Embedding Free Online Machine Translation into Monolingual Websites for Multilingual Dissemination: a Case Study of Implementation

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Abstract

A growing number of websites that are only available in one language rely on free online machine translation (MT) services to disseminate their contents in a variety of other languages, in order to make themselves accessible to Internet users with different linguistic backgrounds. This approach to the management and delivery of digital information that bypasses professional localisation and translation raises a number of thorny issues, but clearly shows that free online machine translation services are regarded as valuable tools to overcome language barriers in the online environment. However, the vast majority of websites that adopt this strategy fail to take full advantage of the potential offered by free web-based MT, mainly due to poor consideration of crucial issues in human-computer interaction and web usability that are vital to ensure that Internet users have a positive and successful online experience.

This paper presents the key stages and challenges involved in implementing this approach to the multilingual dissemination of online content, whereby free online machine translation is embedded into the architecture of a monolingual website. The main technical and practical issues are illustrated by means of an implementation case study based on the website supporting London's successful bid to host the 2012 Olympic Games, followed by the discussion of the selected results of extensive user testing and evaluation.

1. Introduction

1.1. Machine Translation (MT) Technology on the Internet

The area of Internet-based machine translation (MT) has grown considerably since 1997 when Systran Software Inc. and the popular search engine AltaVista launched Babelfish, the first service offering free-of-charge online machine translation on a large scale (Yang &

Lange, 1998; Yang & Lange, 2003). Other similar providers now exist, covering an ever-expanding range of language combinations and supporting the translation of texts typed in by the users as well as of entire webpages (Gaspari, 2004b; Zervaki, 2002). Research data and information on the usage of such services and on their performance are scant and mostly limited to company-based and service-specific reports (e.g. Yang & Lange 1998: 279-282; Yang & Lange, 2003: 203-205), therefore it is difficult to assess the real impact of online MT technology as a whole. Although it is not possible to see the full picture, anecdotal evidence and reports focusing on a number of specific applications suggest that web-based machine translation is a well-established presence on the Internet scene, providing successful solutions to a wide range of real communication problems faced by Internet users.

Whilst the web localisation industry is a thriving field of professional translation in its own right (Cheng, 2000; O'Hagan & Ashworth, 2002; Yunker, 2003; for more theoretical discussions of the cultural issues involved in localisation and the impact of globalisation on translation, see Cronin, 2003; Pym, 2004; Singh & Pereira, 2005), online MT has carved a niche for itself as a valuable resource not only to assimilate, but also to disseminate digital information in a number of ways and within different environments: a popular trend is that of monolingual websites that rely on free Internet-based MT as a tool to disseminate their contents in multiple languages for the benefit of their international visitors (Gaspari, 2004a). Particularly interesting are the scenarios where human translation is not a viable option to localise a website, either due to budget constraints or because of the prohibitive task of coping with the translation workflow and the management of online content, for instance when highly dynamic websites need to be set up quickly and are subject to very rapid expansion, e.g. to support the humanitarian and relief efforts in response to a devastating natural calamity. Gaspari (submitted) reports on a number of websites that were developed after the tsunami disaster that struck south-east Asia at the end of 2004, by leveraging monolingual language resources and online legacy single-language data. This study evaluates the viability and success of incorporating a free online MT facility into a monolingual website, in order to ensure its scalability and streamline the translation into multiple languages of constantly updated content, consisting mainly of time-critical and short-lived information. The case studies under review serve the purpose of comparing the shortcomings of this MT-oriented approach to multilingual content management with the ideal alternative of developing a properly translated website by means of fully-fledged localisation.

MT-based solutions are also becoming common when multilingual and cross-lingual information delivery are achieved by processing and managing large volumes of text data;

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this is the case, for example, when an MT module is embedded at the back-end of complex systems such as the search engines that provide a translation option when they return hits in a language that does not seem to be that of the user. This choice of incorporating translation technology "behind the scenes" of intensive data processing tasks confirms that the Internet is a natural environment for the successful deployment of MT, in particular because fast processing and the need for online interaction in real time are paramount to guarantee a successful user experience, and human translation or localisation are not reasonable propositions in these circumstances. MT can also be applied to relatively evanescent types of asynchronous communication and information exchange, such as email messages (Hutchins, 2003). Similarly, multilingual chat-rooms are another online environment where time plays a crucial role from the point of view of the users, and Internet-based MT can help the smooth synchronous exchange of postings among people who wish to interact even though they do not share a common language; one notable implementation in this innovative area is that of the "AmiChat" facility provided by Amikai, which is described in detail in Cerezo Ceballos, 2002; Flournoy & Callison-Burch, 2000; Flournoy & Callison-Burch, 2001; Yang & Lange, 2003: 206-208[1].

1.2. Monolingual Websites Relying on Free Internet-based MT for Multilingual Dissemination: Overview of Common Current Practice

Despite this popularity in a wide range of areas where the application of online translation technology seems to provide successful solutions to real communication problems faced by Internet users, the widespread presence of monolingual websites that rely on embedded free online MT to disseminate their contents in multiple languages reveals a number of weaknesses. A review of common current practice suggests that Internet-based MT is most of the time provided in monolingual websites as an additional feature or facility, without however paying much attention to key issues in terms of human-computer interaction, web usability and interaction design that are crucial to its successful deployment by people who wish to browse the webpages of the site in their own preferred language. Gaspari (2004a) provides an overview and evaluation of how 36 monolingual websites in English belonging to 3 different categories (i.e. institutional, commercial and informative) incorporate online MT services for multilingual browsing, encouraging international visitors to take advantage of translation technology to access their contents.

In order to evaluate the success of this content dissemination strategy implemented by the websites under consideration, the study reported in Gaspari (2004a) looks at a number of

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[1] The final section contained in Yang & Lange, 2003 (i.e. "6. Postscript: Chatting multilingually", pages 206-208) was written and added to the rest of the article by Harold Somers, the editor of the volume in which it appears, as noted in Somers, 2003: 209.

key usability parameters that can be broadly subsumed under the headings of user-friendliness and interaction design. Factors taken into account include the following: how the use of online MT is proposed to web-surfers (e.g. by means of mono- or multilingual linguistic messages, as opposed to non-verbal iconic symbols like flags); how much relevance is given to online MT (prominent position on the home page of the website); the presence of disclaimers and warnings about the possible problems associated with the use of online MT; the overall degree of integration (i.e. how straightforward and intuitive the process of interaction is made for the user). The sample of websites in the survey revealed a poor consideration of crucial usability issues, and an overall failure to embrace a fully committed approach to user-centred design when it comes to the subtleties of offering an online MT facility for multilingual content dissemination. Although the number of websites considered is very small and it cannot be fully representative, it seems reasonable to assume that the indications provided by this analysis reflect some well-established trends in this area, and the study concludes that the "overall lack of a user-oriented approach and the limited consideration of issues of user-friendliness make the integration of on-line MT into monolingual web-sites largely ineffective" (Gaspari, 2004a: 62).

