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Overcoming Language Barriers in Business-To-Consumer Electronic Service

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Abstract

Communication has been described as one of the determinants of service quality. However, communication is only effective when the parties involved speak the same language. This is almost impossible to achieve in Business-To-Consumer (B2C) Electronic Commerce (e-Commerce) given the diversity of languages used on the Internet. This paper seeks to explore the possibility of using current advances in technology to bridge the communication gap among entities on the Internet.

Keywords: electronic commerce, electronic services, Business-To-Consumer, B2C, e-Commerce, e-Service, e-Commerce language challenges, e-Commerce language barriers

1. Introduction

One of the most significant economic trends of the past decade is the growing use of the Internet for conducting business. Many firms are driven toward greater adoption of e-Commerce by pressure to compete at the global level. In turn, the Internet and e-Commerce are part of the important vehicles propelling the process of globalization.

B2C e-Commerce is driven by consumer preferences. Consumer preferences determine the demand for products and services offered through e-Commerce. Language as a consumer preference is an inhibitor among non-English speaking consumers due to the prevalence of English content on the Web, particularly in Asia where the older generation lacks knowledge of English and Western characters. Beyond language, preferences for local content (even among those who speak English) are evident across countries. Therefore the greater the content online, particularly in the local language, and the greater it meets the real needs and wants of consumers, the more likely they are to go online and buy. And, as the Web becomes increasingly multilingual and incorporates more local content, consumers are likely to participate more in online commerce (Gibbs et al, 2002).

2. Language, Language Diversity and the Internet

Economic globalization has detached itself from the dynamics of Anglicization and adopted a much more sophisticated, multilingual strategy. This new strategy follows from the assumption that adapting to the

local culture and language is a necessary component in the penetration of and competition over local markets. Hence, global businesses are gradually abandoning the utopia of an “international lingua franca” and are looking at ways to penetrate local markets in their own languages (Dor, 2004).

Language, their varieties and their features are not only means of communication, but also symbols of group loyalty and social prestige (Hidalgo, 1986). Language has been defined as the primary vehicle by which people communicate and record information having the potential for expressing an enormous range of ideas and for conveying complex thoughts succinctly (Grishman, 1986). It (Language) has also been defined language as a repository and transmitter of culture (Danet & Herring, 2007). Beedham (2005) describes language as the most human of all human attributes. More than just a means of communication it is our vehicle of thought. We cannot imagine human beings without language, and if we came across another creature with language in our sense we would say it was human or human-like, or intelligent in the way that humans are. Language impinges upon every sphere of human activity, including all the sciences, from physics through sociology to literary criticism.

According to Fromkin et al (2003), a language is a collection of dialects. Speakers of a particular language can talk to and understand each other. Yet no two (2) speak exactly the same. Differences in speech may be due to age, sex, size, speech rates, emotional state, state of health and whether the language used is a first language. Other differences come from word choices, the pronunciation of words and grammatical rules. The unique characteristics of the language of an individual speaker are referred to as the speaker’s idiolect. For example, English language may be said to consist of more than 450 000 000 idiolects. When there are systematic differences in the way different groups speak a language, it can be said that each group speaks a dialect of that language (Fromkin et al, 2003).

Deciding whether the systematic differences between two (2) speech communities reflect two (2) dialects or two (2) languages is not always an easy thing to do. A rule-of-thumb definition can be used: ‘When dialects become mutually unintelligible – when the speakers of one dialect group can no longer understand the speakers of another dialect group – these “dialects” become different languages’ (Fromkin et al, 2003). However, to define the meaning of mutually unintelligible is itself a difficult task. For example, Danes speaking Danish and Norwegians speaking Norwegian and Swedes speaking Swedish can converse with each other. Nevertheless, Danish and Norwegian and Swedish are considered separate languages because they are spoken in separate countries and because there are regular differences in their grammars. Similarly, Hindi and Urdu are mutually intelligible “languages” spoken in Pakistan and India, although the differences between them are not much greater than those between the English spoken in America and Australia. On the other hand, the various languages spoken in China, such as Mandarin and Cantonese, although mutually unintelligible, have been referred to as dialects of Chinese because they are spoken within a single country and have a common writing system.

Because neither mutually intelligibility nor the existence of political boundaries is decisive, this paper will use the rule-of-thumb definition as proposed by Fromkin et al (2003).

Most English speakers automatically assume that English is the language of the Internet, but available statistics (Global Internet usage, Wikipedia; Internet World Stats) claim that this is not actually true. While the Internet may have began with the English language, today it has developed into a much more multilingual arena and has become a truly global communication network. Hundreds of people are already participating online today in languages other than English, in some form of non-native English or in a mixture of languages and this trend is projected to continue in the years to come (Danet & Herring, 2007). In 1997 there were 45 million English speakers using the Internet whereas the number of non-English speaking users was 16 million (Dor, 2004). In 2003, the English-based Internet community comprised around 230 million users whereas the non-English-speaking community comprised 403 million users (Dor, 2004). As at 2004, there were at least thirty-four (34) languages of note used online (Global Internet usage, Wikipedia, 2010); with 280 million English users and no less than 657 million non-English users (Dor, 2004). By 2010, English language accounted for only 536.6 million Internet users (27.3%) while other languages had 1429.9 million Internet users (Internet World Stats, 2010). Table 1 shows some of the available statistics in detail.

