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Trends of Web Services Adoption: A Synthesis

Vincent C. Yen, Dept of Information Systems & Operations Management, Wright State University, Dayton, OH 45435, vince.yen@wright.edu

ABSTRACT

The technology of Web Services has been a hot area in the software industry for many years. Surveys designed to get an answer of various kinds of questions such as why, when, how and where Web services are adopted and applied have been conducted in the past five years. Some of those survey results are available from the Internet. Since conducting a large scale Web services survey takes time and large financial support the research conducted in this paper is a synthesis from published survey results. All surveys indicate Web Services is moving along and will become a strong component of information systems infrastructure.

INTRODUCTION

For components to be reusable across different architectural environments new standards of integration and interoperability have been developed. The maturation of the Internet and the World Wide Web accelerates the idea for the global distributed computing. An important issue is how to make large number of heterogeneous application systems on the Internet interoperable. The answer is to develop standards, for example; CORBA, COM, DCOM, and Java/RMI initiatives. CORBA (*Common Object Request Broker Architecture*) is a specification defined by the Object Management Group, DCOM is an extended version of COM of Microsoft's distributed common object model, and Java/RMI is the remote method invocation mechanism. However, these technologies are not compatible and difficult to use. The success of these standards is rated as marginal (Chung, Lin, & Mathieu, 2003).

A recent approach to tackle the interoperability problem is XML-based Web services, or simply Web services. This approach uses Web standards of HTTP, URLs and XML as the lingua franca for information and data encoding for platform independence. Three XML-base protocols, one for communication, one for service description, and one for service discovery have become de facto standards or the core specifications. They are:

- SOAP (the simple Object Access Protocol) provides a message format for communication among Web services;
- WSDL (the Web Services Description Language) describes how to access Web services;
- UDDI (the Universal Description, Discovery, and Integration) provides a registry of Web services descriptions.

Additional standards that are essential for applications of Web services have been developed. Two major standards under the category of "Web services composition" are

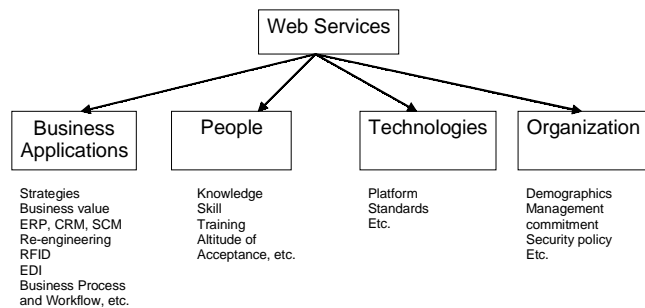
the Business Process Execution Language for Web Services (BPEL4WS) (Fischer, 2002) – called Business Process Execution Language (BPEL) later, and another competing standard the Business Process Modeling Language (BPML) developed by Business Process Management Initiative (BPML, www.bpml.org). Programming tools are now available for creating and composing Web services. For example, BPEL4WS has been incorporated in Microsoft's ASP.Net and BPML has been incorporated in JAVA.

It is obvious that this technology could become a potential revolution in providing "services" within a company and on the Internet, and its impact might be paramount. To understand what the market trend is like

and reasons for adopting or not adopting this technology a research based primarily on what has been done and published on the Internet is conducted. The conclusions are drawn from the synthesis of such publications.

OBJECTIVES OF STUDY

The objective of the study can be explained in the diagram below.



Some survey questions of interest are to:

- Find out whether companies are ready to adopt Web Services, and if so, with what timeframe.
- Find out what kind of Web Services will emerge, and how they will be distributed (payable or not).
- Find out about choices in terms of technologies and solutions.
- Identify the main technological drivers and threats.
- Identify attitudes and concerns of developers in their development efforts in the Web services.
- Where would Web Services be generating values for business?
- How much interest existed in applying WS to the supply chain operations?
- Readiness in using WS. What steps are taken to build company's WS capability?
- Internet-Based Procurement
- About future uses of and barriers to Internet-based eCommerce activities.

Due to the limitations of available data it is difficult to find adequate answers to some of these questions, questions under "organizations" in particular. Nevertheless, published data do provide information to certain vital questions of interest. These areas are presented in the following sections.

REVIEW OF PUBLISHED SURVEYS

The name of Web services was first mentioned by Bill Gates in July, 2000 (Levitt, 2001). Early surveys conducted beginning the year 2001 reveal some aspects of Web services adoption characteristics. This study does not use all surveys conducted in the past because they are either not easily available or they require huge fees for their reports. This study uses data

primarily published on the Internet free of charge. The form of the free survey results that are available often are announced as a piece of news, not a complete report. This form of data certainly has some limitations for interpretation. However, the data still have value when they are used collectively.

In 2001, TechMetrix Research (2001) conducted a survey titled "Web Services Adoption & Technology Choices" among the subscribers of TechMetrix/SQLI's TrendMarkers newsletters. A similar survey was conducted by them in 2002/2003 and was published in 2003 as an update. The responses come from various countries of the world. The survey contains information such as: company size, geographical distribution, job title, industry type. The aims of the study are to find out: readiness of Web services adoption, what kind of Web services will emerge, the main drivers and threats, technology choices and solutions. This paper will only use portions of data from these surveys.

