Smart Service Computing

As a common practice in business enterprise systems, a service provider delegates a human agent to a client site to serve the client. On the other hand, in a computerized business application, enterprise organizations adopt Service-Oriented Architecture (SOA), where an enterprise agent is modeled as a software agent that cannot be transmitted efficiently by service messages. This research enhances data privacy/security, reduces network traffic, and provides new enterprise level features. It introduces two new concepts “task service” and “service representative” in the SOA infrastructure. Task service is a multi-component (model, knowledge, data) web service that can process the client data locally at the client side. Service representative is a generic agent at the client side that will be customized by the knowledge component and will execute the model component on both client and task service data. This approach will enhance the SOA architecture in different ways.

Extending SOA Architecture using Generic Service Representatives
Mehran Najafi and Kamran Sartipi
Journal of Service Oriented Computing and Application (SOCA)

This paper proposes an extension to the traditional architecture of SOA implementations to support generic and lightweight agents that reside at the client site. These agents, that we call “Service Representatives”, can be customized and trained based on the provider generated role description and knowledge to perform their assigned tasks. In addition to providing innovative applications, such a technique allows for more sophisticated features such as maintaining client privacy and separating the functionality of the service and its delegated agent. To indicate the variety of roles that can be done by the service representative, we provide three case studies to show how a local and generic agent can be customized by different providers to personalize financial advice, apply medical guidelines, and verify credit card transactions.

A QoS-Aware Decision Model for Web Service Development: Server-side Data Services or Client-side Task Services
M Najafi and K Sartipi and N Archer
IBM CASCON 2011, Toronto, Canada, pages 271-286

An enterprise system needs to provide different types of web services to model actual services in the corresponding business domain. We have proposed to categorize web services into data and task services. While a data service processes client data at the server site, a task service employs a service representative, as a generic client-site software agent, to process the client data locally at the client site. Task services maintain client privacy by locally processing client sensitive data and reducing the required network bandwidth. However, they limit the computational power of web services to the client platform. This paper proposes a decision model, which uses the analytic hierarchy process method to help service developers decide on the best type of business service for a specific functionality. The decision model includes evaluation functions for relevant quality of service (QoS) parameters. Finally, we use a case study to discuss alternative services and the decision making process.
Virtual Remote Nursing System
M. Najafi, S. Aghtar, K. Sartipi, N. Archer
IEEE International Workshop on Consumer eHealth Platforms, Services and Applications (CeHPSA’11), Las Vegas, USA, pages 13-17

This paper proposes a new framework, namely Virtual Remote Nursing (VRN) that provides a virtual nurse agent installed on the client’s personal computer or smart phone to control the client’s health condition continuously. In this approach, medical practitioners can assign different tasks to a virtual nurse using a generic task definition mechanism, where a task is defined as a combination of medical workflow, operational guidelines, and associated data. A VRN is controlled by the practitioners who decide on the patient’s treatment. Therefore, a VRN acts as a personalized and full-time nurse for its client that performs the practitioner’s tasks on the client’s health information. Such patient information can be obtained from a Personal Health Record (PHR) system such as Google Health or Microsoft Health Vault. We have developed a prototype system that enables traditional client applications and healthcare provider systems to collaborate using a VRN system. Finally, through a case study, we demonstrate how diabetic patients can take advantages of this system.