This scenario suggests that improvement is needed in a number of respects in order to take full advantage of the potential offered by Internet-based machine translation technology, particularly when it comes to incorporating it into monolingual websites for dissemination purposes. While the role that could be potentially played by online MT in a number of areas seems to be beyond question, the feeling remains that this is still a largely untapped resource with substantial scope for development, with a clear need to promote best practice in terms of how MT can be seamlessly integrated into the architecture of monolingual websites, in order to achieve the successful multilingual dissemination of their contents. Against this background, this paper reports on a project whose aim was to explore the challenges and technical issues involved in the whole development cycle encompassing the design, implementation and user evaluation of this MT-based approach to multilingual content management. A case study is presented to illustrate the salient points that emerged when grappling with the task of integrating free Internet-based MT into the architecture of the official website set up in support of London's successful bid to host the 2012 Olympic Games (available at `www.london2012.org`), followed by the discussion of selected results of extensive user testing and evaluation.

2. Overview of the Development Cycle
2.1. Typical Scenario
The typical scenario in which the development cycle under consideration tends to occur is the one in which the contents of a website are developed only in one language, and

translations into other languages are presented to international visitors on an on-demand basis via Internet-based MT services. In order to maximise the impact of this strategy and to reach the largest possible number of multilingual visitors with diverse language backgrounds, the original version of the site is usually created in English, which guarantees the coverage of a wide range of target languages – as a matter of fact, English is the most common source language in most free Internet-based machine translation services. At the moment of this writing, the most popular and longest-established free online MT providers support up to a dozen target languages in combination with English, which is by far the most widely represented.

This situation is determined by the undeniable status of English as the privileged medium of global communication, particularly on the World Wide Web. Therefore the case study reported in section 3 below has taken into account this bias in the current provision of language pairs offered by online MT services, in order to represent a realistic scenario for the whole development cycle, with the aim of promoting best practice in situations where it is most likely to be needed (the websites analysed in Gaspari, 2004a and Gaspari, submitted also reflect this tendency to favour English as the source language in which the "native" version of the website is maintained). One crucial advantage of selecting English as the only language in which the original version of the website is posted online is that it seems quite safe to assume that a larger number of people can have direct access to it (either because it is their mother tongue or because they are familiar with it to some extent), than would be the case for less widely known languages. This in turn is beneficial to the overall visibility of the website, as it becomes more likely that users find it by submitting queries to search engines or browsing through the contents of English-language web directories.

2.2. Benefits of Relying on Free Web-based MT Services

The decision to rely on free web-based MT embedded within the architecture of a monolingual website in order to disseminate its contents in multiple languages is particularly attractive because of the advantages it offers in terms of streamlined online content management, which refers to the work and resources that are needed in order to keep the information contained in a website correct and up-to-date. This process becomes particularly challenging, time-consuming and expensive in the case of multilingual websites, where a lot of effort is needed to create language-specific sections (which may or may not have to contain the same kind of information or level of detail), and to keep them "in synch" with one another, i.e. with changes being reflected without delay in all the languages available on the site. The difficulties of managing multilingual web content are compounded in highly dynamic websites, where new information is constantly being added and updated

(particularly short-lived and time-critical texts, like for example news flashes or press releases), and old out-dated content needs to be removed and archived when it is no longer relevant.

Although this multilingual content management work is vital to the quality and professionalism of the information delivered by websites, it entails a number of very complex and labour-intensive tasks which may be impossible to cope with, particularly for websites with limited budget and scarce human resources allocated to translation. One strategy that is commonly employed to reduce the overheads and difficulties of managing the updates of multilingual online copy is called single sourcing, whereby the "official" version of a website is developed and maintained primarily in one main language, and all the translations are based on and derive from it. This is particularly effective for multilingual websites that wish to have perfectly parallel multilingual versions, i.e. without the need to provide country- and language-specific information, which should not therefore be duplicated across all linguistic versions. Gaspari (submitted) looks in detail at the benefits of adopting single sourcing and combining it with an MT-oriented approach to multilingual web content management and dissemination, reporting on a number of websites developed only in English, but that needed to distribute their contents to as large an audience as possible on a global scale, with no language-specific variation in the information. For the sake of discussing realistic applications with practical functionality, this strategy has also been pursued in the implementation case study presented in the following section 3.

3. Case Study: Redesign of the Website in Support of London's 2012 Olympic Bid

3.1. Background to the Case Study and Aims of the Project

The case study presented here comprised two separate stages. In the first part of the project, which spanned 5 weeks between April and May 2005 and which is reported in this section of the paper, 4 groups of postgraduate students doing an MSc in Computation at the School of Informatics of the University of Manchester carried out a redesign exercise as part of their assessed coursework for their module of Human-Computer Interaction[2]. These students had already previously completed similar hands-on group projects of comparable length as part of their coursework for the MSc, and they all had a strong background in Human-Computer Interaction, web design, programming and software engineering.

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[2] I would like to thank these 14 students for their efforts, commitment and enthusiasm during the project. The names of the students forming each of the 4 groups are listed in the acknowledgements section at the end of the paper. Dr Sri Kurniawan, a lecturer in Human-Computer Interaction in the School of Informatics of the University of Manchester, also deserves credit for her crucial support and input in all the stages of the design and execution of this project, to which she has contributed significantly as part of her supervision of my PhD research.

Following this, the second stage of the project (between late May and June 2005) consisted in the extensive user testing and evaluation of the deliverables produced by the MSc students as a result of the first part of the project, and some selected results are presented and discussed in section 4 below.

The 14 postgraduate students who were involved in the first part of the project were divided up into 4 separate working groups. It was felt that splitting them into smaller operative units would enable them to carry out a significant amount of work thanks to the possibility of sharing responsibilities and allocating tasks to individual members, while ensuring a certain variety in the results and deliverables produced by each of the 4 groups by the end of the project. Given the linguistic and cultural emphasis of the project, and in order to guarantee visible variety across the deliverables produced by the groups, the only criterion according to which the groups were formed was based on the background and nationality of the students, i.e. British and Western students were grouped together in the two 4-member groups, while Asian students formed the remaining two groups, with 3 members each.

The aim of the project was to use knowledge in the fields of Human-Computer Interaction and web usability to redesign the home page of an existing website (i.e. `www.london2012.org` set up in support of London's bid to host the 2012 Olympic Games, see Figure 1 below) to achieve the seamless integration of free online machine translation technology into its architecture, with the aim of disseminating the contents of the website in at least ten languages other than English without the need for human translation. By the end of a 5-week period, each of the 4 groups was expected to submit one deliverable, i.e. the redesigned home page of the website, for which each member would receive a substantial part of the coursework-based assessment. The completion of the project also involved other components (i.e. filling in two follow-up questionnaires with essay-type questions and the performance in a formal presentation of the deliverable), which however are not included because they are not directly relevant to the work presented here.

At the beginning of the project the students were given a list of useful resources (i.e. the Internet addresses of popular free online machine translation services and of the official websites of past high-profile international sporting events) and a suggested schedule of group-related activities with milestones, to ensure they would all be making progress to complete the project within the 5-week time frame. In order to raise their awareness of some of the key issues involved in the work they were expected to carry out, all the students attended an introductory session which provided background information and a basis for the redesign work to be undertaken, highlighting some of the areas and problems that had to be considered; during this session a number of multilingual websites (properly

localised and translated, as well as relying on free Internet-based MT for dissemination purposes) were shown to the students, in order to make them familiar with different approaches that are available to indicate that the information contained in a website is available in multiple languages. Although these websites represented examples of different levels of success in offering multilingual information, the emphasis in this introductory session was on pointing out the basic features of the various approaches, without however passing any explicit judgment on their effectiveness, so as to avoid any suggestion as to the preferred options and correct strategies to be implemented in the redesign project.

