

Services computing encompasses the science and technologies underlying the design and implementation of business services and solutions based on Service-Oriented Architectures (SOAs) and their XML implementation as Web Services (WS). IBM Research has made significant contributions to the creation of the SOA solution stack, including the definition and implementation of core WS standards, such as Simple Object Access Protocol (SOAP), Web Services Description Language (WSDL), and Business Process Execution Language (BPEL). The concept of services computing is being extended to include service-oriented business consulting, modeling, transformation, execution, monitoring, and management. IBM's research covers design, evolution, and optimization of IT services from multiple perspectives, ranging from complexity, security, resilience, tools, and applications, to social, economic, and political constraints. The overarching vision is to enable businesses with reconfigurable IT infrastructures to address current challenges, while remaining flexible and adaptable to changing markets and technology requirements.

SERVICES TECHNOLOGIES

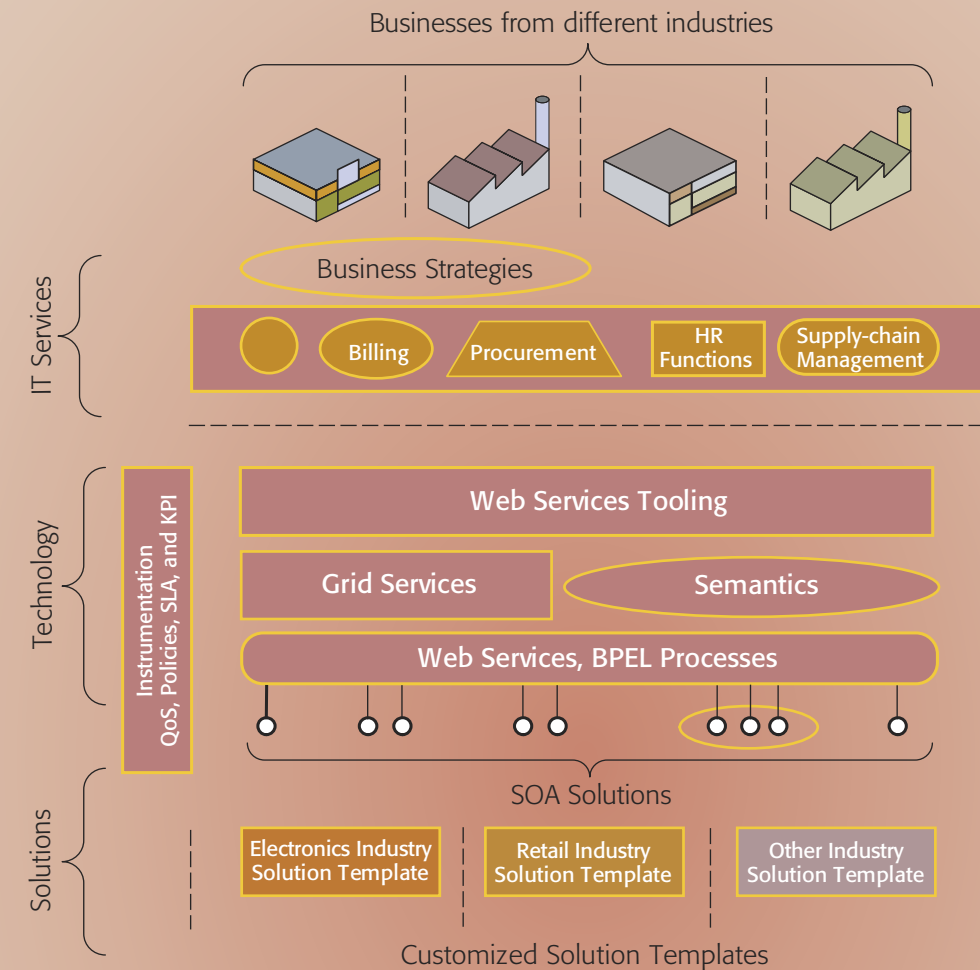
IBM Research's continuing focus on WS technologies involves actively contributing to the follow-up versions to the core WS protocol stack: participating in WS standard proposals to address security, collaboration, Service Level Agreements (SLAs), management, transactions, and so on; creating early standards implementations and making them available to the community; and participating in the semantic Web services efforts to facilitate automatic integration and discovery of services. Another major research focus is directed at combining WS and grid technology to enable the virtualization of IT platforms as well as the easy integration and management of various resources as Web services for strategic outsourcing and effective business services delivery. Additionally, WS performance and security is being addressed by developing advanced parsing technology to enhance XML processing performance and by applying model-driven development concepts to WS-security.

SERVICES SOLUTIONS

To realize the value of services technologies, IBM Research has created a platform for rapid prototyping and incremental implementation of business transformation solutions based on a SOA solution stack. This stack provides roadmaps and guidelines for architectural, design, and implementation decisions; additionally, it provides patterns and insights for integrating these aspects. Reusable assets are being created to enable end-to-end SOA-based business solutions that cover enterprise modeling, business process modeling, service modeling, as well as integration and management of business applications. As an example, for the electronics industry, a reconfigurable SOA solution stack has been developed to support multiple scenarios, such as engineering design collaboration, cross-enterprise project management, and collaborative e-sourcing.

SERVICES IN ORGANIZATIONS

In addition to technological constraints, businesses face social, economic, and political constraints that impact the design and evolution of IT services. Innovation in the services domain depends on conducting research in technology, processes, client demand, organization and businesses, as well as people – all these elements are important in the design of new services. An example of research in the technology component focuses on both structured and unstructured information mining to uncover business insights from internal data and knowledge bases, such as intellectual property portfolios. From a business innovation perspective, our researchers work with client executives to understand and improve their business models, and help plan their strategies, using visualization tools developed on open source platforms. A recent example of research in the people element centers on social computing tools to enable service consultants to easily find collaborators based on their expertise.



SERVICES SCIENCES, MANAGEMENT AND ENGINEERING (SSME)

IBM is working with academics, industry leaders, and governments around the world to establish a new academic discipline known as Services Sciences, Management and Engineering (SSME). Seeking to address the need for more systematic approaches to service innovation, SSME also draws heavily on traditional computer science in disciplines ranging from AI and HCI to programming methodologies and theory of computation. Systematic approaches to service innovation are important to governments (GDP growth depends on it), businesses (revenue and

profit growth increasingly depend on it), and academics (both for challenging multidisciplinary research problems relevant to societal and business needs, as well as for preparing students for future careers). SSME deals with the multidisciplinary study of service system design and evolution, in which clients and providers co-produce value via work sharing, risk sharing, information sharing, and decision sharing configurations of people, technology, and organizations. Topics in the design of fault-tolerant, distributed computing systems that can be generalized to reliable socio-technical system design are especially relevant. Business Performance

Transformation Services (BPTS) is an area of special interest, as business strategy often needs to change at faster speeds than underlying legacy technology implementations can today. IBM is collaborating with universities to establish IT and business services-oriented curricula, degree programs, and research agendas, and also augmenting this initiative through such university programs as Ph.D. fellowships and faculty awards. SSME efforts seek to establish the empirical, analytical, engineering, theoretical, and design frameworks that will underlie this emerging academic discipline and related profession.