Preliminary sociolinguistic and ethnographic research has demonstrated the extent to which Internet activity has become an important component of the lives of non-English speakers around the globe. In case after case, it turns out that the (full or partial) move from English to another language has been not only possible and mostly effortless, it has also allowed for fascinating new developments in the assertion of identity on the Internet (Dor, 2004).

As the Internet expands globally and its use continues to increase, the need to share existing and new information in their native languages will continue to increase. Hence, language is often seen as an inhibitor to effective information sharing.

2.1 Language Challenges and the Internet

Early planners of the Internet were North Americans. They sought only to facilitate communication in English; therefore they did not anticipate problems encountered by speakers of other languages trying to communicate online.

The text-transmission protocol of the Internet is based on the American Standard Code for Information Interchange (ASCII), which was established in the 1960s. ASCII contains 128 7-bit unique combinations of ones and zeros (called codes), 95 of which are available for use as graphical characters. Unfortunately, ASCII has only been of advantage to the English language. Speakers of other languages have faced varying degrees of difficulty. For example, because ASCII does not include the last 3 letters of the Swedish alphabet (å, ä and ö), the URL of a Swedish town called Hörby is <http://www.horby.se>. Swedes must live with the fact that without the 2 dots over the “o”, the name of the town means “fornication village” (Danet & Herring, 2007).

Over time the ASCII character set was expanded to 8-bit profiles that facilitated the use of specific languages and/or groups of languages online. The extended ASCII character set (ISO Latin-1 or ISO 8859-1) added enough characters, including letters with diacritics to accommodate many European languages. Globally, ISO 8859-1 was still not satisfactory. Eventually, the Unicode standard was established.

The Unicode standard is a universal character encoding maintained by the Unicode Consortium (<http://www.unicode.org>). The vision behind the standard is to eventually provide one (1) encoding that will be useful for all the languages of the world. The Unicode standard uses a 16-bit profile and provides the basis for processing, storage and interchange of text data in any language in all modern software and information technology protocols. As at 2005, the 4.1.0 version could accommodate more than a million characters.

The Internet may have been born English but with the evolution of Internet writing systems from ASCII to Unicode, the stage has been set for the existence of an encoding system that is useful for all the languages of the world. This also helps to provide a platform in which e-Commerce can become a truly global phenomenon.

3. Globalization, the Internet and e-Commerce

Globalization is generally regarded as the increasing interconnectedness of the world through flows of information, capital and people facilitated by trade and political openness as well as information technology. It is being intensified by the spread of the Internet, linking businesses and individuals around the world into a common electronic network. There is great excitement about the Internet’s potential for removing geographical obstacles to economic growth and for achieving global integration in developing as well as in industrialized countries (Gibbs et al, 2002).

The Internet, an interconnected network of thousands of networks and millions of computers linking businesses, educational institutions, government agencies and individuals together (Landon & Traver, 2004), has diffused at a rate faster than earlier generations of communications technology. From 1990 to early 2000, the estimated number of Internet users grew more than tenfold to roughly 300 million, affecting the way in which people communicate with each other, acquire information, learn, do business and interact culturally. One particularly promising application of the Internet is in e-Commerce (Goldstein and

O'Connor, 2000), where the Internet has been identified as the world's fastest growing marketplace with seemingly limitless opportunities for marketing goods and services. A review of practitioner's rationales for exploring the opportunities of the Internet reveals that the main driving forces behind the explosive growth of the virtual marketplace are among others: cost efficiency, 24/7 accessibility, a lack of geographic limitations, interactivity and low entry barriers (Ruyter et al, 2001).

e-Commerce, a subset of Electronic Business (e-Business) (Olajubu et al, 2009), while lacking a standard, universally adopted definition (Cater-Steel & Grist, 2006; Duffy & Dale, 2002) is recognized as having the potential to contribute to national productivity, economic growth and welfare (Cater-Steel & Grist, 2006). Some acceptable definitions of e-Commerce as relates to this article are:

- includes everything from learning about products online and electronic transactions to online customer service and support (Cater-Steel & Grist, 2006)
- buying and selling products and services over the Internet including: pre-sales activities such as marketing and brand awareness; the sales transaction itself (including fulfillment, inventory control, pricing, shipping/receiving); processing the payment; post-sales activities (for example, warranty registration) (Communication and Information Advisory Board, 1999)
- the sharing of business information, maintaining business relationships and conducting business transactions by means of telecommunications networks (Vladimir, 1996)

e-Commerce is exponentially increasing the availability of information, giving customers access to more knowledge, of better quality and faster than before (Singh, 2002).

