Web Services: An Emergent Opportunity for Customer Prospecting

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Abstract. One of the most difficult tasks for organizations is customer prospecting. This activity alone will often determine if a new venture will succeed or fail. It is also critical to the marketing activity of established firms. The effectiveness of the usual marketing techniques for prospecting and targeting customers methods as well as their limitations are discussed. In the light of this, the question of how emergent web services technologies can further enable businesses in this crucial marketing activity, is examined. The paper explicates the functioning of this new ICT infrastructure and goes on to discuss its potential for customer prospecting. Current misunderstandings about the nature of web services is clarified and dispelled. The use of XML based software, such as, WSDL, UDDI and SOAP, is presented, as the basis for this emergent infrastructure. The architecture is presented for a non-technical audience, with a view to showing how it can be used to realize new business opportunities rather than from a purely scientific perspective. The current gaps in the market and opportunities for service providers and brokers to provide the necessary business services to make the new technological infrastructure fully viable, are also assessed.

Keywords. Web services, customer prospecting, XML, SOAP, UDDI, WSDL.

1. Introduction

There are a several emergent factors in the current business world, which in their confluence, will profoundly shape the future, the principal ones being, the Internet and its increasingly sophisticated software, the knowledge economy and organizational learning. These in turn will affect innovation, competitiveness and entrepreneurship. This paper examines these factors in relationship to SMEs (Small and Medium sized Enterprises). In particular it examines one particularly powerful new software toolset for use on the Internet. This is the new set of XML based software, called Web Services. They will be described briefly and their potential for use by SMEs for customer prospecting will be illustrated via a use of scenarios. Leading edge software of this kind is still at an early stage, so bridges between existing software use and potential web services based use will be described.

The paper will look at its subject matter in the following order. It will look specifically at what customer prospecting is and why it is important from an entrepreneurial perspective. It will investigate why this is of particular concern to SMEs. It will then briefly examine how SMEs are using the Internet and other aspects of the new technology at present and critically evaluate this usage. It will then describe what Web Services software is, discussing such software as XML, WSDL, UDDI and SOAP, but in accessible, lay terms. The way in which it can help SMEs in their customer prospecting aspirations will then be discussed. Next, a number of illustrative scenarios of this nature will be developed to demonstrate the potential of the new technology. It will also indicate the needs for existing and entrant vendors to increase their offerings in this new market. Finally

conclusions will be drawn, the findings summarised and indications of future developments hypothesised.

2. What is customer prospecting and why is it important for entrepreneurs

One of the most difficult tasks for organizations is customer prospecting. This activity alone will often determine if a new venture will succeed or fail. It is also critical to the marketing activity of established firms. The European Union, in a marketing manual for SMEs, defines prospecting in the following terms [1]:

"Prospecting means searching for and calling upon potential customers. It is vital here to identify customers who need the product and can afford it (prospects); thus, developing a system (screening and investigating) to identify prospects is an important part of the sales manager's job."

It goes on to describe six classic methods of identifying sales prospects. Market Studies of a variety of kinds can be utilized. The Sales manager can draw up a list of prospects from personal contacts and experience. Present customers can suggest new prospects or they may want new products themselves. Access to competitors' customers can be a very useful source of prospects, if it is possible to find out who they are. Finally, articles and announcements in the press can lead to potential prospects. These are the traditional sources of sales prospect information.

The advent of the Internet has provided SMEs with other potential sources. By merely having a website or appearing on a listing site, prospects can readily be generated [2]. Taking this a step further, Poon and Swatson [3], suggest SMEs can scan Internet newsgroups, post questions and scan signatures in response messages. Large firms are already taking advantage of other Internet based opportunities for building prospect lists by using software to "mine" web access logs (records of all visitors to a website) [4], which SMEs might start using more extensively as software prices fall.

