Standards are essential to the efficient development and adoption of information management technologies—hardware, software, and services. Accordingly, many commercially successful technologies have undergone some process of standardization before achieving mainstream adoption.

Consider the standards that make up the foundation of the World Wide Web, such as HTTP, HTML, and TCP/IP. These standards, and the cost-effective systems and software they allow, enabled the rapid development and success of the Internet, and were remarkably effective in making its technology available to millions of users. Conversely, a lack of standards can significantly impede broad adoption of IT. Before the World Wide Web, the lack of a standard network stack resulted in a highly fragmented market, where interoperability problems meant that many software applications could only be deployed on a specific LAN and that IT organizations were burdened with supporting disparate network infrastructures.

To help address these challenges and increase enterprise value, standards are a prerequisite for the widespread adoption of many technologies. Enterprise service-oriented architecture (SOA) is no exception. Openness—the foundation of enterprise SOA—and a holistic approach to standards are essential to SAP co-innovation with its partners and customers.

Utilizing standards as the foundation of enterprise SOA

Enterprise SOA is the blueprint for the latest generation of SAP software—the business applications and underlying technologies that form a business process platform. Enterprise SOA elevates the design, composition, and deployment of Web services to an enterprise level through the use of enterprise services, standards-based ways of encapsulating enterprise functionality and exposing it as a reusable business service. A combination of granular Web services and business logic, enterprise services form the building blocks needed to automate complex business processes and allow cost-efficient development of composite applications.

Enterprise SOA reverses the concept of integration. Traditionally, organizations purchased large enterprise systems and then spent tremendous amounts of capital on integration. With enterprise SOA, integration starts when it should—at the beginning. Organizations first acquire services—from SAP or SAP partners, for example, or by developing them internally—and then integrate them into composite applications to help address a specific set of challenges.

However, the business process flexibility enabled by these composite applications requires services from diverse sources, which is why standards—technical specifications...
adopted to allow products from different sources to work together—are critical. For organizations using SAP software, standards allow both SAP and non-SAP applications and services to interoperate, meaning they can exchange information as seamlessly as possible without introducing unnecessary costs and risks.

Creating standards for technology, languages, and business semantics

SAP takes a holistic approach to the relationship between standards and the business process platform, which SAP classifies into three layers, as shown in Figure 1: technology standards, languages for defining business semantics, and business semantics standards. Utilizing standards within each layer allows the efficient assembly of interoperable composite applications. (For more information on the common standards that cut across all three of these layers, see the “Building common standards” sidebar in this article.)

Technology standards: Building security, reliability, and scalability

Technology standards provide the foundation for the openness and interoperability of the SAP enterprise SOA, which is designed to provide high levels of process and development flexibility. The technical underpinning of the SAP enterprise SOA is SAP NetWeaver, a comprehensive platform for the provisioning, production, consumption, and management of services and service-enabled business processes. This platform helps ensure that critical processes are secure, reliable, and scalable.

SAP NetWeaver is built on an enterprise SOA that utilizes Web services standards. These standards are important for efficiently deploying enterprise solutions, and are often created within international standards development organizations with business experts, systems architects, and other thought leaders. SAP leads and participates in these organizations and the development of these standards. For example, SAP is part of the World Wide Web Consortium (W3C) advisory board, which defines the technical standards for the World Wide Web, including HTML, XML, and core Web services specifications such as Simple Object Access Protocol (SOAP), Web Services Description Language (WSDL), Web Services Addressing (WS-Addressing), and Web Services Policy (WS-Policy).

SAP also leads multiple SOA standards critical to enterprise SOA at the Organization for the Advancement of Structured Information Standards (OASIS). These standards are reflected in the core Internet connectivity and Web services interoperability capabilities of SAP NetWeaver. This interoperability is also rigorously tested in the Web Services Interoperability Organization (WS-I), chaired by SAP. WS-I promotes consistent and reliable interoperability among Web services across platforms, operating systems, and programming languages. SAP NetWeaver is already compliant with WS-I Basic Profile 1.1 and WS-I Basic Security Profile 1.0.

Enterprise SOA is much more than just a technology platform; however: it integrates SOA with business semantics. Accordingly, the languages in which business semantics for services are defined must also be standardized.