Internet stores and e-Commerce are still in their infancy and have not reached their full potential in international markets, as indicated by the fact that as at 2002, e-Commerce sales were low, comprising less than 2% of the Gross Domestic Product (GDP) of each country. Several global trends have been identified as common factors creating pressure for e-Commerce adoption by all countries. These include the rise of global production networks, the increased influence of multinational corporations, the creation of open trade regimes and increasing levels of global competition faced by firms in all countries (Gibbs et al, 2002).

The Internet embodies the set of technologies that drive e-Commerce (Vladimir, 1996) and as it (the Internet) continues to experience phenomenal growth, opportunities are being seized by various players to fully exploit the Internet as a reliable tool for communication, marketing and commerce. Through it people are able to exchange information, even far afield at reasonable costs, businesses are able to capture target markets for their products and services and online shopping is no longer a pipe dream (Msiska, 2006). Some of the benefits of the Internet to e-Commerce include (Msiska, 2006):

- The Internet provides a two-way communication medium with tremendous speed. This translates to instant feedback from either party
- The Internet allows for around-the-clock transactions
- Unlimited outreach (audience)

The e-Commerce matrix consists of four (4) general classes namely: Business-To-Business (B2B), Business-To-Consumer (B2C), Consumer-To-Business (C2B) and Consumer-To-Consumer (C2C) (Duffy & Dale, 2002). Although Duffy & Dale (2002), argue that C2B is tenuous (or insubstantial) and was probably included for the sake of neatness and balance rather than any conviction that C2B represents a significant part of e-Commerce. This paper focuses on the B2C class of e-Commerce because B2C represents the public face of e-Commerce (Duffy & Dale, 2002) and the most highly touted applications of e-Commerce are consumer oriented. Such applications include remote (or home) shopping, banking and stock brokerage accompanied by (and, in most cases so far, paid for by) on-line advertising. The audience for this market has not reached critical mass, although its immense potential is driving much of the interest in e-Commerce. For a chance of success in this marketplace, a firm must identify an actual customer need and the firm's relationship with the customer must build on a key feature of the Internet namely interactivity (Vladimir, 1996).

3.1 B2C e-Commerce and Electronic Service (e-Services)

B2C, the second-largest form of e-Commerce (Goldstein & O'Connor, 2000), can be defined as an online

business selling to individual consumers (Landon & Traver, 2004). It has also been defined as a system that enables users to purchase commodities through computer networks such as the Internet (Olajubu et al, 2009).

The ability of the Internet to reach global markets has long been touted and recognized both by businesses and researchers (Muthitachareon & Palvia, 2002); unfortunately most e-Commerce transactions occur between customers and sellers in the advanced economies of United States, Canada and Western Europe. Most of the world's population, however, exists outside the borders of these countries. B2C diffusion seems to be less affected by global forces and more affected by variables specific to the natural and local environment such as consumer preferences, retail structure and local language and cultural factors. In addition, B2C is "pulled" by consumer markets, which are mainly divergent. While all consumers desire convenience and low prices, consumer preferences and values, national culture and distribution systems differ markedly across countries and define differences in local markets (Danet & Herring, 2007). For countries with a small market size, a lack of local content, products and services limits the amount of B2C e-Commerce that is possible (Denmark, Singapore, Taiwan). Language differences and difficulties with western character sets inhibit B2C e-Commerce in Asian countries, especially among the older generation (China, Japan and Taiwan) (Gibbs et al, 2002).

Currently, e-Commerce revenue in developing countries is miniscule in comparison to that found in the advanced countries. The state of e-Commerce in developing countries is similar to what it was in the United States in the mid-90s. Predictions are variable, but they tend to point to significant growth of Internet access among businesses and among consumers in many developing countries. The fact that those connected to the Internet also tend to be among the more affluent in these societies make this group very attractive to firms that sell over the Internet (Hawk, 2004). Thus, e-Commerce business firms continue to explore innovative ways of conducting business for reasons that may range from the maximization of profits through an enlarged clientele to the reduction of operating costs (Msiska, 2006). Several initiatives have been undertaken by businesses with the goal to expand their consumer base into different countries. Some web-based initiatives include (Muthitachareon & Palvia, 2002):

- Incorporating different languages to reach global audiences
- Using culturally-appropriate colors in the web pages
- Allowing various payment methods and currencies acceptable in different countries
- Tailoring contents and visuals to the targeted audience

Despite these and other initiatives by businesses, as at 2002 worldwide B2C e-Commerce outside the United States was only 20% of the total market (Muthitachareon & Palvia, 2002):. This is because many e-Commerce applications do not fully utilize the true nature of the World Wide Web (a key component of the Internet (Goldstein & O'Connor, 2000)), which in its purest form is an interactive, personalized information service. The true nature of the Web, termed Electronic Service (e-Service) will be an important key to marketing most effectively to the consumer (Rust & Lemon, 2001).