A number of other Internet based lead generation techniques that could be used equally well by large or small businesses also exists [5]. These techniques focus around what is referred to as permission marketing, whereby customers agree to be sent marketing material, which in turn leads to lists of "qualified leads". These are defined by Chaffey as "contact information for a customer and an indication of his or her propensity to purchase different products". This starts from the assumption that if a web site is in place, customers can then be attracted to the site via advertising (conventional or web based) or offered an incentive to engage in an online dialogue, which is followed by registration of the visitor and the gaining of permission to contact the respondent in the future. This can be used to build up a database of customers and the process of building an ongoing customer relationship can begin. Chaffey suggests a number of ways to attract potential customers to a site to initiate this relationship: Offline advertisements, public relations or word of mouth, access via a search engine, (e.g. Yahoo, Google, Ask Jeeves), reciprocal links with other web sites, paid banner adverts or direct mail. Developing the theme of reciprocal links, Deitel et al [6] describe affiliate programmes whereby for a fee (often based on number of "click throughs", or customers passed on), a site can have a

hyperlink to other sites of similar interest to the initial site. Any or all of these can be considered by the more technologically aware SME.

It is also possible to purchase customer lists from specialist intermediaries such as Web www.researchwizard.org (from Tulsa County Library), http://www.act1lists.com/, (providing permission based, opt-in lists), http://www.zapdata.com/, (from Dunn and Bradstreet) and many more. Some will also offer software tools to customers to build their own lists. Others will supply CRM, (customer relationship management) software to manage databases of prospect information e.g. RTI Software, (http://www.crm-software-relationship.com/). Thus it can be seen that already, even without using emergent Web Services software, the existing Internet technology offers a wide range of opportunities, which the new software can build on and dramatically enhance.

3. The importance of customer prospecting to SMEs

In order to delineate the importance of customer prospecting it is necessary to identify some of the key factors affecting SMEs, particularly at the time when they initially start up in business. A number of factors will have a critical affect on their success or failure, some of these will be from the external environment and some will be internal to the firm. The successful ones will have a number of internal strengths, the primary ones being: focus, short lines of communication, dynamism, entrepreneurial attitude, innovation and originality. They may initially be characterized by a number of internal difficulties, such as: lack of funds, a need to achieve success rapidly and a consequent need to attract business quickly, lack of business experience and ICT (Information and Communications Technology) expertise and lack of knowledge of the market and their potential customer base. They will be faced with a number of external challenges, such as: already established SMEs, larger competitors, customers who are slow to pay invoices, governmental red tape and lack of immediate demand.

Those of a more entrepreneurial and adventurous style will turn to technology to help solve some of their problems. They will buy inexpensive server and network technology and use office automation software such as Word Processing, Spreadsheets, Databases and packaged software for accounts and personnel functions. What is proposed is that, in the future, problems of achieving immediate market penetration and the provision of necessary business applications, could be markedly enhanced by Web Services based software to provide customer prospects more quickly and easily at prices affordable by SMEs. This would improve cash flow, increase market penetration and counteract lack of ICT expertise by providing an affordable customized solution from a Web Services provider. The ability of Web Services to embed existing application within other applications means that software does not have to be written from scratch but can be quickly integrated by an intermediary at minimal cost. The rapidity and ease with which they will be deployed will allow the SME entrepreneur to tackle the opposition from the word outset.

Some existing web based opportunities were described above and in many respects suitable use of these would alone suffice to enhance the prospects of SMEs, both new

start-ups and existing companies. However, they have certain shortcomings. One of these is lack of ICT expertise. Unless the SME is a new Internet start-up or software based company there is likelihood that it may lack a sophisticated ICT capability. Another potential problem is availability of investment funds. New businesses will not want to spend scarce cash on developing bespoke software or buying expensive packaged software. Another drawback is lack of time, the entrepreneur will be aware that their company needs to break into the market quickly in order to survive and grow. They will not want to spend valuable time on developing applications, but will prefer to buy in a service as and when they need it. This will also give an automatic capability of expanding the provision of applications as the business grows. Among the most important of these applications will be those centring on customer acquisition and management. This is where Web Services will come into their own. The ways in which this can be achieved are described below in the detailed discussion of the nature and capabilities of web services and the scenarios, which will identify practical ways in which they are likely to be deployed.

4. What prompted a move towards Web Services?

Many initiatives, technologies and concepts that were promoted and developed over the last decade were primarily driven by the need to integrate enterprise applications. Enterprise resource planning (ERP), enterprise application integration (EAI) and customer relationship management (CRM) are just a few that typify this approach. The drivers behind all these business/technology frameworks was to cut costs by bridging the islands of automation, increase revenues by increasing customer satisfaction and ensure that return on investment in high-level technologies is maximised. As the Internet technologies matured, it became obvious that further synergies are to be expected by integrating these technologies with the Web. However, it also became quite obvious that the existing infrastructure was not adequate and that new architecture will have to emerge. This new architecture was named Web Services and it promises to solve a number of existing issues, as well as to open up a number of new possibilities.

