The Universal Description, Discovery and Integration (UDDI) Standard as a Catalyst for Service Oriented Architectures

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Abstract

With the diffusion of technology in business systems, the operating environment for systems’ interaction is becoming costly and complex. Service Oriented Architectures (SOA) help in creating a standardized, interoperable and reusable environment that eliminate these problems and create new opportunities. The growing business interest in service oriented architectures has resulted in the creation of Web services. Web services framework is an attempt at connecting business applications and processes with minimal human intervention. There has been great acceleration in the creation and availability of Web services from both the business and consumer perspectives. However, with Web services being made available, their effectiveness is limited if they cannot be located and interacted with efficiently. This paper identifies the value of the Universal Description, Discovery and Integration (UDDI) standard and how it acts as a catalyst for the Web services framework, from both intra and inter-organizational perspectives. Specifically, the paper documents the need for Web services, provides a guide to evaluate UDDI vendor products, and discusses the challenges and risks that ought to be addressed by an organization considering the UDDI standard.

Keywords

UDDI, Web Services, XML, Service Oriented Architectures, Integration, Interoperability and B2B Infrastructure Standardization

INTRODUCTION

Today’s lack of interoperability and standardization in business systems can be solved by architectures that follow global standards. One implementation of such standards is the Web services architecture, promoted by open industry organizations such as the Worldwide Web Consortium (W3C) and the Web Services Interoperability (WS-I) organization. UDDI forms the cornerstone for current and future Web services architectures and is administered by the Organization for Advancement of Structure Information Standards (OASIS). OASIS is a non-profit, global consortium that drives the development, convergence and adoption of e-business standards.

The importance of Web services and UDDI is evidenced by the number of large organizations that have implemented or considering the architecture for internal and external business systems usage. One such firm is an electronic business equipment manufacturer (referred to as Company X for confidentiality reasons) that has actively implemented Web services internally was setting a strategy for UDDI adoption. Company X asserted that UDDI will act as a vehicle in increasing the development, deployment and use of Web services.

There has been extensive literature on the technical aspects of UDDI; however, there is no guide or roadmap to aid organizations in comparing vendor UDDI products. The paper presents a vendor product evaluation guide and the key findings from the comparison of Microsoft and IBM UDDI registries. Further, it provides a detailed literature review outlining the current state of Web services and UDDI; and a business case outlining the requirements, challenges and risks with respect to UDDI adoption. Due to the nature of the conference, mainly the business results and analysis are being presented in the paper.

LITERATURE REVIEW

Service-Oriented Architecture (SOA) takes existing software components residing on the network and allows them to be published, invoked and discovered by each other. SOA allows business processes to be modelled as services, enabling integration of systems within an organization and across suppliers or trading partner chains (Vergil Technology, 2002). Web services are an implementation of a SOA. Web Services are loosely coupled reusable software components that encapsulate discrete functionality and are programmatically accessible over
standard Internet protocols. Hagel et al (2001) claimed that the open architecture of Web services allow organizations to adapt quickly to current marketplace circumstances such as strategic restructuring, acquisitions and partnerships. Gartner Dataquest (2003) surveys show that Web services have entered the mainstream, indicating that Web services usage has matured beyond the first stages of intra-enterprise pilot projects.

The Universal Description, Discovery and Integration (UDDI) standard describes an XML-based registry whose ultimate goal is to streamline online transactions by enabling companies to find each other on the Web and utilize their service offering in a dynamic fashion. UDDI is often compared to the telephone white and yellow pages directories since it allows businesses to list themselves by name, product, location, and/or Web services they offer (TechTarget Network, 2003). Copeland (2001) stated that UDDI helps increase collaboration up and down the supply chain by efficiently enabling access to the Web Services of partner firms. UDDI aids in the creation of a private or public directory to facilitate business-to-business e-commerce transactions. Without UDDI, the discovery and integration process might not be dynamic, efficient or cost-effective. Copeland (2001) anticipated that benefits of UDDI will not be realized until 2003-2004. The two major players, Microsoft and IBM, have developed UDDI registries and development tools. There has been rumour that Microsoft and IBM were going in separate directions in terms of implementation of their respective UDDI registries. However, there has been little or no research on whether the vendor products are compliant to the UDDI standard. Part of this research includes a study of interoperability and adherence of vendor registries to the UDDI standard.

