Summary

**Guiding Service-Oriented Software Engineering**  
- A View-based Approach

Recently, the trend in software development has shifted from developing software systems to developing service-oriented systems that are composed of ready-to-use services. The Service-Oriented Architecture (SOA) architectural style has been widely adopted in industry thanks to its ability of providing seamless integration among software services. If the services are well-specified, loosely-coupled and coherent, implementing a SOA can bring many benefits to an enterprise, including: increased ROI, reduced IT costs, and increased organizational agility.

Since developing Service-based Applications (SBAs) requires identifying, discovering and composing services in addition to traditional software engineering (TSE) activities (such as coding, testing and deployment), existing software development methodologies no longer fulfill the needs for developing service-based applications (SBAs). Systematic, disciplined and quantifiable approaches for engineering service-oriented software systems (SOSE) are needed.

In SOSE, principles known from TSE need to be tailored to service-oriented development. In particular, engineering SBAs requires a different mindset than TSE. Design decisions are often postponed to runtime with the aim to accommodate ever-changing requirements. Many responsibilities (e.g., maintenance) of service consumers are shifted to service providers since services are physically located at the service provider’s side. In contrast, service consumers acquire additional responsibilities such as service discovery, composition and monitoring; the relationship between business and IT becomes closer since SOA is often business-driven and deals with enterprise level implementation.

This thesis is about a view-based approach for supporting service engineers and architects in managing the service development process and service-oriented architectural knowledge. The support provided is specific to SOSE in the sense that it focuses on issues that are less relevant in TSE but of great importance in SOSE. To provide such support, this thesis investigates the novelty of SOSE by identifying its differences with TSE and identifying a set of service aspects that are specific to SOSE. By visualizing the information that is of specific importance to SOSE by means of models or tables, a set of views is created that can be particularly helpful for service engineers and architects.

From the perspective of a typical service-oriented development process, the following views are provided:

- a view of a service life cycle model guiding the modeling of SOSE process, highlighting three service aspects: increased importance of the identification of stakeholders, the relevance of cross-organizational collaboration, and the need for increased effort at run-/change time;
- a view of a taxonomy of SOSE stakeholders to show which stakeholders may be involved in which phases of the development process of SBAs;
- a view of an evaluation framework guiding the selection of SOSE methodologies, mainly based on their support of service-orientation;
• an input-output matrix guiding the selection of service identification methods based on available resources of enterprises and their target services.

From the perspective of service-oriented architectural knowledge, the following views are provided:
• a view (template) used for documenting architectural design decisions, which supports structured reasoning, improves traceability, and facilitates focus on service-oriented design;
• a view specifically used for documenting SOA design decisions with the support of modeling additional knowledge entities needed specifically in SOA design; this view addresses four service aspects: different architecture types, temporary provision-consumption relationship, dealing with heterogeneity, and different perspectives of stakeholders;
• a view used for documenting SOA process decisions addressing two service aspects: temporary provision-consumption relationship and the relevance of cross-organizational collaboration;
• a set of views addressing the concerns about service automation, assisting the reasoning about architecture-level decisions, options, or risks, and communication among stakeholders as long as human intervention on the execution of services is concerned.

Put together, the views proposed can be used as a `tool' to guide the mindset of service engineers and architects by focusing on the issues that are less relevant in TSE but especially relevant to SOSE.