After having been exposed to examples of both good and bad practice in terms of how to design websites available in multiple languages, at the outset of the project the students were also informed about the key marking criteria for the redesign exercise: they were expected to demonstrate the awareness and consideration of Human-Computer Interaction and web usability issues in the redesign of the home page of the London 2012 website, ensuring that it could cater for the needs of a global multilingual audience, so that users with different linguistic and cultural backgrounds could navigate the website in their preferred language by taking advantage of an embedded MT facility. The redesigned home page should enable the seamless integration of free online machine translation technology to support multilingual coverage with a view to disseminate the content of the website in at least ten languages other than English, without the need for human translation. Another stipulation was that the redesign exercise should modify the existing original home page only to the extent that was required to integrate the online machine translation facility. The coursework-related documentation also mentioned some key areas that were going to be looked at for the assessment, and within this fairly broad brief the 4 groups were left free to use their creativity and to implement the redesign that they thought was best for the purpose.

3.2. Linguistic Limitations of the Original London 2012 Website

The whole idea behind this case study was to get the students to work on a realistic project, setting them goals that they could relate to and that would test their ability to come up with a redesigned deliverable that could solve a real issue. This experience would give them valuable transferable skills in terms of user-centred and usability-oriented web design, as well as the appreciation of design-related cultural issues in Internet-based communication that they could then use in their future careers. Every effort was made to present the project as a real-life task, in a scenario that they could be realistically working in after completing their MSc course, given the emphasis of their studies on web design and Internet-based forms of communication.

This first part of the project took place in the three months before the International Olympic Committee was due to announce the city chosen to host the 2012 Games, when excitement and anticipation were building up in the British media in support of London's bid. As a matter of fact, until the very day on which the results of the election of the host city were announced in early July 2005, it was very much in doubt that London was in a position to overcome the stiff competition of the other candidate cities (i.e. Paris, New York, Moscow and Madrid) to secure the privilege of hosting the Olympics in 2012. A number of high-profile events and campaigns featuring prominent personalities and celebrities were promoted by the British government in the huge effort to ensure backing and gather momentum behind London's bid, which was eventually successful. The home page redesign project that the 4 groups of MSc students were working on was presented to them within this context, as part of a broader effort to ensure the visibility and effectiveness of London's bid campaign, with the Internet presence being a key part of the communication channels that could contribute to its success.

As a result, one crucial element of the project in this respect was to outperform the other competitors bidding to host the Olympic Games, by presenting the students with an "as is" situation in terms of how London's website had been structured and developed up to that point (see Figure 1 below), giving them the challenge to redesign it by integrating free online MT into its architecture, with a view to boosting the international impact of London's bid.
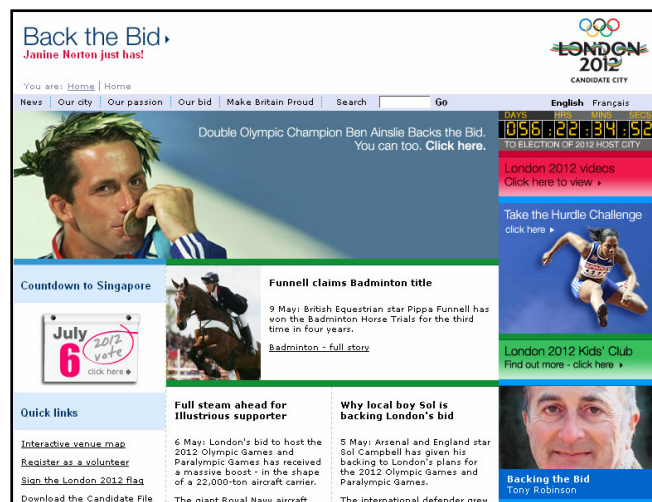

Figure 1. The English version of the home page of the official London 2012 website as it appeared in early May 2005

The benefit of an MT-based solution to the content management and dissemination of London's website was that this approach would avoid the need for the expensive and slow human translation, so that the whole website could then be maintained only in English, with its information made available to anybody throughout the world in at least ten other languages in real time on an on-demand basis at no additional cost, by relying on the

seamless integration into the architecture of the website of free online MT technology. It was made clear to the students that during the project they needed not worry about the quality of the translations into the target languages provided by these MT services: for the purpose of the redesign project they were asked to assume that this was not a problem, as the focus was exclusively on the success of the redesign exercise in terms of web and interaction design, rather than on the performance and output quality of the free MT systems employed to this end, which was beyond their control.

At the start of the project, i.e. in early April 2005, the contents of the London 2012 website were only available in two languages: the whole website was in English, with only some parts translated also into French[3]. This was regarded as a serious problem, which the groups' redesign project should help to resolve:

(1) the current coverage of only two languages, one of them being the language of the prospective host country, was very limited and did not adequately reflect the international spirit of the Olympic Games and London's determination to host such a high-profile global sporting event;

(2) the current design of the partially bilingual website was very costly, slow and inefficient, as it constantly relied on human translation for some of the content to be translated into French; all the copy for the website was generated in English in the first instance, and then some of it went through a team of French translators before the information could finally be posted onto the French version of the website. This was an expensive, time-consuming and error-prone process, requiring a lot of work and resources to manage the workflow of information and keep both versions of the website up-to-date and "in sync";

(3) much of the information posted on the website was time-critical, changed often and had a very limited life span, particularly the "news" section, which contained press releases and short announcements that needed to contain current information all the time and were frequently updated, with old content being removed and archived. Human translation represented a serious bottleneck in the management of the information workflow: owing to the delay caused by the translation, by the time some texts had been translated from English and were ready to be posted online in French, the information they contained might have been no longer of interest or accurate;

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[3] It is interesting to note that the official website of the Olympic Movement (available at `www.olympic.org`) is also only in two languages, i.e. English and French.

(4) with the exception of Paris - which until the end of the bidding process was commonly regarded as London's strongest competitor - the official websites set up to support the bids of the other cities battling to host the 2012 Olympics seemed to be dealing very successfully with the problem of multilingual coverage, since they contained more information in a wider range of languages, as summarised in Table 1 below. The redesign project was aimed at resolving this weakness of London's website, in order to give it a leading edge over its competitors in this respect.