There is a general consensus in the industry that Web services will play a prominent role in future of business systems. The Stencil Group (2003) claimed that “Web services adoption is not a question of if but of how”. International Data Corporation (IDC) predicted that Web services “...will become the dominant distributed architecture in the next 10 years” (Muse, 2003). Gartner Group, on the other hand, described Web services as “fulfilling its potential as low-risk, high-utility data integration catalyst” (Sullivan, 2002). It is estimated the Web services market will grow to US$1.7 billion in 2003 (Taft, 2002) and reach $27 billion in 2010 (Muse, 2003). Contrary to this growth projection, there has been debate as to whether UDDI will experience rapid enterprise adoption. Sullivan (2002) quoted a Gartner Group study that gave UDDI the lowest rank among the three standards and protocols (namely SOAP, WSDL, UDDI) that make up Web services. However, Gartner Group expects wide spread adoption once the standard reaches maturity for external usage in the 2004-2005 timeframe.

Clearly, UDDI is an important component of the Web services architecture. UDDI registries can be used to increase developer efficiency by promoting the use, reuse and aggregation of existing Web services within a company (Microsoft, 2003b). Qwest’s (a broadband Internet based communications provider) Architecture and Transversal Services group was responsible for evaluating and deploying a UDDI registry to be used by its 4,500 developers (Microsoft, 2003a). The motives behind this move were expressed by Lynn Fischer, Chief Information Officer of Qwest as being “…it enables reuse and eliminates duplication, thus saving costs and producing faster delivery”. UDDI increases the reliability of Web services architecture by enabling runtime discovery and configuration of applications; and the value proposition being its ability to allow partners to locate and integrate Web services efficiently (Microsoft, 2003b). In essence, UDDI registries not only improve interaction with existing partners but also address the gap of finding the optimal service (Apte et al 2003).

In the Australian context, thirty percent of Australian organizations are using Web services with the majority doing so behind the firewall (Mackenzie, 2003). Government organizations such as the Australian Taxation Office and the Australian Bureau of Statistics are amongst the early adopters of Web services. Another example is Queensland Health which adopted .NET based Web services in a bid to integrate its diverse legacy systems (Riley, 2003). Although, there has been a lot of interest in Web services, lack of existing literature on UDDI in the Australian context seemed to suggest a slow adoption rate. The reason behind this slow adoption trend needs to be examined in light of the prominent role UDDI is expected to play.

The importance of this research effort is three fold. Firstly, there exists no guide or roadmaps to aid organizations in evaluating and choosing a UDDI vendor product. Secondly, current research on UDDI is more focused on the technical aspects. However, there seems to be little or no literature illustrating the business value of UDDI and more specifically how large organizations intend adopting and utilizing this standard. Finally, there has been no business case study published by an independent group. Most business cases are published by the vendors which typically exhibit bias towards their own product. The UDDI standard and its prospects for businesses needed to be examined.

**METHODOLOGY**

The study was undertaken as a research and development project over a period of nine (9) months starting in August 2002 for a Fortune 500 company (Company X). There were two phases to the project. Phase 1 included 6 Carnegie Mellon graduate students who worked in conjunction with the authors in evaluating and offering a
recommendation to Company X on the value of UDDI. Phase 2 of the project involved researching and presenting the key findings of Phase 1 within the larger business context.

**Research Framework**

As identified in the literature review, the topic of this study is a standard that is in the early stages of adoption. To obtain the research data, it was recognized that a qualitative design would need to be employed. The main instrument for data collection was personal interviews. The methodology aimed at gathering information from a large-sized firm that had sufficient expertise in developing Web services. Other sources of evidence included the UDDI specification documents, analyst white papers, journals, newspaper articles and technical newsgroups.

There were no simple models or roadmaps specific to UDDI that were available to evaluate, compare and contrast vendor offerings. Table 1 below presents the research framework developed in Phase 1 of the project (Aggarwal et al, 2002). The framework was created to identify all important characteristics of a UDDI vendor product. The framework consisted of four (4) modules:

- **UDDI Architectural Evaluation Guide – An evaluation of four (4) principle architectural requirements.**

<table>
<thead>
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*Table 1: UDDI Architectural Evaluation Guide*

It is important to look at these architectural requirements because, under a scenario where there is heavy reliance on UDDI, any failure caused by the UDDI registry translates into financial loss. Completing the architectural evaluation guide requires knowledge of the UDDI server and the backend database. Depending on an organization’s requirements different weights can be assigned to each architectural feature.