It is generally accepted that there are three IT paradigms for managing business. A migration from data, via information to knowledge management is the only way forward for managing business affairs and sustaining competitive advantages. If this is the case, then a question is raised: which of the paradigms is possible using the current Internet technologies? To answer this question, a reminder of what constitutes current fundamental Internet technologies is necessary.

The Internet fundamentally relies on several basic protocols: TCP/IP as a transport and network layer protocol and HTTP, SMTP and FTP as application layer protocols[1], to mention just a few. A quick analysis of these three application layer protocols reveals

[1] This classification is part of the so-called OSI (Open System Interconnection) Seven Layer Reference Model, which is based on a proposal developed by the International Organization for Standardization (ISO) – www.iso.org

immediately that they were designed primarily to convey data and enable other protocols (or specifications) such as HTML to contextualise them and convert into information[2]. Major efforts were made to improve HTTP performance [7], to use HTTP just as an example, but it remains a protocol that is only capable of transmitting data and enabling data representation. SMTP falls into a similar category, whilst FTP does not even satisfy these two criteria. It is, just as the name implies, a simple File Transfer Protocol.

In order to shift the paradigm from data/information domain into a knowledge domain, a more comprehensive application integration protocol(s) are needed. These protocols (specifications) are known as XML, SOAP, WSDL and UDDI. They constitute the foundation of what we call Web Services and we'll describe them after we dealt with the rationale for their usage.

5. Web Services initiatives

The technology that enables us to convert marketing catalogues and brochures into Web pages and present them electronically over the Internet is based around the HTML code. Unfortunately, this technology is rather restrictive as it only enables displaying information, rather than interacting with information. To enhance the functionality of HTML, various scripting approaches are used, either on the client or the server side, and they enable some limited interaction between the user and the application. Searching for a product and making a payment using a credit card on an e-commerce site are two typical examples that typify scripting facilities in the HTML environment. Unfortunately this is not enough.

In the same way as we as users want to interact with applications, and scripting languages help us to this, there is a need to enable applications to talk to one another automatically without any human intervention. Needless to say, this was always possible, but it required a major integration effort, which implied producing a lot of proprietary code and writing one owns procedures. Instead, the aim is to use standard specifications and protocols that will enable disparate applications, not just to exchange information, but to interact with one another. If this could be automated in a standard fashion, then a shift towards knowledge management is possible.

Development of such technologies started only a few years ago. In February 2002 The Web Services Interoperability Organisation (WS-I) was formed. In April 2002 the first WS-I Community meeting took place and the charter was defined. WS-I's mission is broadly defined as "… an open industry effort chartered to promote Web Services interoperability across platforms, applications, and programming languages" [8]. The founding members of WS-I are some of the best known names, such as Microsoft, IBM, SAP, Sun Microsystems, Intel, HP. etc. Currently more than 135 industry leaders are members of the WS-I community, actively participating in the work of this organisation.

[2] See details on HTML on http://www.w3.org/MarkUp/

6. Web Services definitions

World Wide Web Consortium (W3C) defines Web Service as a software system identified by a URI (Uniform Resource Identifier), whose public interfaces and bindings are defined and described using XML. Its definition can be discovered by other software systems. These systems may then interact with the Web service in a manner prescribed by its definition, using XML based messages conveyed by Internet protocols [9]. One can think about the Web Services as software components that figure as either web objects or web applications. What is characteristic for them is that they are self-contained, self-describing and modular. They can be published, located and invoked across the Web. Once Web service is deployed[3], other applications (and other Web Services) can discover and invoke the deployed service [10].