3.2 B2C e-Service

Advances in technology have resulted in a shift, in advanced economies, from goods to services. In addition to the growth of service companies, service is becoming more important to goods producers. In fact, for many goods producers, service is becoming a key revenue and profit driver, over and above their traditional "tangible" product mix. The service revolution has increasingly been an information revolution, because information service is the highest growth area in service. Information service is an aspect of service in which information is the primary value exchanged between two parties (for example, buyer and seller). The Internet is built upon this concept of information service. By its very nature, the Internet is a network that permits the interchange of information (at its very core, in zeros and ones). What is revolutionary is the ubiquitous access to information, the new flows of information and the new markets for information that the Internet makes possible. The purest commercial utilization of the special characteristics of this environment is interactive information service, with consumer wants and needs going in one direction and highly customized information going in the other direction. This interactive information service is the critical backbone of the new electronic economy (e-economy) and is critical to understanding the role of

e-Service in this new domain (Rust & Lemon, 2001).

Certain segments of the service sector are especially amenable to:

- a) the introduction of Information and Communication Technology (ICT),
- b) the establishment of a web presence and
- c) transacting business electronically

For instance, the international travel and tourism industry is increasingly moving online and developing countries that either currently attract or aspire to attract a sizeable tourism business need to react accordingly. The list of other services that are potentially cyber-deliverable is an open one, limited in a sense only by the imagination. Already, offshore data processing centers and even some low-wage developed countries provide data transcription and “back-office” functions for insurance companies, airlines, credit card companies, banks and various other service enterprises in Organization for Economic Co-operation and Development (OECD) countries. Telemarketing firms can afford to hire remotely located sales persons to pitch their products. Customer support call centers of dotcoms and other ICT companies in OECD countries are among the fastest growing segments of the offshore services sector. India and the Philippines have developed into major locations for offshore data entry and computer programming, while India has also built up a fairly sophisticated software development capability (dependent on highly skilled personnel). Translation services, editing, proof reading and even electronic publishing are other candidates for remote service provision, though ones that obviously require more than basic literacy in at least one language. Local Internet Service Providers (ISPs) and other entrepreneurs in developing countries may be able to compile information on Web use habits that has a potential market value to international companies. Also, music produced by developing country artists can be digitally recorded and distributed via the Web, already there are websites marketing recordings of African and other artists (Goldstein & O’Connor, 2000).

The concept of service seems to be inextricably linked to e-Business because it has become clear that the information and sales functions of e-Business need to be supplemented by electronic customer service or e-Service (Ruyter et al, 2001). A study by Datamonitor Inc. suggested that in 1999, as much as \$6.1 billion in potential Web sales were lost due to inadequate e-service (Rust & Lemon, 2001). Also Gibbs et al (2002) has identified the lack of customer service as an inhibitor to B2C. An individual accepts or rejects to make a transaction online not only because of the characteristics of the Internet stores but also because of relative advantages that an Internet store offers to consumers. Relative advantage is defined as the benefits accruing to an individual when he or she selects one alternative over others (Muthitachareon & Palvia, 2002). For customers that purchase services via the Web, relative advantage results in higher service quality perceptions of the e-Service and a higher intention to use it (Ruyter, 2001). It is important for a business that becomes involved in B2C electronic marketing (e-marketing) in a region to be aware of what competitors are doing. Failing to provide options comparable to those of competitors may put a site at a relative disadvantage (Hawk, 2004). Now that more than 400 000 companies have websites, experts are recommending that 70-75% of Web budgets should be allocated to developing e-Service (Rust & Lemon, 2001). Therefore, the next vista for companies operating in the virtual marketplace seems to be e-Service or delivering value-added interactive services to customers (Ruyter, 2001). Traditional aspects of customer service are important on the Internet. What is known about consumer behavior and service will provide a solid foundation for developing service strategies on the Web. Elements like site effectiveness, trust, response quality and response timing, fulfillment, and availability will be key in defining a basic approach to serving customers on the Web and developing e-Service quality (Rust & Lemon, 2001).

e-Service, the future of e-Business (Rust & Lemon, 2001), can be defined as an interactive, content-centered and Internet-based customer service, driven by the customer and integrated with related organizational customer support processes and technologies with the goal of strengthening the customer-service provider relationship (Ruyter, 2001). E-Service is more than order fulfillment, more than responsiveness to inquiries, email and status requests. The true nature of e-Service is providing consumers with a superior experience with respect to the interactive flow of information (Rust & Lemon, 2001). Thus, e-Services range from the electronic provision of traditional services (services with an “e” in front), such as investing and airline ticketing, to intelligent interactivity in post-sales product support (Ruyter, 2001).

e-Commerce success especially in the B2C area is determined in part by whether consumers show loyalty to a particular e-Service provider they cannot touch. Loyalty is defined as the intention of a consumer to repurchase products or services through a particular Electronic Vendor (e-Vendor) (Luarn & Lin, 2003). Successful e-Service strategies have the potential to create significant word-of-mouth for a firm's website, as customers tell other customers their success stories of interacting with the firm in real time, with real-time responsiveness and situation-specific customization (Rust & Lemon, 2001). Hence, e-Services are important in B2C e-Commerce for managing customer relations and enhancing sales. Some services offered to customers electronically to enhance their online shopping experience include: search support, electronic response to customer queries, orders and transactions, electronic payment, electronic transaction record management, electronic assurance and trust, electronic help (e-help) and other online support in the B2C electronic space (Singh, 2002). As customers embrace e-Commerce they have escalated expectations about service and support to enable them to shop online. Customer service applications in e-Commerce are more critical than in conventional sales, since customers and merchants do not meet face-to-face and a click of a mouse is enough for an online customer to select a new provider.

