REAL AND VIRTUAL CONFERENCES

Exploring the use of computer communications

D Lawrence¹, R Roy², P K Chawdhry³

¹*School of Computing Science, Middlesex University, London, UK.*

²*Department of Enterprise Integration, Cranfield University, Bedford, UK.*

³*School of Mechanical Engineering, Bath University, Bath, UK.*

Key words: Internet broadcasts, virtual conferences, webcast.

Abstract: Over recent years, experience has been growing in the use of computer network communications to relay audio, video, and other information to people who are remote from the source of that information. Typically the receivers are users at home, but may also include professionals or academics connected to broad bandwidth networks. The transfer of multimedia information across the Internet is an activity that transcends a wide range of subject areas and interests. It attracts a great deal of attention from academics, industry developers/promoters, and home/business users. This paper has a focus on the use of web space to host 'virtual' and 'terrestrial' academic conferences. Although other aspects are discussed, the paper deals in particular with 'interactivity' and organisational issues, and compares three basic types of conference experience: traditional, virtual and webcast. The paper is based on extensive personal experience in organising, planning, designing and implementing traditional conferences, Internet broadcasts (webcasts) and 'virtual conferences', and benefits from both a UK-wide and international perspective. The discussion includes particular reference to the CE '99 (6th International Conference on Concurrent Engineering), Bath UK, September 1999 webcast, and the 'On-Line World Conferences on Soft Computing in Industrial Applications' held in 1998 and 1999. The paper examines the opportunities for experiencing shared events in a virtual environment and identifies technical, interactivity and organisational requirements and issues. Two case studies are presented - one being a virtual conference scenario, and the other being the simultaneous webcast of a traditional academic conference.

1. INTRODUCTION

It is a sign of how the Internet is becoming an increasing part of our personal and professional lives, that almost every contemporary academic conference utilises the Internet in some way. This may be in the form of a webpage to 'market' the event, email to communicate on such aspects as appointing referees, calling for papers, booking and payment of fees, arranging attendance requirements, etc. This paper targets two further uses of the Internet - to host the conference itself (i.e. a 'virtual' conference), and to 'broadcast' some or all of a traditional conference to a remote audience.

In addition to attracting the interest of academics and practitioners in the area of Multimedia Communications, the topic of video conferencing and broadcasting over the Internet is of special interest to corporate and individual users interested in exploring leading edge techniques of computer based video/audio communication. The potential for business organisations, in terms of using video conferencing and webcasting technology for the purpose of significantly improving the effectiveness of communication between geographically separated and remote executives, managers and professionals, is recognised as being immense [8].

There is a great deal of contemporary research activity in Internet video broadcasting ([9], [10], [2], [5], [7]), and although there continues to be problems with achieving consistently high levels of audio/video transmission quality, there are apparent improvements in the technology and the utilisation of available technology. The role of networks and communication technologies have been identified as being dominant in the application of video conferencing—especially where individuals are using the technology at or from their homes [1].

A comprehensive and practical study has been made [3] of well known formats and products used in video conferencing around the world. The finding is that there is as yet no universal agreement on how best to carry out the conferencing and broadcasting. Our approach is to experiment with a range of readily available broadcasting formats/software - partly to enable comparisons and evaluations, but also to widen access to the broadcasts. In previous webcasts [4] we have used a combination of Cuseeme [12], Webvideo [13], RealMedia [14], and mbone [15] has been utilised. RealMedia (video and audio) has become a popular choice of medium for broadcasting live and/or recorded video/audio over recent years, and it is this environment that was chosen for use the webcast of the traditional conference discussed in this paper.

2. VIRTUAL CONFERENCES

2.1 Background

Conferences are expensive events, costing money to organise, as well as to attend. The travel cost is a major limitation especially to those who have to travel abroad to attend the conference. A Virtual Conference organised on the Internet can provide an alternative and inexpensive method of publishing technical findings on the Web. The authors of papers to be presented are not required to travel, participants get better opportunity to discuss the scientific issues, and the organisers get flexibility in operation. Virtual Conferences are becoming more widespread [16], [17], providing an opportunity to scientists from all countries to publish freely on the Internet, and thus bridge the gap between different countries. It is observed that the main challenge is to attract good quality papers, and maintain a good quality discussion.

Virtual conferences organised on the Internet provide some additional opportunities in terms of giving access to a wider audience, live demonstration of research results, cross referencing papers, giving access to the participants to all 'parallel' technical sessions, and finally better discussion of papers in the conference. With the new technologies, such as white-boards, java-applets, and chat software, the conference can be further enhanced through better interactivity.

