

A Capability Oriented Management Approach for Business Integration

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Abstract: Service oriented architecture (SOA) has emerged as a popular software paradigm for integrating distributed applications. Services are generally regarded as interoperable building blocks for constructing, integrating, and merging applications. However, existing SOA based solutions often focus on solving technical integration problems while neglecting business-level capabilities which are most important for organizations. In this paper, we introduce the notion of capabilities as an important concept for business management. We identify major shortcomings of the existing service based solutions and outline a novel approach for capability oriented configuration and management that can react to the dynamically changing nature of business integration environments.

1 Introduction

Service-oriented systems aim at dealing with interconnecting mostly independent activities and workflows of different parties to achieve a task. Services, software architectures, infrastructures and engineering methodologies are broadly employed in industry in various domains to deal with such interconnection problems. Despite a large amount of work [PH06, ACHM03, W3C07, IBM07] carried out on service oriented computing recently, these work mainly focus on the low level integration of business processes. However, from business perspectives, those technical aspects are not sufficient enough to justify the decision of investing in service oriented computing. Instead, it is more important to focus on activities required to maintain the capabilities and hence sustain the goals of business. In this paper we argue that this business capability orientation is the missing piece of the current service based solutions. We also outline a new approach which relates capabilities to service-oriented constructs to address this limitation.

Based on industrial scenarios (e.g. food supply chain management) we derived in summary two challenges service-oriented systems have to face:

1. Necessity to deal with an increasing amount and complexity of information and workflows (interacting and interfering processes and process chains): The information complexity is increasing in parallel to the considered information amount (both data and workflows), whereas the considered information is increasing according to regulatory and market demands.
2. Necessity to react fast to frequent changes in a highly dynamic environment: The market and the natural and legal environment is frequently and fast changing which has to be considered in the supply chain management again due to legal and market demands.

Trying to deal with these two challenges current service-oriented solutions reveal three major deficiencies:

1. Insufficient business and management level support on top of service-oriented systems and an insufficient systematic vertical interconnection (mapping)
2. Insufficient systematic mapping (vertical interconnection) from the management level to technical service solutions
3. Insufficient support of complex and dynamic environments and their horizontal interconnections

2 Capability-oriented Approach to Answer the Challenges

The enormous efforts involved to overcome the above mentioned deficiencies manually call for automation support. In order to meet the challenges an approach is needed that

- focuses on business capabilities of resources in service-oriented environments and their representation (suitable for a system management on a level where the business decisions are taken)
- provides a capability based management layer on top of current service-oriented solutions
- ensures and atomizes a systematic mapping between the highly dynamic layers as well as the highly dynamic dependencies between the entities within one layer

We propose to deal with the challenges by means of capabilities derived from [FH05, LH04, SH05]. A capability-driven configuration paradigm uses business capabilities and capability maps to manage the other levels even if they reflect dynamic environments in a way that sustainability and reliability is preserved. We propose a novel approach of

a capability-oriented configuration and management of dynamically changing business environments (extending current service-oriented solutions on a management level). To overcome the observed deficiencies in current service-oriented solutions we propose a management level driven infrastructure with a systematic dependency management and a systematic mapping between the model levels and support for dynamic environments. The service-oriented systems are extended with an additional management level by means of a capability concept (cf. figure 1).

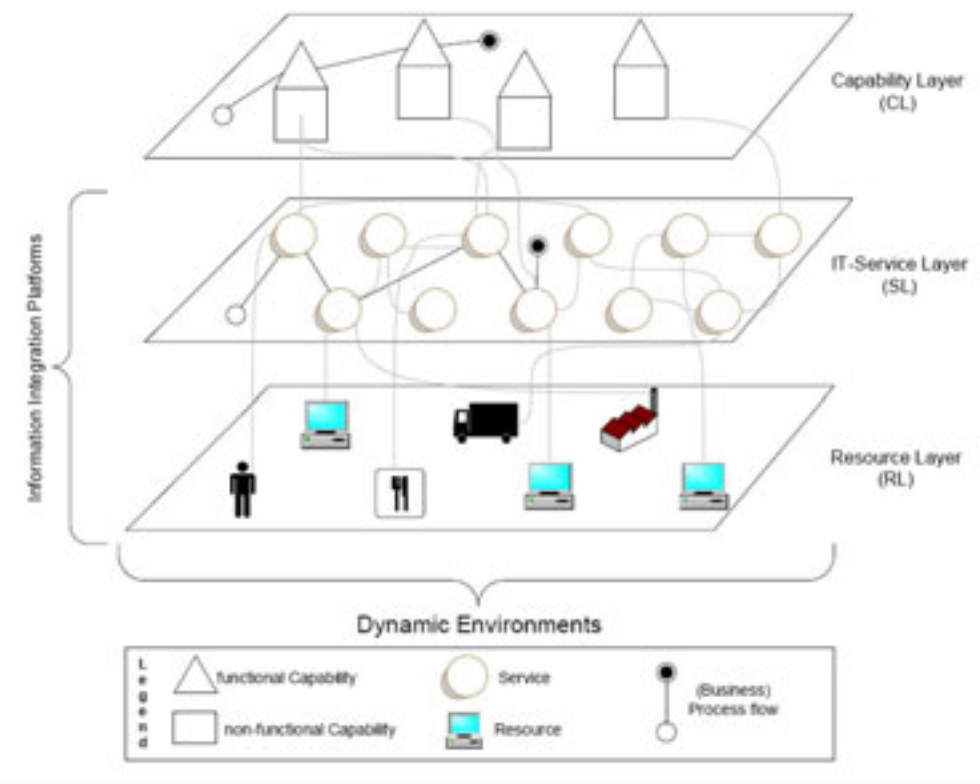


Figure 1: Extending current service-oriented infrastructures by an additional capability layer.

The fundamental idea of the capability-oriented configuration in dynamic environments is to incorporate all resource information that is relevant from a business and technical point of view in configuration decisions. By resources we understand in principle all kinds of objects/entities including for example e-services, goods, production and transportation assets, and even human resources involved in business process execution. Any resource and its relevant (business) attributes are encapsulated in a resource-specific capability. All resources of a dynamic business environment are represented by an associated capability which in turn is an aggregation of the resource’s offered functional and non-functional characteristics. All relevant characteristics have to be well-defined by a seman-

tic resource description and a complex set of attributes and metrics. Attributes and metrics describe a resource's capacity, quality levels, dependencies and synergies with other resources, business-relevant constraints, accessibility, working hours, and so on. The multi-dimensional set of attributes and metrics form a multi-criteria resource evaluation entity which in turn provides a transparent business-oriented resource description and the abstract capability.

3 Summary and Conclusion

We propose a management level extended service infrastructure to approach two core challenges service-oriented solutions have to face today and increasingly in the future - information overflow in service-oriented systems and the issue of adaptability of these systems to volatile environment. The paper outlines the extension of service and software architectures with an additional management level. This business and management level forms an integral part of the service and software architecture. These infrastructural parts are able to play together to overcome the management, mapping and dynamic environment support gaps.

Based on the capability-oriented architecture, future work is needed in the identification, definition, modelling, quantification, verification and management of capabilities.

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