Instant Messaging (IM), the focus of this paper, is an e-Service technology that can help to improve customer service by taking advantage of a key feature of the Internet namely interactivity, to provide near real-time communication between customers and Customer Service Representatives (CSRs).

3.3 Instant Messaging (IM) as a B2C e-Service tool

Thinking about the Internet simply as an advertising medium, however, ignores 3 crucial aspects of the Web World:

- a) 2-way (instantaneous) communication,
- b) personalization based on 2-way communication and
- c) real-time adjustments of the firm's communications with customers and even its offerings (Rust & Lemon, 2001)

On the Internet, the time lag between communications from the firm and communications from the customer is compressed, real-time dialog is possible and the firm's responses to the consumer can be adjusted much more quickly. Two-way communication (and learning) over time enable e-businesses to personalize offerings to an extent not before scalable, resulting in greater differences between competitors. The interactive, instant-feedback nature of the Internet provides firms with existing product-development opportunities. In addition to being able to customize its response to customer (in terms of communication or product offering), the firm can collaborate with the customer to develop new products and services. At a minimum, marketers should use this 2-way capability to elicit information from the consumer and then use it to personalize the product offering. But the possibilities for dialog go much further (Rust & Lemon, 2001).

Messaging has always been a core feature of the Internet. For example, one of the first and still most pervasive Internet technologies is email. It remains an Internet killer app. However, it is well known that Internet communication can be even more interesting and powerful than "plain old email." One should be able to better exploit it as an inexpensive medium for transferring data almost instantaneously (Shigeoka, 2002).

Most people who use the Internet have been exposed to Instant Messaging (IM). Like email, IM is a user-centric technology. It offers something people want to use by addressing a basic human need—the need to communicate. There are dozens of public IM services: companies ranging from the leading software developer, Microsoft, to the leading web application developers, Yahoo and Google, offer free IM services. To make sure you use them, they also develop IM clients that work across platforms—from Microsoft Windows, Apple MacOSX, and Linux, to handheld devices like your mobile phone and PDA (Sharma, 2008).

One of the most promising applications of IM in the enterprise is in the area of customer relationship management (CRM) or customer service. First, IM provides yet another way for a company to communicate with its customers. In addition, IM allows you to plug in to the customer's experience to

provide better support. Imagine a computer customer whose software application has just crashed. They start the Help utility that came with the application. The utility is actually a customized IM client. The client joins a chat group dedicated to users of the application. The user can ask anyone online for help. If there is no one available, the client contacts an automated chatbot on the IM system. The chatbot can ask basic questions about the problem and use that information to route the user to the best technical support expert at the company. Notice how the customer is instantly connected to support resources once a problem emerges. In addition, IM allows you to provide guided assistance starting with free online user groups. Automated chatbots can monitor the customer's progress, make suggestions, and eventually lead them to a company employee that can help. The filtering of simple problems by the free user group can eliminate many customer service incidents that drain profits and reduce customer satisfaction. Since IM is worldwide, your user community has a global reach that is very handy when customers want help outside of your business hours (Shigeoka, 2002).

The current use of IM technology in e-Commerce requires both the customer and CSR to speak the same language. This can result in potential loss in sales revenue when a company does not have the resources to provide a CSR that speaks the language of a visiting and/or potential customer. This paper thus proposes the use of language identification and machine translation technologies in the design of modern day IM to overcome the language barriers.

4. Proposed Architecture

The architecture proposed is distributed and involves the incorporation of language detection and language translation capabilities into the design of dyadic B2C e-Service applications (such as Instant Messaging (IM) applications) in order for companies to extend their reach beyond their local market into the global business arena. In the development of the architecture, a Service Oriented Approach (SOA) was used for incorporating the language detection and language translation.

In today's business environment, application infrastructures must keep pace with shifting business requirements and be able to absorb new business partners and products (Goodson & Steward, 2009). In addition, the push towards business automation, motivated by opportunities in terms of cost savings, higher quality, and more reliable executions, has generated the need for integrating different applications (Benatallah & Nezhad, 2008). SOA is a design methodology for software that promises companies agility and the ability to quickly adapt their applications to the changing needs of business through reusable services (Goodson & Steward, 2009). It provides an architectural paradigm and abstraction that allows the simplification of integration. There a number of technologies available to realize SOA. Among them, Web services and the set of related specifications (referred to as WS-* family), and also services that are built following the REST (REpresentation State Transfer) architecture (called RESTful services) are gaining the momentum for integration at the data level. One of the main facilitators of integration in WS-* approach is standardization. Standardization is a key to simplifying interoperability: instead of having to interact with heterogeneous systems, each with its own transport protocol, data format, interaction protocol, and the like, applications can interact with systems that are much more homogeneous. More specifically, Web services standards foster support of loosely coupled and decentralized interactions mainly at the application level. The main feature of RESTful approach is the simplicity of service development and usage. This architectural style has been adopted in the offering of data services which is a major advance in data-level integration. AJAX (Asynchronous JavaScript and XML), which is an enabler of ad-hoc service composition approaches known as mashups, is also based on REST. Mashup applications enable integration at the presentation level. This refers to integration of graphical user interfaces (GUIs) of applications (Benatallah & Nezhad, 2008).