Availability was identified as being the ability of UDDI registry to run on a continual basis with no disruption or downtime. Clustering UDDI registries and configuring an automatic fail over scheme is important in this respect.

Disaster Recovery is the ability of the UDDI registry to recover from a catastrophic event; this is usually done by offsite replication of data, or setting up geographically dispersed clusters.

Scalability refers to the ease with which a system can be modified to accommodate increases in system loads and transaction complexity. The ability to setup clustering along with load balancing is important.

Integration was used to refer to the ability of developers to use existing development environments to inquire and publish; and the ability to couple the registry with any database.

UDDI Version 2.0 Adherence Testing – Assessment of the standards compliance of vendor UDDI registries with the UDDI Version 2.0 standard. In particular, testing of the two API function sets - Inquiry and Publishing...
- was conducted. Standards compliance is another factor which is essential for systems interoperability. As part of the study, ninety seven (97) test cases\(^1\) were designed, developed and run against the Microsoft and IBM UDDI registries. Cross testing was also performed using Java and .Net based clients. These tests allowed us to verify vendor claims of standard compliance.

UDDI Version 2.0 Evaluation of GUI – Developers, administrators and end users interact with the UDDI registry through its Graphical User Interface (GUI) and therefore underlying the importance of the GUI. It is desirable to have a UDDI registry with an easy to use interface that presents most of the UDDI registry’s functionality, in order to easily manage and maintain the registry contents.

UDDI Version 3.0 Evaluation – Although UDDI Version 3.0 is still a committee standard, it is expected to become an open standard pending OASIS ratification. It is important for organizations to evaluate the UDDI Version 3.0 feature list and vendor plans to support it. This module aims to assess and highlight the features that can be employed by an organization.

The method of how to evaluate UDDI registries was posed to Karsten Januszewski (Program Manager with UDDI at Microsoft) on the Microsoft Developer Network UDDI newsgroup\(^2\). Karsten, who is also one of the authors of the UDDI Version 3.0 specification, outlined a similar although not as detailed an approach. It must be emphasized that this framework is generic enough to be used by any organization that is in the process of formulating a strategy for UDDI adoption.

**Case Study**

Part of the research involved a detailed case study of Company X (a Fortune 500 company) that operates in the electronic business equipment manufacturer space. In 2002, Company X employed over 60,000 people worldwide with headquarters in the United States.

Company X required a third party assessment on which vendor product to choose and to set their strategy on how they were going to employ UDDI services. The objective of this case study was to evaluate two vendor UDDI registries – namely Microsoft .Net Server UDDI Release Candidate 1 and IBM WebSphere UDDI Version 1.1.1 - from a technology and business perspective. Although there are a number of other UDDI registry vendors such as Oracle, Systinet etc, Company X was interested in only evaluating the Microsoft and IBM products as they had existing partnerships with these vendor organizations. The driver of the project (who will be referred to as John from hereon-in) at Company X was a senior executive in the Technology, Architecture and Strategy group. John approached Carnegie Mellon University to gain an unbiased recommendation.

The case was conducted over a period of five (5) months starting August 2002. The case included numerous face to face meeting with a Technology and Solutions Architect of Company X, who was located in Pittsburgh. Additionally, weekly conference calls with John were conducted to gather information on the business requirements, current technology infrastructure and future strategies of Company X. Another medium for data collection was to interview vendors. As part of the case study, we interviewed technical and sales representatives of Microsoft. Specifically, we interviewed the Eastern Region Consultant Engineer and Group Product Managers for Microsoft .Net. These interviews allowed us to obtain technical and business strategy information as to how Microsoft was marketing their UDDI offering.

The validity of research data is implicitly substantiated by the fact that Company X is the initiator of the project. As such it was in their best interest to provide accurate information. The personnel from Company X that were involved were senior architects and technology executives.

**RESULTS**

The key results from the Company X case study and personal interviews with vendors have been summarized below into two topics.

**Significance of UDDI**

It is important to consider what Company X’s business incentives are in utilising UDDI. John viewed UDDI as a catalyst for generating business opportunities. Like other large companies, Company X is actively pursuing technologies that enable it to gain a competitive advantage in the marketplace. With the growing popularity of

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\(^1\) Test cases and results can be obtained from the authors.