Languages for defining business semantics: Promoting a common vocabulary

For an organization to create composite applications using enterprise services, it needs a technology foundation of relevant Web services standards that help ensure secure, reliable message exchange. But it also requires common languages that can be understood by all parties when designing, provisioning, composing, and consuming enterprise services.

Such languages are used to create formal, standardized definitions of business information, processes, and services. For example, WSDL is a services definition language that provides a technology-independent way to describe Web services. These types of languages provide a bridge that allows technology and business semantics to evolve independently of one another. They also allow the expression of the business contract that defines the obligations of an enterprise services provider. Rigorous contract specification helps ensure the business integrity needed to develop and integrate composite applications.

Business semantics standards: Crossing industry borders

Business semantics standards enable the precise, efficient use of information across different technologies, markets, industries, and locations.

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**Figure 1. Enterprise SOA standards**

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BUILDING COMMON STANDARDS

Common standards apply to all layers of the standards taxonomy and are critical to a successful enterprise SOA strategy. SAP is leading the way in its adoption of industry-accepted common standards:

- The SAP NetWeaver development environment is built on the open source Eclipse platform. By using Eclipse, SAP has adopted the de facto industry-standard development environment, and organizations using SAP software can benefit from the large Eclipse ecosystem.
- SAP became a leader in enterprise Java when it announced early compatibility with Java Platform, Enterprise Edition 5 (Java EE 5).
- SAP is a key participant in the Open SOA Collaboration, providing developers with a simple, powerful way to construct composite applications. This collaboration defines a language-neutral model that exploits SOA characteristics and benefits. Currently, the collaboration is working on the Service Component Architecture (SCA) and Service Data Objects (SDO) specifications.
- SAP is also a key contributor to the Web Services Business Process Execution Language for People (BPEL4People) specification, which provides missing process definition capabilities for human interactions as one of the key SOA building blocks.

For example, a purchase order can be correctly processed only if each field in the message is correctly understood in the proper context. Business semantics standards provide the common understanding necessary to execute a business process such as order-to-cash, which may include messages such as orders, ship notices, goods receipts, invoices, and remittances.

Today, many organizations are helping define which standards are necessary for specific vertical industries or for cross-sector uses. These organizations typically include private-sector entities seeking to establish a cooperative relationship with national, regional, and international standards organizations.

SAP, with its 30-year history of building business process applications, has helped lead the development of business semantics standards for vertical industries such as the aerospace and defense, automotive, chemical, consumer goods, high-tech, mill products, oil and gas, banking, health care, insurance, transportation, and public services industries. Today, SAP is actively engaged in over 50 vertical-industry standards development organizations as well as numerous customer focus groups and industry value networks.

The proliferation of vertical-industry standards organizations, however, has become a serious obstacle to interoperability, particularly when those standards cross industry borders. For example, functionally equivalent messages are represented in vastly different ways in different industries and sectors. Semantically, the messages have the same meaning and function, but integration efforts have become extraordinarily expensive across industries.

A convergence of methodologies and semantics across vertical industries could help address these challenges. Creating this convergence would require a well-positioned, cross-industry standards development organization. Accordingly, SAP has invested heavily in the United Nations Center for Trade Facilitation and Electronic Business (UN/CEFACT). UN/CEFACT standards define both basic message primitives (vocabulary) and the methodology that enables consistent naming and structuring (grammar). SAP adopted the UN/CEFACT methodology in enterprise services design several years ago, and has since been active in standards organizations in many vertical industries to encourage the adoption of this methodology.

Establishing common business semantics is an enormous investment, but success can facilitate the high level of interoperability crucial to enabling organizations to efficiently compose applications in an enterprise SOA. Industry standards and SAP enterprise services are already helping increase semantic interoperability as a result of these efforts.

Enhancing flexibility through industry standards

Industry standards defined by organizations such as W3C, OASIS, WS-I, and UN/CEFACT are critical to realizing the benefits of enterprise SOA. With SAP NetWeaver and enterprise SOA, SAP has enhanced business process flexibility so that organizations can develop, build, and manage business applications on a foundation of open standards—flexibility that, in turn, helps them use IT to increase the responsiveness and profitability of their business.

Michael Bechauf is the vice president of industry standards at SAP, where he is responsible for SAP participation in industry-standards activities and for the strategy to integrate standards into SAP business process platform software. He currently serves as president and chairman of WS-I and as a member of the Java Community Process Executive Committee and the Eclipse Foundation board of directors.

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