The use of SOA in the proposed architecture provides an opportunity for businesses that cannot afford to implement their own identification and translation mechanisms to take advantage of cloud-based services offered by larger organizations in the business of language translation.

Figure 2 shows a first attempt at integrating language detection and language translation functionalities into the design of a classic dyadic (2-way) communication architecture (Figure 1). Unfortunately, in a truly distributed system, the different parts that make up the system can execute in

different physical locations. Business processes are increasingly being automated and interconnected in spontaneous ways. Companies increasingly require the integration of once independent applications; either because they are vertically integrating components of the business or because of mergers or outsourcing of function to separate organizations. In summary, there is a convergence to loosely integrated distributed systems, where each component can evolve independently (Guruduth et al, 1999). Taking a closer look at the execution environment reveals its heterogeneity: different hardware platforms, network technologies, operating systems, and programming languages can make the development of distributed applications a big challenge. What is needed for distributed systems, therefore, is an infrastructure that suitably supports the development and the execution of distributed applications. A middleware platform presents such an infrastructure because it provides a buffer between the applications and the network. The network merely supplies a transport mechanism; access to it depends heavily on technological factors and differs between various physical platforms. Middleware homogenizes access to networks and offers generic services for applications. It also bridges technological domains and encapsulates the differences between different systems (Puder et al, 2006).

Figure 3 shows an improvement of the architecture of Figure 2 by introducing a messaging middleware. Messaging middleware is specialized software that accepts messages from sending processes and delivers them to receiving processes (typically across a network). Such middleware typically support two common delivery patterns: point-to-point (p2p) and publish/subscribe (pub/sub). The architecture of the middleware can take many forms. The two principle styles are centralized and distributed architectures. With centralized architectures, all processes communicate with a common messaging server. In distributed architectures, processes communicate with local messaging middleware components; these local messaging components then communicate over the network to deliver messages on behalf of senders and receivers. Messaging middleware can perform various functions that facilitate reliable, loose-coupling. In distributed architectures, the sender's messaging component can tolerate network failures by repeatedly sending a message until it is acknowledged by the receiver's messaging component; this interaction can occur even after the sending process has terminated (or is otherwise unavailable). The receiver's messaging component can tolerate the unavailability of the receiving process by maintaining messages until the receiving process is ready. From the sender application's viewpoint, this allows the application to "fire-and-forget" messages, relying on the middleware to guarantee message delivery. The messaging endpoints ideally are the messaging clients (the sending and receiving applications). With common messaging middleware, the guarantees are, however, typically restricted to the middleware endpoints of message brokers and message queue managers. It is then assumed that a messaging client accesses a messaging middleware endpoint locally and using transactions (though a distributed and/or non-transactional access is possible, too). The middleware only ensures message delivery within its own "network" of managerial messaging endpoints. In addition to acknowledged delivery (through proper correlation of messages and acknowledgments), ordered delivery of messages is another aspect of reliable messaging middleware. This is particularly important in asynchronous environments, where messages are typically stored by the middleware (for example, a message queue) before they are dispatched to or retrieved by final recipients. Messages can further be attributed with expiration timestamps, a priority attribute, a reply-to address, and other properties that contribute to messaging reliability. Such attributes are checked by the middleware in order to prevent delivery of a message if it is no longer valid, to prioritize messages that are stored at the middleware for later dispatch, and to guarantee that a receipt acknowledgment is sent back to a specific, application-defined reply address. A further important aspect of reliability concerns the integration of a message delivery in a larger processing context. A message typically is part of some business process (messaging conversation) and atomic unit-of-work. Key requirements on reliable messaging middleware therefore include the ability to atomically group a message with other messages and other process activities, and, to integrate a message store like a message queue as a resource manager in a distribution transaction (Tai et al, 2003).

5. Prototyping the Architecture

A prototype Internet Messaging system was built using the Google App Engine Cloud Computing Platform (Java version). Two (2) languages were used in the prototype namely English and French. Figures 4 to 6 shows the class diagram, use case diagram and sequence diagram of the prototype system. Figure 7 shows

the potential audience that can be reached compared with other single language Internet Messaging System.