Candidate host city	URL of the official website in support of the Olympic bid	Number of languages covered by the website	Languages covered by the website
London	`http://www.london2012.org`	2	English, French (partially)
Paris	`http://www.parisjo2012.fr`	2	English, French
Madrid	`http://www.madrid2012.es`	3 (+15)	English, French, Spanish *
New York	`http://www.nyc2012.com`	3 (+6)	English, French, Spanish *
Moscow	`http://www.m2012.ru`	7	Arabic, Chinese, English, French, German, Russian, Spanish
These are the languages in which the whole website was available. However, some limited information in support of the bid of the respective city was additionally offered in other languages (number in brackets) and could be accessed from the home page			

Table 1. Language coverage of the official websites supporting the candidate cities to host the 2012 Olympic Games (information correct as of Monday 11 April 2005)

3.3. Technical Issues in the Seamless Integration of Free Online MT

One of the issues pointed out by the survey presented in Gaspari (2004a) is that the large majority of the websites observed in the sample considered in that study did not offer a satisfactory degree of seamless integration and optimised interaction design, thereby failing to cater for the needs of typical users, who expect a smooth, straightforward and pleasant online interaction. What was found, on the other hand, was that most of the websites only provided a low degree of user-centred design, thus jeopardising the actual effectiveness of offering an online MT facility to users altogether. Given this awareness, in the case study presented in this paper great emphasis was placed on ensuring that multilingual and international visitors could easily visit the website selected for the experiment in their own language, without having to worry about awkward navigation and interaction patterns.

This requirement raised a number of technical challenges with an impact on the actual redesign and implementation of the new home page for the London 2012 website proposed by each of the 4 groups. In the introductory session clarifying the aims of the project and showing some relevant examples, the students had seen how other monolingual websites tried more or less successfully to offer an integrated online MT facility for the benefit of their non-English speaking visitors. The MSc students subsequently took these MT-oriented websites as a basis to get ideas and come up with their own redesigned deliverables, and one crucial part of this exercise was to do some reverse engineering, discovering from the examples they looked at some technical details that they would need in the development and implementation of their own prototypes.

One key element to ensure the seamless integration of the web-based MT facility into the deliverables was to keep to a minimum the visibility of the MT engine enabling the operation of the translation workflow. To this end, the students had to make sure that users would have to select their preferred language in some intuitive way, and then be able to carry on navigating the translated website, without having to resort to cumbersome procedures, like logging on to the webpage of a free online MT service and type in or copy and paste the URL of the English version of the London 2012 website into the appropriate field and select their chosen language combination, in order to have it translated. Whilst some monolingual websites do force their multilingual users to go through such complicated steps, clearly disregarding basic user-friendliness and usability principles, the purpose of this project was to minimise the visibility of the MT processing, and students were expected to redesign the home page making sure that the interaction design was as simple and straightforward as possible.

All groups were able to deal with this aspect very successfully, understanding how to code links to free online MT services that would keep hidden from the visitors the MT processing. As it turned out, all 4 groups chose Babelfish (available at `www.world.altavista.com` or `www.babelfish.altavista.com`) for the implementation, given that this system was regarded as the leader in the field and a good choice, particularly because it offered more than ten target languages in combination with English, which was the number required in the case study[4]. The design choices of the groups varied with regard to how these links were presented to the users (i.e. whether they were embedded in a visual icon or shown as clickable text – more details about these choices are discussed in section 4 below), but the URLs encoded in these links all shared the same structure, as in the following example:

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[4] The only exception was the deliverable produced by group B (see next section for more details), which also included Norwegian as a target language, and in their redesign this particular language combination which is not offered by Babelfish was supported by Freetranslation (available at `www.freetranslation.com`).

http://babelfish.altavista.com/urltrurl?url=http://www.london2012.org/en&lp=en_es

a   b   c
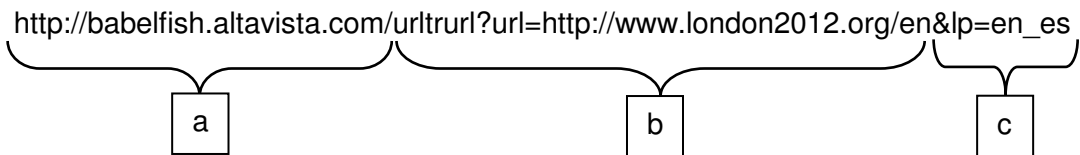
As indicated above, this Internet address can be broken down into three separate components (a, b, c), each of which performs a specific role in identifying the actions that take place when the user clicks on a link that is coded with this URL:

(a)   `http://babelfish.altavista.com/`

this identifies the online MT service to which the translation request is submitted, in this case Babelfish. In other words, a request to process the translation is sent to the Babelfish server;

(b)   `urltrurl?url=http://www.london2012.org/en`

this specifies that the source text of the translation is not a passage of plain text typed in by the user, but it can be found at a specific URL, i.e. the Internet address of a webpage that is available online, and particularly in this case the source document to be translated is the home page in English of the London 2012 website;

(c)   `&lp=en_es`

in this final string of characters of the URL, "lp" indicates the language pair (or language combination) for the translation request, and in this particular case the variables for the source and target languages are instantiated to the codes "en" (for English) and "es" (for Spanish), respectively.

The following two figures show the original home page of the London 2012 website and the translation into Spanish provided by Babelfish by using the URL described above:
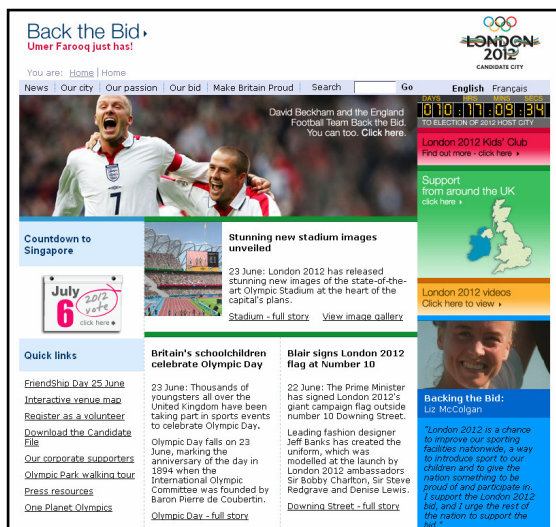

Figure 2. The official home page in English of the London 2012 website (late June 2005)
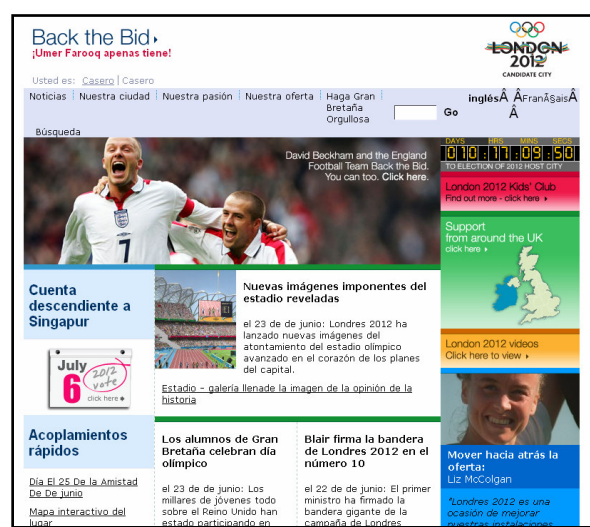
Figure 3. Translation into Spanish provided by Babelfish using the URL described above

All the groups involved in the redesign project used variations of the basic URL described above to provide translations from English into the target languages that were covered in their deliverables. For example, changing the final two characters of the Internet address above from "es" (for Spanish) to "it" or "de", would submit to the Babelfish server a request for the translation of the home page of the London 2012 website from English into the target languages of Italian or German, respectively. Once this basic pattern was discovered, the codes for the other target languages supported by free online MT to be included in the deliverables could be easily found by experimenting with simple reverse engineering techniques.

