliability.

3. Cross-Layer, Pro-Active Monitoring & Adaptation

Existing adaptation and monitoring approaches are not adequate for the purposes of future service-based systems since they address particular application domains and/or systems and are isolated from adaptation requirements. Further, current service-based system (SBS) life-cycle models are mainly concerned with the phases preceding the release of a new version of the SBS. S-Cube will research the possibility of dynamic, proactive adaptation of the deployed SBS to new contexts and requirements.

4. End-to-End Quality Provision

Each technology layer in the S-Cube framework (BPM, Service Composition and Infrastructure) provides a certain level of quality to adjacent layers. End-to-end quality is the aggregation of quality levels across those technology layers. S-Cube will define a quality reference model and devise novel techniques to model, negotiate and assure end-to-end quality using software engineering and service-oriented computing knowledge which includes the prediction of quality attributes during runtime.

5. Business Processes and Service Compositions from fragments

Faster and cheaper construction of business processes and service compositions can be achieved using process fragments. This approach introduces a number of problems, such as the the separation and identification of the re-usable fragments. This research theme will investigate these problems, including mechanisms for fragmentation.

6. Human-Service Interaction

Work in service-oriented computing often does not pay much importance to the role of the human in the system development and operation phases. S-Cube aims to research the intersection between service-based systems and Human Computer Interaction (HCI) and to define and co-ordinate HCI knowledge for SBS development and use.

At a Glance

S-Cube is the Software Services and Systems **Network of Excellence** establishing an integrated, multidisciplinary, vibrant research community to enable Europe to lead the software-services revolution, helping shape the software-service based Internet

Project Type: FP7 Network of Excellence
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Visit the S-Cube **Knowledge Model**, a public repository of service-specific knowledge, at <http://s-cube-network.eu/km>



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