Unlike current component technologies, Web services are not accessed via object-model-specific protocols, such as the distributed Component Object Model (DCOM), Remote Method Invocation (RMI), or Internet Inter-ORB Protocol (IIOP). Instead, Web services are accessed via ubiquitous Web protocols and data formats, such as Hypertext Transfer Protocol (HTTP) and Extensible Markup Language (XML). Furthermore, a Web Service interface is defined strictly in terms of the messages the Web Service accepts and generates. Consumers of the Web Service can be implemented on any platform in any programming language, as long as they can create and consume the messages defined for the Web Service interface. [11]

In order to achieve the objectives stated by the above definitions, some fundamental technologies are necessary. These fundamental technologies come in the guise of XML, SOAP, WSDL and UDDI, which were mentioned earlier and need to be explained.

XML stands for eXtensible Markup Language, which is a more versatile version of the HTML language we were referring to above. HTML is a static language that can only display information in a predefined format. XML does the same, i.e. is a standard way to represent data, but it goes beyond presentation. It also provides means of describing the data. In a way, it is a meta-language for document and programme definition and exchange. It has been developed since 1996 and launched in 1998 by the Worldwide Web Consortium (W3C).

SOAP, or Simple Object Access Protocol[4], is a protocol that enables exchange of structured information via XML encoding. SOAP defines the rules for how to use XML to represent data as well as how to represent remote procedure calls (RPC), which enable disparate applications to interact with one another. Currently SOAP is bound only to HTTP protocol, to maximise its usage and encourage the adoption, but in the future other

[3] This definition is based on IBM's view of Web Services
[4] More recently referred to as Service Oriented Access Protocol

protocols will be used too. Briefly, SOAP is a standard format for communicating with Web Services.

WSDL stands for Web Services Description Language. This is an XML based language that describes what messages and requests a Web Service will accept and how will it respond to them. To an extent, this is a standardised XML vocabulary description layer[5].

UDDI, or Universal Description, Discovery and Integration[6], is a method of discovering the existence of the Web Service. It describes how the discovery document format is structured (in XML) and where to find the service. This specification is often described as the Yellow Pages, or a public registry, for advertising and locating the service.[7]

The technologies described above enable the facilitation of a new approach called Service-Oriented Architecture.

7. Service-Oriented Architecture

Software architecture is an abstraction of the run-time elements of a software system during some phase of its operation. A system may be composed of many levels of abstraction and many phases of operation, each with its own software architecture [12]. The way Web Services have emerged as a new service-oriented architecture (SOA) is often depicted as per Fig.1 [13].

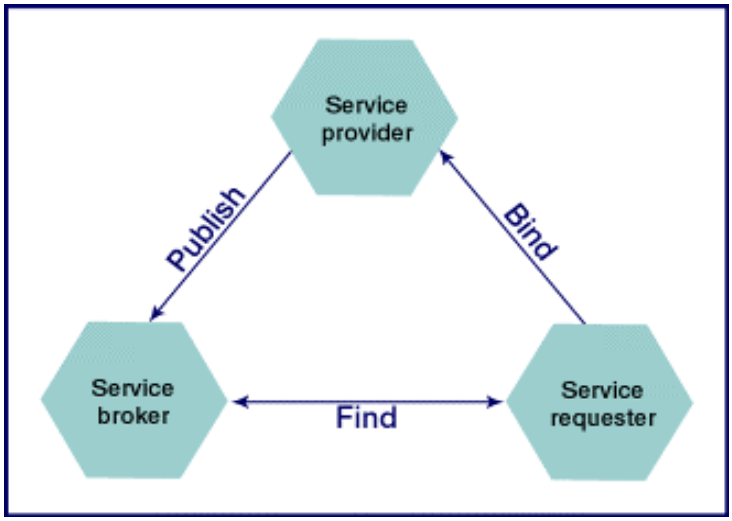

Fig. 1. Web services architecture

[5] Examples of WSDL files can be fount at www.xmethods.net , a public repository of Web Services
[6] Sometimes the acronym is interpreted as Universal Directory Discovery Interface
[7] Details about individual specification are available from a number of web sites, primarily from: http://www.w3.org/2002/ws/, http://www.w3.org/XML/, http://www.w3.org/TR/SOAP/, http://www.w3.org/TR/wsdl/, http://www.uddi.org/ and http://www.webservices.org/

The diagram in Fig.1 communicates a possibility of placing the Web Services into one of the three available categories. Service Provider provides service interface for a software asset and publishes its capabilities using the WSDL document. Service Broker consists of a registry listing the existence of the Service Provider. This is established by using the UDDI documents. Service Requester is an application that, using the SOAP protocol, binds and invokes the service offered by the Service Provider.