As can be seen in Figure 3 above, the textual content of Figure 2 that is not captured in graphics is translated into Spanish, whilst some parts remain untranslated (e.g. "Back the Bid", "David Beckham and the England Football Team Back the Bid. You can too. Click here.", "Candidate city" under the logo, etc.), because online machine translation services cannot process text that is part of graphic files, banners, etc. Still, in this example most of the content on the text-intensive original home page gets machine-translated into Spanish (e.g. the main navigation bar consisting of keywords and the highlights of the latest news).

3.4. Design Options and Approaches to Implementation

The 4 groups taking part in the project were confronted with a number of decisions with regard to the design of their deliverable and how they would implement the integration of the online MT facility into the existing website of the London 2012 Olympic bid by redesigning its home page. Some of the key issues are listed here: the use of text as opposed to visual symbols and metaphors (e.g. flags, clickable maps, etc.) in order to inform visitors that the website could be browsed in multiple languages by international users; the arrangement and distribution of these options on the home page to maximise their impact, organising them according to some recognisable order; alerting the users to the fact that the versions of the website in languages other than English were provided by using free online machine translation, making them aware of likely imperfections in the translation; the provision of error-recovery paths for any mistakes made by users in selecting the wrong language; how much of the existing web design of the official home page to reuse, i.e. adding features to the existing code to modify the original home page only slightly, or start again from scratch for a complete overhaul of the home page, etc.

The 4 groups of students gave different responses to these crucial questions, and they came up with fairly different approaches to the implementation of their redesign of the multilingual home page of the website, as illustrated by the following figures:

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Figure 4. The redesign of group A

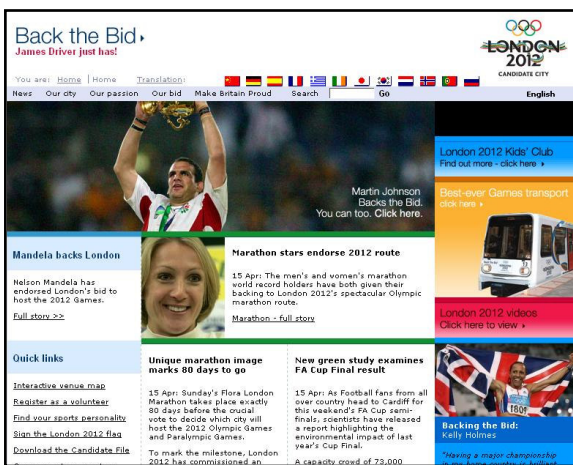Figure 6. The redesign of group C

Figure 5. The redesign of group B
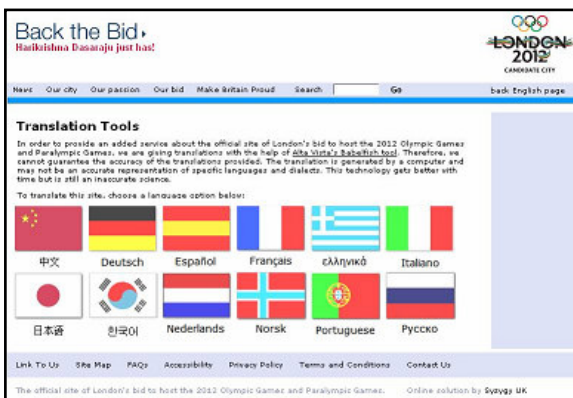

Figure 7. The redesign of group D
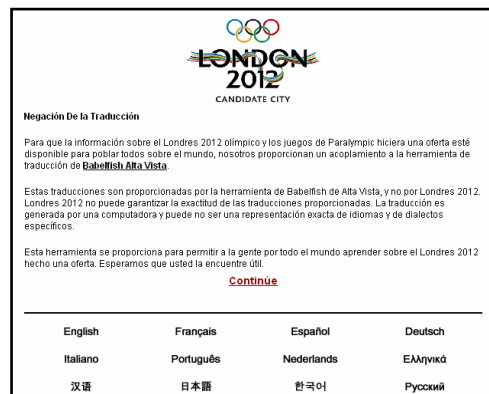

Figure 8. Extra webpage of group B

Figure 9. Extra webpage of group D

As an additional feature to their redesigned home page, which was the key element required in the project, two groups of students (i.e. B and D) also provided some support webpages, examples of which are shown in Figures 8 and 9 above. The webpage reproduced in Figure 8 would appear when users clicked on the "Translation" link that was added to the left of the row of flags indicating the various languages offered in the redesigned home page of group B. This extra webpage contains a disclaimer informing

visitors that the translations are provided by Babelfish, and warning them that the accuracy of the translations cannot be guaranteed. By clicking on one of the flags it is then possible to view the machine-translated home page of the website in the relevant language. However, since this additional page with the disclaimer is only available in English, it is not clear how helpful it would be to users who are not familiar with this language. It is also interesting to note that in their redesigned home pages, group C provided a very short disclaimer only in English ("Translations may not be exact" – see Figure 6 above), as did group A in a somewhat more understated or implicit manner ("This site uses a free online machine translation facility" – see Figure 4 above).

Figure 9 above shows one of the additional pages that formed part of the deliverable produced by group D. This webpage is in Spanish (i.e. machine-translated from English into Spanish – therefore itself far from perfect), and similar pages were available in the deliverable for all the other target languages covered in the redesigned home page. This disclaimer in the language selected by the user would appear immediately after the visitor had chosen from the redesigned home page (shown in Figure 7 above) how to browse the rest of the website, thus meeting the expectations and needs of those who cannot understand English. By clicking on the link at the end of the disclaimer (for the Spanish version "Continúe", as shown in Figure 9 above), the user would eventually view the machine-translated version in Spanish of the home page of the London 2012 website, from where they could start to browse its contents translated into Spanish. One drawback of this implementation is that users would be forced to go through this disclaimer page every time they tried to view the Spanish version of the website, which is not ideal. A neat feature of this implementation, however, is that an error recovery path is provided at the bottom of the disclaimer page: in case users select the wrong language from the redesigned home page and wish to amend their choice, they can do so easily by clicking on the correct link for the language they actually want from the complete list.

3.5. Review of the Key Features of the 4 Deliverables Produced by the Groups

This section reviews some of the key functional features of the 4 deliverables, emphasising the differences in the redesign as well as common aspects of the implementation process, but without taking into account subjective aesthetic considerations. Group B (Figure 5 above) produced the redesigned home page that was most heavily based on the original, by reusing most of its code and adding the clickable icons of the flags to indicate the availability of multiple languages. This approach has the advantage of leveraging the design work already done by professional developers, whilst the other three groups have created their redesigned home pages from scratch, without reusing any significant part of the original home page.

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The students of group B were also the only ones who incorporated the language selection facility into a fairly complex environment, by adding a row of flags at the top of the original home page which had images as well as information already provided in English (therefore not necessarily understandable by international visitors). Groups A, C and D, on the other hand, opted for a welcome page whose sole purpose was to guide the users through the process of selecting their favourite language in which to browse the contents of the website.