\(^2\) Accessible at http://msdn.microsoft.com/newsgroups

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Web services, Company X recognizes that the Web services architecture will play an extensive role in both its internal and external business systems. UDDI enables Web services to be described and located.

Specifically, Company X envisions two scenarios where UDDI plays a part. Firstly, UDDI will be deployed internally to foster and track Web services development efforts currently being undertaken across all departments. This step will eliminate duplicate efforts, foster reuse of Web services and result in faster application development. Secondly, Company X hopes to publish business services beyond the firewall, allowing partners to search and subscribe services, with an aim of exchanging and integrating information.

The case highlighted the key question as to why UDDI will succeed when other preceding technologies have failed. Firstly, John mentioned that “…the driving forces behind UDDI are the customers (companies and enterprises) and vendors of IT products”. Specifically, John stated that IONA (the largest vendor of object technology interoperability and integration), who has been heavily involved with CORBA (a distributed middleware architecture), is moving towards Web services. This is significant because of the reputation of this vendor and the clientele they possess. Secondly, the difference between UDDI and other similar preceding technologies is that vendors have agreed to not compete at the standardization level. Finally, John stated that“…the heart of Web services is UDDI. Currently, technology is a barrier between two businesses integrating their business processes, e.g.: a buyer being able to post a payment to a seller.” UDDI working in conjunction with Web services will abstract technology away, so more people can do more business faster.

**Vendor product comparisons**

**UDDI Architectural Evaluation Guide**

Given the requirements of Company X, the UDDI Architectural Evaluation Guide was developed during this study to aid in evaluating Microsoft and IBM UDDI registries. Organizations considering vendor UDDI registries are encouraged to adapt the guide to meet their specific needs.

Company X’s vision for Web services was not only to utilise them internally but also externally with partners. John mentioned that “UDDI forms the centre of this vision as long as the registry can be architected to meet enterprise needs”. Architectural features that we identified to contribute to the success of the vendor UDDI offering in order of importance were availability, disaster recovery, scalability and integration of backend systems and tools. The completed UDDI Architectural Evaluation Guide for Microsoft and IBM product is listed below in Table 2.

<table>
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<td>✓</td>
<td>✓</td>
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<tr>
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<td>X</td>
<td>✓</td>
</tr>
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<td>✓</td>
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<tr>
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<td>X</td>
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<td></td>
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</tr>
<tr>
<td>Database</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Integrated Development Environment</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>
Table 2: Microsoft and IBM UDDI Product Evaluation

In applying the evaluation framework, the Microsoft UDDI registry was identified to be the better product for Company X’s needs. The reason for this extensive framework is to address Company X’s main concern of “…choosing a vendor product that would not potentially limit the enterprise in the future”.

UDDI Version 2.0 Adherence Testing

The current UDDI Version 2.0 has been ratified by OASIS and is considered an open standard. The current status of UDDI Version 3.0 is that of a committee standard and in that respect, can be considered as an emerging standard. Company X was interested in closely studying interoperability and adherence of vendor registries to the UDDI specifications. Adopting a UDDI registry that closely adheres to the current UDDI standard is of utmost importance as this ensures interoperability of the registry with different client applications and other vendor registries. A standards compliant registry gives Company X’s developers the freedom to use any technology framework (Java or .Net based) in Web services development efforts.

Results where analysed and categorized according to the following:

Failed: Test cases that failed to meet the UDDI Version 2.0 API specification.

Grey Area: Test cases that exhibited anomalous behavior but didn’t violate the UDDI Version 2.0 specification.

Not Tested: Test cases that were not conducted, due to the fact that input test data could not be entered due to graphical user interface limitations.

<table>
<thead>
<tr>
<th>Registry</th>
<th>Failed</th>
<th>Grey Area</th>
<th>Not Tested</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM WebSphere UDDI Inquiry</td>
<td>1</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>IBM WebSphere UDDI Publish</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Microsoft .Net UDDI Inquiry</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Microsoft .Net UDDI Publish</td>
<td>0</td>
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Table 3: Microsoft and IBM UDDI Product Compliance to Version 2.0

The growing consensus in the industry is that integration of business systems represents a high proportion of the overall systems cost. Compliance to a set of standards will help in lowering the integration costs. Hagel et al (2001) documented that organizations were incorporating technology personnel behind the network “…who manually take information from one application and enter it into another” to create an illusion of seamless systems integration. Parallel to this, John mentioned that currently, the process of integrating a business process of firm A with that of firm B’s “…is an exercise in technology, not an exercise in business acumen or business agility”. By adopting a widely accepted set of standards, decisions will be based on business requirements rather than technology limitations. The result of such an architecture will be “…more partnerships and newer market opportunities, where more people will use the service being offered”. Through standards compliance, where all parties are operating under the same parameters, UDDI will provide a mechanism to list company services and requirements, and search and subscribe to services and requirements posted by other firms.