This effectively mean, to use a very simple language, that the whole Internet with all the publicly available applications that are 'wrapped' in Web Services, could be used by anybody who uses the same specification. Without any special coding, users do not have to run their applications just from their desktops, or their LANs, but the whole Internet becomes a repository of numerous and diverse publicly available applications.

8. Benefits for the SMEs

In the same way as the Internet provided numerous and quantifiable benefits for the SMEs, Web Services promise to do the same. In the era of EDI, small and medium size companies were virtually excluded from trading electronically with large companies, or one another. The Internet removed all the proprietary protocols and expensive leased lines that typify EDI. The SMEs were back in the game, competing on virtually the same footing as their larger competitors.

However, the next generation of e-commerce, in particular various B2B models, begun to pose a threat again to the SMEs. A possibility was emerging that the SMEs will not have enough muscle to take advantage of application-to-application integration over the Web. That would put them back in the pre-Internet days. The Web Services approach indicates that the SMEs could be the major beneficiaries of this technology. Because one of the main characteristics of Web Services is modularity, SMEs can buy small solutions that will enable them to conduct business electronically with any customer, regardless of the platform and a solution that particular customers use.

Web Services imply that an average PC Desktop has been extended to a "Webtop". Programmes, applications and files do not have to reside on our PC any more. They could be distributed anywhere on the web and accessed, as well as invoked, without knowing anything about the native character of the software. Moreover, this is feasible without any human intervention, i.e., Excel spreadsheet from my PC can access Oracle database without knowing how this database is structured and configured. In other words, SMEs will be use other applications without a need to install and maintain them, as well as they will be able to provide applications and services to larger companies, without worrying how to integrate them with these large companies legacy systems.

9. Web Services SME scenarios

Travel agent –Imagine a scenario in which one tries to set up a web travel agency. Customers browsing such a site enter details of their desired holiday type and destination and expect some suggestions (and eventually bookings). The travel agent's site needs numerous connections with various systems (airline reservation systems, hotel reservation systems, rent-a-car systems, etc.). To achieve this, the site would require intimate knowledge of numerous APIs (Application Programming Interfaces), often proprietary to each and one of these systems. Even if this were possible, maintaining them all could easily turn into a nightmare. Web services offer a solution. Each proprietary system offers its information and applications wrapped as Web Services. They can be invoked by the travel agent's server and presented to a potential customer, as if they all came from a single database.

Estate agent – Imagine a scenario in which a customer drives around a new area looking for properties for sale. He/she can see the sign indicating that a property is for sale. Despite the fact that different signs indicate different property agents, they all advertise the same phone number. A prospective customer calls the number from the phone and receives property details on his/her phone. The viewing appointment can be immediately arranged too. What actually happened in the background is that the WAP phone accessed a web site, which provided the service. This web site was connected to all the estate agents' property systems using Web Services. Prospective customer had the convenience of dialling a single number. Even small estate agents with just a PC based database, using broadband technology to connect their PC to the Internet can participate in this.

A small shop in a shopping mall – Imagine that a small shop wants, on a particular day, to attract as many customers of a particular sex and age to advertise the sale of a garment. The easiest way to do this would be to contact a broadcasting agent. Such agents will have, using Web Services, access to all major mobile phone companies. Following some customer profiling instructions, every mobile phone that happens to be in the cell that corresponds to the location of the shopping mall, will be called. Matching customers will receive a text message inviting them to visit the small shop and take advantage of the sale opportunity. Again, without Web Services, it would be impossible to access all these customers and send them a message that is relevant to the time and place of the campaign.

Small component manufacturer – Imagine a SME specialising in the manufacture of precision die-castings for the automotive industry. Such manufacturer might be excluded from electronic commerce with all the car manufacturers, because he cannot afford links with all the proprietary e-purchasing systems that these manufacturers have. However, using Web Services, he can receive orders directly into his order entry system placed automatically by the car manufacturing systems as soon as the level of inventory on their stock has gone below a certain level.

The bottom line is, Web Services will eventually enable SMEs to do more business electronically, with more customers, without making a significant investment to facilitate this.

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