Groups A and D (Figures 4 and 7 above, respectively) showed a common approach to the language selection process in their redesigned home pages, in that they provided clickable buttons with the names of the languages (each written in the respective language). These buttons consist of images, therefore there is no need for users to have the font packages for Asian languages installed on their machines in order to view these redesigned home pages correctly[5]. The drawback of this choice, however, could be that this design strategy might result in slower download, which may have a negative impact on the online experience of users who rely on slow Internet connections with limited bandwidth. A difference between these two deliverables is that the "alt texts" accompanying the clickable buttons are left in English in the home page redesigned by group A (i.e. "German", "Spanish", etc.), whilst group D translated them into the appropriate language (i.e. "Deutsch", "Español", etc.). Finally, the home page redesigned by group B (Figure 5 above) relies only on flags to convey the idea that multilingual visitors can select their own language, whilst group C (Figure 6 above) chose a hybrid approach, showing both a flag and a short textual welcome message in each of the languages covered by the deliverable.

3.6. From Prototype Design to User Testing and Evaluation

The deliverables provided by the 4 groups illustrated different approaches to the design and implementation of an MT-based architecture to disseminate in multiple languages the contents of an originally monolingual website, adopting different choices with regard to a number of key features, some of which have been reviewed in this section. Therefore, in order to complete the case study with an evaluation of the success of the 4 redesigned home pages of the London 2012 website, it was felt that these 4 prototypes would be excellent material to conduct user testing and evaluation investigating the linguistic, cultural and design issues addressed by the project. This would shed some light on the design and implementation strategies actually favoured by international users in this scenario, giving an opportunity to identify examples of best practice that should be encouraged whenever a monolingual website wishes to rely on free online machine translation for dissemination

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[5] Figure 6 above with the home page redesigned by group C shows the problem that occurs if fonts for Asian languages are not installed on the computer: the user can only see squares (or other unintelligible symbols) instead of the correct fonts. However, at the bottom of the deliverable of group C there is a link to direct users who need to install Microsoft language pack with the required Asian fonts.

purposes. The next section reports on some selected results of an extensive follow-up user evaluation, discussing some of the most important issues that emerged.

4. Selected Results and Discussion: User Testing and Evaluation

4.1. Design of the Experiments for User Evaluation

Following the first part of the case study discussed in the previous section, the next stage of the project consisted in the testing and evaluation of the 4 deliverables produced by the groups of MSc students as part of their coursework, and took place at the University of Manchester between late May and June 2005, i.e. in the few weeks before the International Olympic Committee announced the decision that London would actually host the 2012 Games. The intention of these evaluation experiments was to get people with different linguistic, cultural and national backgrounds to use the prototypes produced in the first stage of the case study, evaluating a number of key aspects of their design and interaction.

The participants were recruited by posting an email message to the mailing list of the students of the University of Manchester, and those who had initially expressed an interest were subsequently screened to make sure that the people involved would be good Internet users and would therefore be able to carry out some tests and guided evaluation tasks with the deliverables, navigating the Internet. The sessions lasted approximately one hour, and the participants were rewarded with a small amount of money in cash for their time. The tests were based on a number of evaluation tasks presented in a 74-item questionnaire. Due to reasons of space, the rest of this paper only presents a small set of the results and usability data gathered in these experiments. The next section provides more details about the participants who were selected to complete the investigation and the whole make-up of the sample.

4.2. Make-up of the Sample of Participants in the User Evaluation

These usability tests involved 72 participants[6] who were native speakers of the following 7 languages, which were all covered by the 4 deliverables with the redesigned home pages of the London 2012 website: Chinese, French, German, Greek, Italian, Russian and Spanish. The participants were all students at the University of Manchester, roughly equally divided between undergraduates and postgraduates, enrolled in a very wide range of courses based in many departments across the whole University. Every effort was made to ensure that the 7 language-specific samples were balanced in terms of demographic variables such as gender, age and discipline studied at the University, in order to avoid any bias in the design of the experiment and in the make-up of the user population taking part in it.

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[6] I would like to thank these people for their crucial help in my research and for sparing some of their time to participate in the evaluation experiments.

Furthermore, the entire sample consisted of individuals representing different countries, in order to investigate the variation of cultural issues among people with the same mother tongue, but different nationality. For instance, native speakers of Chinese included citizens from the People's Republic of China as well as Hong Kong, Malaysia and Taiwan; German speakers came from Germany as well as Austria, Liechtenstein and Switzerland; the group of native speakers of Greek was equally divided into Hellenic and Cypriot citizens; finally, the sub-sample of native speakers of Spanish included 8 individuals from Spain and 8 participants coming from Latin American countries (i.e. Bolivia, Chile, Colombia, Mexico and Peru).

The following figure shows the make-up of the sample of the 72 participants in the user evaluation, grouped according to their mother tongue and indicating the main nationalities represented in the sample for the native speakers of Chinese, Greek and Spanish:
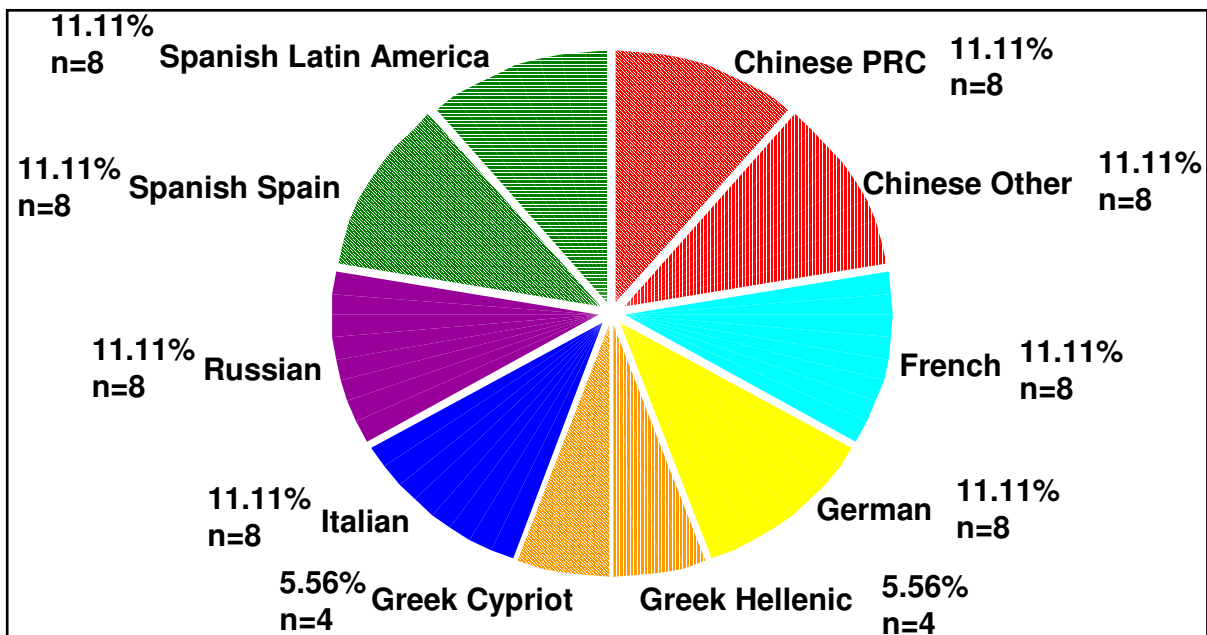
Figure 10. The make-up of the sample of the 72 participants involved in the user testing and evaluation of the deliverables, based on mother tongue and main nationalities (for each group the absolute number and the percentage in relation to the total sample are given)

4.3. Selected Results of the User Testing and Evaluation

The evaluation tasks reported here focused on the comparison of the 4 redesigned home pages against a set of web usability heuristics and on a number of key principles in user-centred web design. The participants were asked to say which approach to implementation they preferred on a number of key areas, choosing from the options illustrated in practice by the 4 deliverables that they were asked to use and interact with. The rest of this section presents the results for two of the most important implementation choices in terms of design, which have already been briefly introduced in section 3.5 above.