UDDI Version 2.0 Evaluation of GUI

GUI evaluation was conducted in a subjective manner. The test cases which comprise of the most frequent usage scenarios of a UDDI registry were executed against the GUI. The main focus was to verify that most of the data inquiry and publishing functionality were available. The Microsoft UDDI registry GUI presented all of the functionality required by the test cases, unlike the IBM UDDI registry GUI which failed to provide one important feature (namely the identifiers). Another focus was to verify whether the GUI interface accurately represented the registry data in a structured manner. Given our experience with both vendor products, the IBM UDDI registry did not provide an intuitive representation of the data. IBM’s UDDI registry GUI did not show the unique keys related to data entries in the registry. This is a significant limitation because developers require these keys in order to accurately locate Web services advertised in the registry.

UDDI Version 3.0 Evaluation

Noting that UDDI Version 3.0 specification (released in July 2002 and currently a committee specification) has the potential to become an emerging standard, it is imperative that Company X evaluate the offerings of the new specification. Company X identified the ‘Inter-registry Interaction’ as a feature of business interest in the short term. Other features such as digital signatures, policy and extended search features were identified as being
interesting in the longer term. A concern that Company X faced was whether it should adopt a UDDI Version 2.0 registry or wait for a UDDI version 3.0 compliant registry to be released.

‘Inter-Registry Interaction’ (also known as Entity Promotion) is the notion of transferring a UDDI entry from one registry to another. The value of this feature can be illustrated via an example. Consider Company X maintaining two registries - one internal for development purposes and another for external use by its partners. A Web service which is currently in development will only be advertised in the development UDDI registry. Once it is ready for the production environment, it can be promoted or redeployed to the external registry for use by Company X’s partners.

DISCUSSION

The areas of discussion that have emerged from the results section have been summarized below into three (3) topics.

Adoption of UDDI

It is important to gauge if UDDI will play an increasing role in large firms. Pertinent questions such as ‘Is UDDI here to stay?’ need to be examined. It needs to be established that UDDI is in fact the heart of Web services. The evidence presented by representatives from Company X suggests that UDDI is here to stay. Admittedly, this perception is reinforced when one considers that the UDDI standard is backed by all major platform and software providers. Since UDDI is not an industry specific standard, it means that it has the potential to reach a wider business community. The value proposition of UDDI is that of reaching new customers and creating new market opportunities where none existed before. Durchslag (2001) stated that in a world of frictionless collaboration and integration, the new enterprise will be defined less by its boundaries or assets, and more as a nexus of data relationships, business process interfaces and intellectual capital. Service oriented architectures are also being driven by the need for better inter-enterprise exchange of data. This notion cements the need for the business exposure created by UDDI interfaces. UDDI will facilitate creating this nexus of business interfaces that will consequently establish a community of business services and new opportunities. Sleeper (2001) stated that UDDI by itself will not usher in a miraculous new paradigm; however, the momentum UDDI is generating for Web services is that of a critical catalyst. It is clear from the case, that Company X will implement UDDI. Company X recognizes that UDDI is a catalyst in the Web services framework, without which the ultimate goal of efficient business systems interaction and integration is not realized. The value proposition that UDDI delivers is by no means specific to Company X; it is applicable to any large enterprise that seeks to gain competitive advantage.

Vendor product evaluation

The UDDI Architectural Evaluation Guide revealed that the Microsoft UDDI product possessed two architectural features that the IBM system lacked. One feature was the ability to import and export entries from one registry to another. The other feature was the ability to tune performance by reading from and writing to different backend databases.

Both Microsoft and IBM registries performed well against the UDDI Version 2.0 Adherence Tests. We attribute the few tests that each registry failed to implementation bugs. Conducting these tests helped to highlight some of the issues that developers might face. The Microsoft UDDI registry for example, offered two methods of authentication, and this affected the way client applications were programmed. Although some organizations may not have the time and resources to conduct such tests, it is recommended that at least some amount of experimentation should be conducted in the evaluation process. This is important in order to ensure that an organization’s development tools and languages work well with the potential UDDI registry.