6. Business Implications

An increase in the number of languages supported by an e-Commerce business can result in an increase in the audience reach of the business which can also result in an increase in the sales revenue as depicted by Equation 1

$$x = \sum_{i=1}^n a_i c_i t_i p_i \quad (\text{Equation 1})$$

Where,

x = estimated total sales revenue

i = number of languages supported by the e-Commerce business

n = total number of languages available on the Internet

a = audience reach for a language (≥ 0)

c = conversion rate for the language ($\geq 0\%$ & $\leq 100\%$)

t = average number of items sold for the language (≥ 0)

p = average cost of each item sold for the language (≥ 0)

As an e-Commerce business adds e-Service(s) that can attract potential customers from several languages, it can increase its actual sales revenue for a particular language, thereby increasing its total sales revenue.

7. Discussion and Conclusion

The process of globalization has far-reaching linguistic consequences which have to do with the general function of language and the relationships among languages, speakers, nation-states and the global market. As these relationships are gradually changing, most dramatically on the Internet, we already witness the global emerge of novel patterns of linguistic usage, standardization, maintenance and variability. These patterns more than anything else meet the needs of the evolving global consumers market. In this new state of affairs, the forces of economic globalization do not have a vested interest in the global spread of English. They have a short-term interest in penetrating local markets through local languages and a long-term interest in turning these languages into commodified tools of communication. Indeed, some of the major players in the global economy, most importantly the software industry, already understand this and are working to achieve this goal.

All Internet users are potential customers. For businesses to win these potential customers and convert them into real ones depends on effective customer relationship management. This necessitates that online enterprises offer extraordinary services and create positive customer experiences by taking advantage of the three (3) central changes brought about by the Internet namely: true interactivity with the consumer, consumer-specific, situational personalization and the opportunity for real-time adjustments of a firm's offerings to consumers. Electronic Services (e-Services) that win customers and positively contribute to effective customer relationship management also enhance Business-To-Consumer (B2C) Electronic Commerce (e-Commerce) and the volume of transactions. Thus, a complete organizational focus on e-Services support by appropriate electronic technology is essential to maintain loyal customers, improve operational efficiencies and boost revenues as promised by e-Commerce. In essence, e-Services done right can improve the bottom line.

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Table 1. Internet Users on a language basis. Data provided by Internet World Stats (Internet World Stats)

Report Date	Internet Users per Language
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	English			Others		Total
	Population	%	Rank	Population	%	
30 May 2004	293 072 401	37.3	1	492 637 621	62.7	785 710 022
14 February 2005	283 363 528	25.5	1	534 083 619	74.5	817 447 147
31 December 2005	311 241 881	30.6	1	706 815 508	69.4	1 018 057 389
11 January 2007	327 084 785	29.9	1	766 444 907	70.1	1 093 529 692
30 November 2007	379 529 347	30.1	1	882 503 350	69.9	1 262 032 697
31 December 2008	451 951 053	36.2	1	1 129 620 536	63.8	1 581 571 589
31 December 2009	499 213 462	39.5	1	1 303 116 995	60.5	1 802 330 457
30 June 2010	536 564 837	27.3	1	1 429 949 979	72.7	1 966 514 816

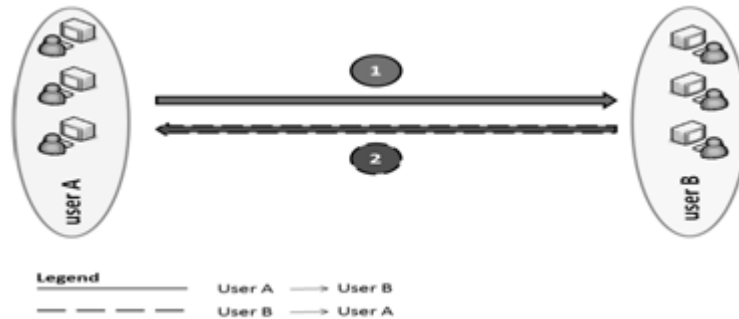


Figure 1. Classic dyadic (2-way) communication architecture

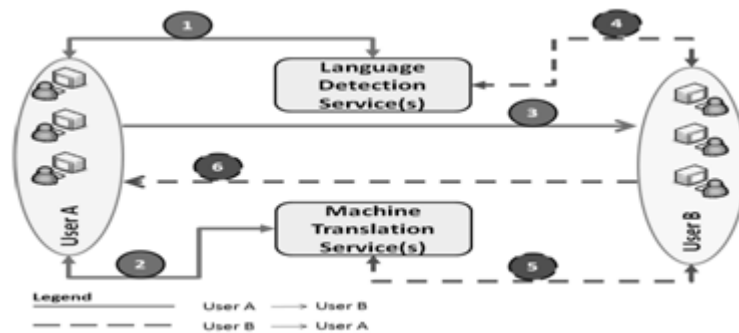


Figure 2. Language detection and translation functionalities have been incorporated into the classic dyadic architecture using Service Oriented Architecture (SOA) design paradigm