The 72 participants in the experiments were asked which of these 3 approaches was in their opinion more successful in indicating that they could navigate the site in their own language:

(I)   name of the language written in the language itself (as in deliverables A and D);

(II)   flag representing the language and no other indication (as in deliverable B);

(III)   combination of flag and a brief welcome message in the language concerned (as in deliverable C).

Nearly half of the sample expressed a preference for option (III), i.e. a combination of a brief welcome message in their own language accompanied by a flag representing the language (as presented by the redesigned home page of group C), whilst the other two possibilities obtained a roughly equal number of votes, as summarised in the following figure, which also shows a small image of the deliverables in question associated with each design option:
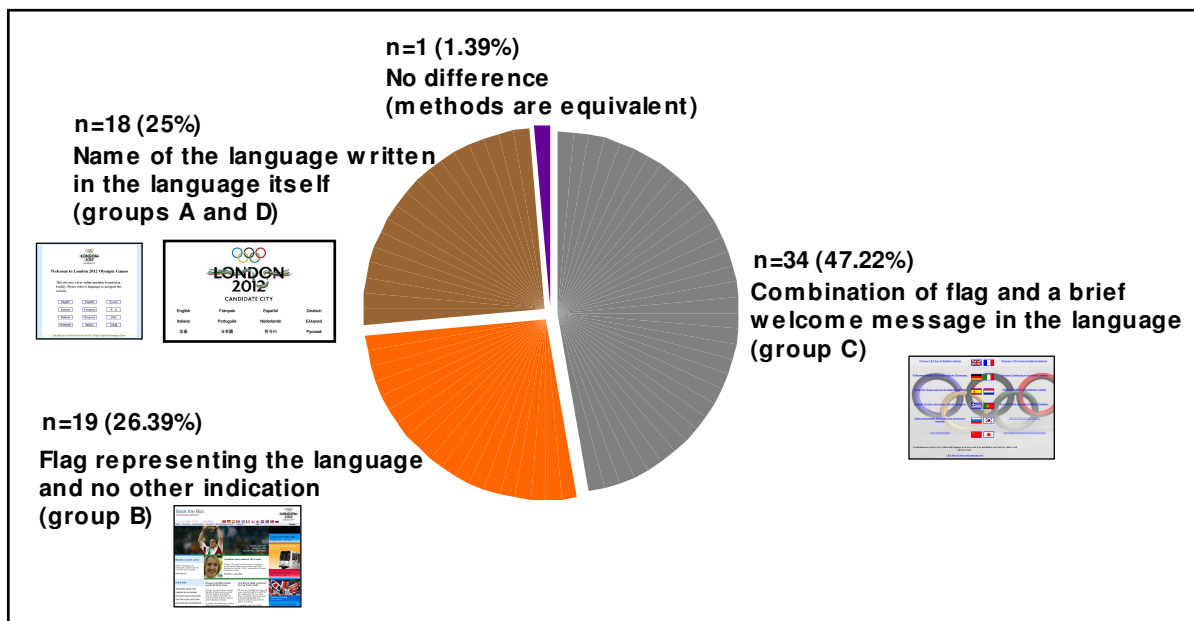
Figure 11. Answers to the question "Which of the following three approaches do you personally think is more successful in indicating that the information contained in the website is also available in your own language?"

Another question of the survey asked the respondents which of these 2 approaches was more successful in indicating that they could navigate the site in their own language:

(i)   language options presented in a separate page (as in deliverables A, C and D);

(ii)   language options presented prominently on the existing home page (as in deliverable B).

The reaction to this question was more balanced than the previous one, but with a marked preference for option (ii), i.e. presenting the language options in a prominent and visible area of the home page (as shown by the redesigned home page of group B), rather than

creating a separate welcome page focusing exclusively on getting the users to select their own language. The following figure summarises the answers to this question:
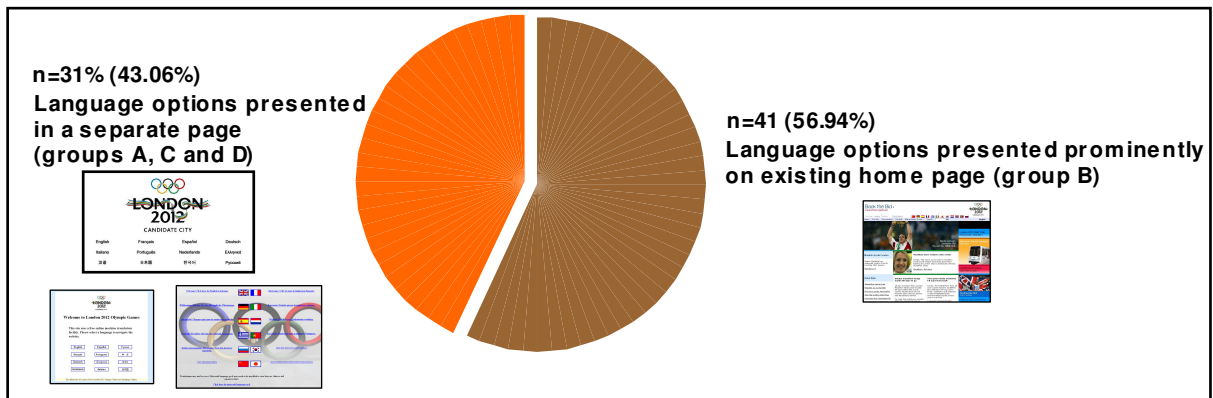

Figure 12. Answers to the question "Which of the following two approaches do you personally think is more successful in indicating that the information contained in the website is also available in your own language?"

