Chapter 2
Beyond Service-Oriented Architectures: Knowledge Services?

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ABSTRACT
Predictions for Service Oriented Architectures (SOA) to deliver transformational results to the role and capabilities of IT for businesses have fallen short. Unforeseen challenges have often emerged in SOA adoption. They fall into two categories: technical issues stemming from service components reuse difficulties and organizational issues stemming from inadequate support or understanding of what is required from the executive management in an organization to facilitate the technical rollout. This paper first explores and analyses the hindrances to the full exploitation of SOA. It then proposes an alternative service delivery approach that is based on even a higher degree of loose coupling than SOA. The approach promotes knowledge services and agent-based support for integration and identification of services. To support the arguments, this chapter sketches as a proof of concept the operationalization of such a service delivery system in disaster management.

INTRODUCTION
Service Oriented Architecture (SOA) promotes loose coupling between components to enable faster and more flexible reconfiguration of business processes and provides a means of organizing system resources in an open and flexible way. It promises to avail systems that can easily adjust to changes in business requirements. From an enterprise management perspective, the successful delivery of such systems

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translates into responsive business processes that can adjust to varying customer service requirements (Demirkan, Kaufman, Vayghan et al., 2008; Erl., 2008). Expected responsiveness and adjustment is based on leveraging the knowledge of relationships between various services and mixing and matching groups of services to satisfy new business requirements. The ability to easily integrate services can increase flexibility and agility not only in systems development but also in business process management. For instance, if an airline company decides to offer a new seating arrangement to create “a kids free zone” in their Airbus 380, the airline should be able to do this without having to worry about the software system that manages their ticketing orders. An SOA enterprise system would ensure that the service, which manages orders of this new type of seating, is easy to introduce. It would be composed of services similar to existing services but replacing one or two small service software components.

Attraction to SOA comes with the expectation that energies from software development and acquisition will be shifted to other core business activities, and at the same time deliver better alignment with business requirements (Demirkan, Kaufman, Vayghan et al., 2008). However, predictions for SOA have fallen short (Gartner, 2008). They did not deliver the anticipated transformational results to the role and capabilities of IT for businesses. Recently too, there has been a rapid expansion of publicly available data, mobile apps, web services, and rapid prototyping tools. This creates the potential for new customized services on demand. In this new context, the paper examines the obstacles encountered and argues for a new generation of service delivery systems which can provide effective use of this dispersed, continually and rapidly growing knowledge, and at the same time resolve the obstacles that hindered the take up of SOA.

The adoption of SOA presents two types of challenges: technical ones stemming from service components’ reuse difficulties and organizational challenges stemming from inadequate support or understanding of what is required from the executive management (in an organization) to facilitate the technical rollout. The hindrances to the full exploitation of SOA were explored in a special issue of IJIIT in 2013 (Beydoun, Xu, & Sugumaran, 2013). This chapter reviews those hindrances with the further emergence of Web 2.0 services and calls for an alternative approach that harnesses domain knowledge and intelligent systems to deliver more effective service delivery systems.

**SOA ADOPTION HINDRANCES**

Service-oriented software engineering, with all its promised improvements to business process enablement, in practice has been hard to realize. The transition from requirements to design and implementation is typically fraught with problems. In a service oriented environment, this is further complicated as business requirements are normally developed independently from the services themselves. Services are typically developed by different groups and/or at different organizations from those doing service composition. It is unrealistic to expect that the business requirement models can predict the exact behavior of services required. Indeed, the first barrier to effective SOA adoption is whether customers of the organization are sufficiently understood by the organization to enable packaging of the services in a reusable form. Assuming that this understanding is in place, adequate communication between service component providers and service component users is a must (Elgahwash & Freeman, 2013). This will lead to the development of more relevant service components and evolving them over time. Innovative software development approaches are required to accommodate this continued relationship between service providers and service consumers. A cultural change is required within an organization to create
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