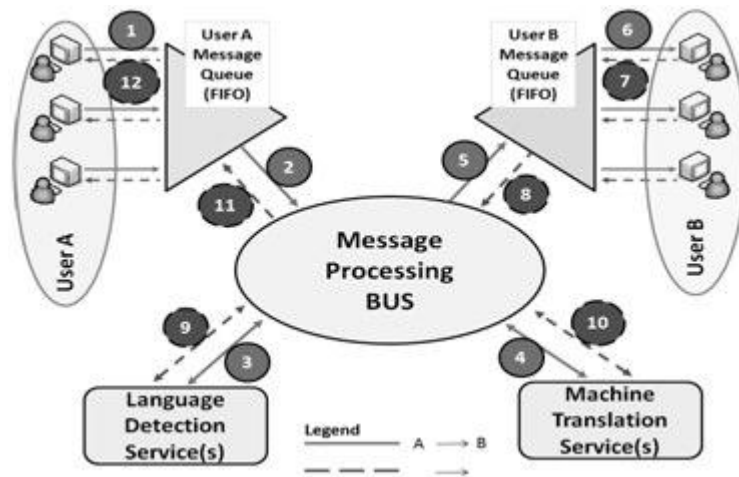


Figure 3. MOM has been introduced in order to loosely couple the different parts of the distributed architecture

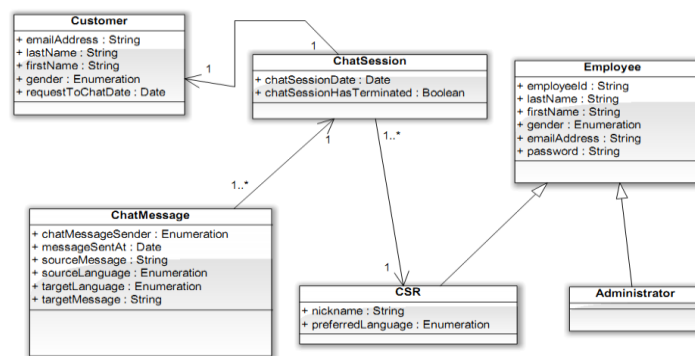


Figure 4. Class Diagram for the prototype system

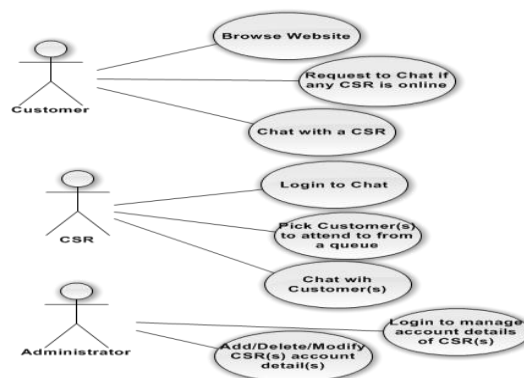


Figure 5. Use Case Diagram of Prototype System

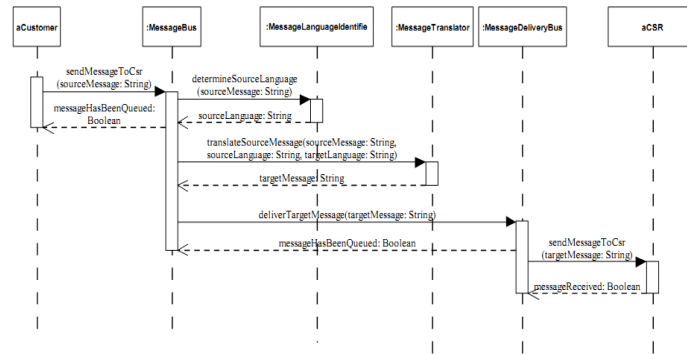


Figure 6. Sequence Diagram of Prototype System

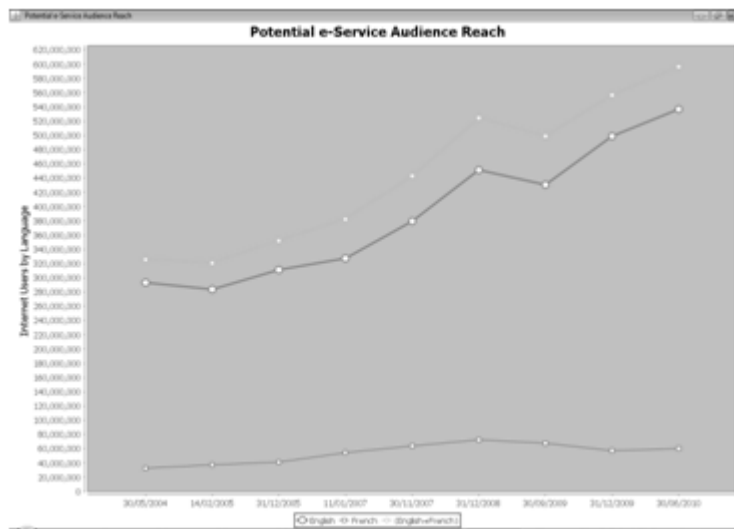


Figure 7. Line Chart showing the potential Internet audience

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