4.4. Discussion of the Selected Results of the Comparative Evaluation

In the final part of the questionnaire, after performing some other tests to evaluate and rate the quality of the machine-translated output from English into their 7 native languages (which are not reported here for reasons of space), the 72 international participants were asked to rank the 4 deliverables, giving them marks to put them in their order of preference from best to worst. Following this comparative evaluation, the home page redesigned by group B (which was largely based on the original home page of the official website) was rated top by more than half of the sample (41 respondents, i.e. 56.9%), and was the clear overall winner among the respondents, as shown by the following figure:
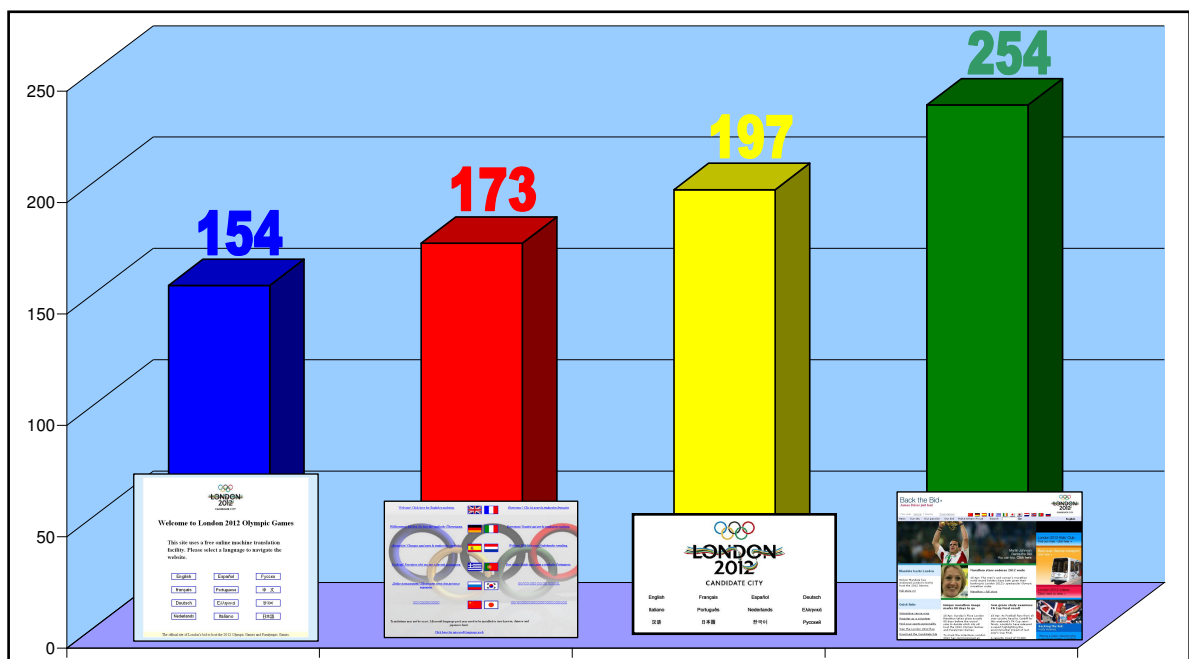

Figure 13. Results and overall scores of the ranking of the four deliverables given by the 72 international respondents based on their personal preference

5. Conclusions and Future Work

5.1. Applicability of the Findings to Monolingual Websites Embedding Free Online MT

The results of this extensive user testing and evaluation, some of which have been reported in the previous section, represent the first attempt to shed some light on the design and implementation issues involved in presenting a monolingual website to an international multicultural audience, giving users the possibility to browse online content in their preferred language by taking advantage of an online MT facility. Whilst it is difficult to identify optimal design options given the significant role played by individual preferences at a number of levels (not least in aesthetic terms, which is very difficult to pin down and factor in during the evaluation), this experimental data shows that there is some consensus on how the majority of international users prefer to be presented with the option of choosing their own language to navigate a website.

One surprising result was that flags are not regarded in the main as problematic symbols or discriminatory metaphors for language selection in the deliverables produced by groups B and C (see Figures 5 and 6 above, respectively). There is no space here to give many details, but the study found that for example participants with Cypriot nationality did not have a problem in general with clicking on the Greek flag as a "shortcut" for the availability of their mother tongue; this was the case also for other languages spoken in a number of different countries (e.g. German, where the German flag had to be clicked on by Swiss and Austrian citizens) or Spanish (where the flag of Spain would serve as the icon to be clicked on by Latin American people as well, although they do not have any direct affiliation with Spain as such).

This seems to be the consequence of current practice in many multilingual (i.e. professionally localised) websites, where sometimes Internet users from different countries are assumed to visit a language-specific version of the website that is associated with one country where the language is officially spoken. As a result, people do not seem to be upset or offended by having to click on a flag that is not that of their own country, when they know that this is a symbol that stands for a widely spoken language, thereby showing a fairly pragmatic attitude. In addition, with specific regard to the method used by the redesigned home pages to get users to select the language in which to browse the website, the sample of participants expressed a clear preference for the design that combined textual components (i.e. the names of the various languages, each in the respective language), with graphic or visual elements like flags, as illustrated by deliverable C (Figure 6 above).

Another interesting finding of this investigation was that the majority of the people participating in the survey preferred to select the language from a list of options presented prominently on an already existing home page with some content (as was the case for deliverable B, in Figure 5 above), rather than on a separate page with the sole purpose of guiding the language selection process. This seems to indicate that Internet users are quite accustomed to viewing complex and text-intensive webpages, presenting a number of different elements (e.g. banners, pictures, navigation bar, text, etc.) competing for their attention at the same time, whilst they would rather avoid spending some time on a single page only to choose the language in which to carry on browsing the rest of the website.

5.2. Wider Implications for Professionally Localised Multilingual Websites

Although this user evaluation was strongly focused on multilingual websites powered by online MT, these design-related findings apply with equal force to any multilingual website, regardless of whether the translations are provided by an online machine translation engine embedded within its architecture, or whether they are the result of a fully-fledged localisation process. Either way, the same broad considerations in terms of design and interaction apply when it comes to getting international visitors to select their preferred language to navigate the website, and similar cultural issues arise (e.g. choosing a particular national flag to refer to a language that is spoken in multiple countries). It seems therefore reasonable to suggest that the findings provided by this case study and by the user evaluation included here can also help to promote best practice in the design of websites that are professionally localised and translated, in order to maximise their ability to meet the expectations of a multicultural and multilingual user population on a global scale.

5.3. Future Research Avenues

The case study reported here consisted of two separate stages, i.e. a redesign project based on the London 2012 Olympic bid website and a subsequent user evaluation based on the deliverables produced in the initial part. A considerable amount of observational usability data was gathered during the user testing, by collecting the responses to a 74-item questionnaire provided by a sample of 72 participants with different cultural and linguistic backgrounds. It is hoped that this initial investigation will be followed by similar experiments in the future, covering a wide range of different websites (e.g. e-commerce sites, corporate and institutional websites, etc.) and considering different language combinations, with a view to gaining further insight into the design-related issues in multilingual websites, and the variation of expectations of users with different linguistic, cultural and national backgrounds.

The deployment of online machine translation technology, particularly as a feature that enables people to browse originally monolingual websites in their preferred language, raises

a number of issues that deserve careful investigation. Further research is vital to develop a better understanding of how its potential can be brought to bear on the solution of real online communication problems. The approach adopted in the study presented here emphasises that user-centred design and the careful consideration of issues in Human-Computer Interaction have a crucial role to play in enabling web users to take full advantage of MT technology, so that its power can be harnessed in the interest of more effective strategies of multilingual content management and dissemination on the Internet.

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