Company X was not initially concerned with each product’s UDDI graphical user interface, however whilst we were carrying out the adherence testing, the importance of the GUI became increasingly apparent. The IBM UDDI GUI was plagued with usability issues with not all of the UDDI functionality being exposed. This made specifying complete information when publishing or advertising a UDDI entry almost impossible.

The key lesson learnt from the vendor product evaluation exercise was the need for organizations to evaluate their existing infrastructure and employee technology expertise. Managing UDDI registries and tuning them for performance requires knowledge in specific application servers and databases. It is recommended that organizations choose UDDI registries that match their existing technology infrastructure. Organizations should note that there are hidden costs in training, administrating and maintaining when opting for a UDDI vendor product.
Future evolution of UDDI

Currently, few UDDI registries are Version 3.0 compliant; both IBM and Microsoft registries are implementations of UDDI Version 2.0. Many critics have voiced concerns about UDDI Version 2.0 and its lack of several essential features, such as inter registry interaction and the ability to assure the integrity of its contents. Most of these concerns have been addressed by the UDDI Version 3.0 standard. At present, adopting a UDDI Version 2.0 registry introduces some difficulties when migrating to UDDI Version 3.0. Organizations will be forced to run multi-version registries (OASIS, 2002); and maintain and support for two versions of client applications.

Organizations are encouraged to assess the possible uses of UDDI and Web Services. We predict two scenarios for UDDI adoption. First, if internal integration and reuse is the focus then we recommend organizations to adopt a UDDI Version 2.0 product to kick start Web services development. However, organizations that foresee business to business interaction (i.e. with suppliers and partners) are recommended to wait for a vendor product that is Version 3.0 complaint.

CONCLUSION:

This paper presented the results of UDDI vendor products performed for a Fortune 500 company. The area of research is cutting edge with little or no literature available on how large organizations are evaluating and intending to harness the value proposition of operating in service oriented architectures. The study presented a framework to compare vendor products and offered an unbiased third party evaluation. Although the study only encompassed one case, the findings are pertinent to large organizations considering UDDI technology. Discussions with Microsoft and IBM confirmed that the issues raised by Company X are representative of the typical concerns facing other organizations. The framework developed to analyse the vendor UDDI products is applicable to most large organizations, particularly any Fortune 1000 enterprise.

The analysis framework used in this paper suggested that vendor products seemed to be standards compliant since no significant divergence from the UDDI specification was noticed. The results from the case and discussions with main vendors in the product segment have reiterated that currently UDDI is mainly being deployed within the firewall. The reasons for internal deployment are that the firm retains control of its data and immediate value from the undertaking can be accounted for and realized. Most importantly the vision for external UDDI usage has not been established, and firms are wary about publishing their data externally.

Organizations have realized the importance and efficiencies that service oriented architectures could create. Web services, an implementation of service oriented architecture, abstracts technology away from business processes with an aim of seamless integration of systems within and beyond an enterprise. Undoubtedly, UDDI is the heart of Web services and is estimated to mature and become more prevalent by the year 2005. Web services coupled with UDDI will eliminate today’s business system integration problems and act as a catalyst in creating new business and market opportunities.

FUTURE RESEARCH

A limitation of the study is that it included only one organization. Future research could be conducted on a larger sample to gather and analyse best practices and experiences. A suggested sample demographics would be firms operating in diverse industry sectors such as financial services, manufacturing and retail. Future research of significant value in the Australian context would be in documenting and analysing the interest level in Web services and UDDI by companies operating in Australia; and estimating the market size for Web services in Australia. It is imperative to analyse the Australian market needs/characteristics that govern the adoption and usage of Web services and UDDI. Finally, it could be valuable to contrast the interest level and approach of companies in US and Australia. Clearly, more research and perhaps quantitative research needs to be conducted.

UDDI’s goal is to streamline online transactions and utilize service offering dynamically; with an anticipation that this ubiquitous interaction will bring about marketplace that is efficient and competitive. An interesting area for future research is to substantiate whether UDDI in its full implementation and deployment will bring about this free marketplace. The vision for UDDI is that it will jump start business to business activity and create new opportunities whilst eliminating technology barriers. Research that demonstrates when and how this might happen will be valuable to organizations.

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