SURVEYS OF 2002

IDC has estimated that just 5 percent of U.S. businesses in 2002 had completed a Web services project.

Borland Software conducted a survey among its users conference and results indicate that an unprecedented 80 percent of respondents are either currently using Web Services or are planning to use them in the very near future. Borland customers are using Web Services across many industries, but of those surveyed, a surprising 24 percent are in healthcare, 14 percent are in finance, and 14 percent are in government.

As reported by Fontana (2002), the Hurwitz Group found in its Web Services Primary Research Opportunity Study, in which it polled 300 IT professionals, that 45% of companies are implementing Web services, while another 36% are testing the technology. When the two percentages are added it equals to 81% - a figure comparable to the survey by Borland. The results also show that 47% are using Web services for internal integration projects and 25% for external integration projects.

Survey of CIOs by BEA Systems (Hayday, 2002) in Europe shows 54% of European companies adopted Web services, and 59% expect benefits.

TechMetrix Research (2004) finds 26% have already started projects and another 26% are testing/prototyping. It may be said that there are 52% of respondents have projects in Web services when the two percentages are combined.

SURVEYS IN 2003

According to Mimoso (2004a), of 273 Global 1000 companies surveyed recently by Westbridge Technology, 37% are currently using Web services in production, and 26% plan either to deploy a Web service within six months or to complete a proof of concept. Of those using Web services, 70% are using them internally, while 48% are exposing them to the Internet for business-to-business transactions.

In a survey conducted by IDC (2004), it shows about 61% of government organizations (central/local) are already using Web services.

SURVEYS 2004

Fifty-two percent of web services deployments have occurred in the United States, with the rest of the world accounting for the remaining 48 percent, the Radicati Group said in a report entitled "Web Services Market 2004-2008." Europe accounts for 39 percent of all deployments this year, followed by Asia Pacific with 6 percent and the rest of the world 3 percent.

SURVEYS 2005

From Information Week (Babcock, 2005) survey, here are responses to two questions.

1. What is your company's business case for adopting an SOA or Web Services standards?

Top five responses are: standardization (60%), business process automation (59%), business flexibility (52%), operational savings (48%), better integration with business partners (43%). 2. If your adoption has fallen short of expectations, which of the following reasons best describes why? Top three responses are: Legacy systems couldn't be cost-effectively integrated (50), cost more than expected (33%), introduced more complexity into IT system (36%).

AMR (Vahidy, 2005) uses a survey to find how components of SOA were most used in actual deployments; here are only two items of interest to this paper: Web services (71 percent), and BPM framework (14). The survey also finds most companies (57 percent) have standardized on Web services as an SOA component.

FUTURE INVESTMENTS IN SOA

Surveys done by Yakee Group of Boston in 2004 and 2005 reveal that

1. For 2005 (Mimoso, 2004), 75% plan on investing in the technology and staffing necessary to enable a service-oriented architecture; by industry the greatest investments in SOA are coming from the wireless telecom and manufacturing markets (78%), financial services (77%) and health care (71%).
2. For 2006 (Stansberry, 2005), the surge of SOA implementation in 2006 reaches saturation in many verticals: Wireless (93%), Retail (92%), Financial (89%), ? Manufacturing (76%), and Government (75%).

BENEFITS AND THREATS

Surveys reviewed do have information on motivations and reasons for non-adoption. However, it is quite limited.

Benefits and Technical Drivers

- Standards compliance and interoperability
- Scalability
- Tools for development productivity
- Tools for administration
- Reuse services
- Lower integration costs
- Faster delivery of products
- Making application development more flexible
- Increase customer satisfaction and revenue
- Important to business goals
- They reduce the burden of internal and external integration.
- They allow for true reusability.
- They are a platform-independent facilitator, enabling data to flow across applications and systems.
- They break down internal silos by providing information across traditional technological barriers.
- Web services extend the life of legacy systems by extracting specific business processes, such as licensing and appointment and quoting, and making them available in new forms

Threats

- Security and authentication issues
- Interoperability issues (e.g. non-compliant SOAP implementations)
- Lack of standard Business Schemas
- Service Level Agreement of WS providers
- Lack of awareness in the business
- Developing effective ROI cases
- Standards compliance and interoperability
- Scalability
- Tools for development productivity
- Tools for administration
- General knowledge of SOA within their enterprise
- Governing development standards within their enterprise

CONCLUSION

Publicly available survey results on the adoption of Web services are available in limited forms. Even though the data are limited they still contain valuable information. For example, by looking at “Using or building WS” data over time, there is a clear rising trend. In the years of 2001, 2003, 2004, and 2005, the percentages of major companies or organizations using and building Web services are 28, 52, 52, 70 (an average over three pieces of survey data). This ad hoc trend analysis should be indicative and reflecting the real world progresses. It would be interesting to compare with more formal approaches based on longitudinal studies. Another area the data reviewed has information on “what motivates or deters the users from using Web services”. That information is useful not only to end users but also to IT vendors. Other information contained in the survey but not extracted here are technologies used, industry group differences, etc. It is obvious that there are more research to be done in order to answer the research objectives set forth in the early part of this paper.

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