2.2 Organisation: Technical View

From the organisational point of view, a virtual conference includes almost all the academic activities that is necessary for a conventional conference. The main activity that is not required is the physical organisation of the conference, and arrangements for the participants. On the other hand a virtual conference requires the setting-up of a web site to host the conference. Designing and hosting the web site is an interesting challenge for the organisers. Technology is very tempting, one has to restrict the use of new technologies in the web site to make it accessible from different parts of the World. The organisers should always keep the varied nature of participants in mind.

An example case study scenario is the 'On-Line World Conference on Soft Computing in Industrial Applications' series, held in 1998 and 1999. These conferences, WSC2[18] and WSC3[19], are both academic conferences which were hosted simultaneously by several University web sites from across the world. Where several host institutions are involved, there are the potential problems of website interface and content inconsistencies. Universities also use different web server systems, and this

makes web mirroring a very difficult task, specially when the server is restricted to registered members only. University web servers sometimes are over-stressed, and thus can go down quiet frequently. It is necessary that the virtual conference should have an alternative mirror site in case the other site fails. It is advisable that the alternative site should have exactly same web site system as the main host.

Once the main web site is set-up, the next stage is to publish scientific papers in technical sessions. The virtual conference can also have 'online tutorials', 'online discussion' and 'virtual exhibition' features. In the technical session, authors are encouraged to publish their presentation slides and live demonstration of their results. Online tutorial authors invite questions from participants through 'discussion forums', and they answer online. In WSC2 and WSC3, online discussions were organised using 'discussion forum' software. It is observed that 'chat software' can provide better real time interaction, and is more suitable for a small session like a panel discussion. The discussion forum software is most suited for deep technical discussion. The virtual exhibition is organised for vendor companies and related research groups. This was also the main source of income for the conferences.

It is important that a wide range of people is included in the conference to make it truly global. Therefore, it is important that the organisers should consider dissimilarity in networking facilities, cost of connecting to the Internet in different countries, and the speed of connection. A true interactive system has to communicate fast. It is observed that there were two main options for 'on-line discussion' in the conference: discussion forum or online 'chat'. Considering all the above factors, it was decided that discussion forum based interactivity would provide enough support to the discussion while integrating a large population of researchers across the World. Later it is also observed that a forum-based discussion is very suited for a scientific discussion, where people need time to comprehend one issue before answering or asking questions.

The WSC2 and WSC3 conferences did not have registration fees for the authors or other participants. One of the main obstacles was online transaction of the small amount of payment. With the advancement in e-commerce it would be possible to implement some registration fee for future conferences. Online payment is becoming quiet common, although it involves some up-front expense to acquire the payment system. It is not likely to be possible for individual conference organisers to spend such money to receive the fees online. One possibility is to hire the facility from some service provider, but that is very expensive and is not suitable for such small numbers of transactions. Ideally there should be some online 'conference facilities' which can be shared by academics to organise online

conferences. Universities and other academic and research organisations could play an active role in developing such an infrastructure.

2.3 Organisation: Social View

Organising a successful virtual technical conference is more of a social challenge than a technical challenge. A conference is successful if it can attract good quality papers in the right number, and that is very much dependent on the 'public image' of the conference. Therefore, developing a good 'public impression' about the virtual conference is essential. It is necessary to establish academic credibility of the conference, and this can be achieved as follows:

- Strict reviewing of papers
- Good International Scientific Committee
- Attracting good quality papers from reputed authors
- Thorough scientific discussion about papers
- Publication of the papers in a post conference book by a reputable publisher
- Providing good support to the participants during the conference
- Involving people from across the World
- Getting co-sponsorship from International professional organisations

It is observed that socially, a virtual conference is a great medium to give equal opportunity to all in technical publication. The conference also provides an inexpensive way of interacting with the experts in the field. It has encouraged a number of young scientists across the World to take part in similar programmes. Recently the organisers of WSC2 and WSC3 have started an International Organisation called 'World Federation on Soft Computing (WFSC)', which is also a virtual organisation.

3. CONFERENCE WEBCASTING

3.1 Background

The 6th ISPE international conference on concurrent engineering (CE '99) was held at Bath University, United Kingdom on 1-3 September, 1999 [22]. As somewhat of an experiment, the conference organisers decided to webcast one of the panel sessions (a 90 minute session on the second day of the conference). The webcast event was organised in conjunction with the MInT (Multimedia Informatics and Telematics) research group at Middlesex University. The planning began several months

before the conference, and culminated in a successful webcast that overcame all obstacles except one - a fire alarm!

3.2 Technical features

In the interests of simplicity, only one popular software format only was utilised (RealMedia), with the general plan being to broadcast the panel session 'live' in video and audio. A specialist team based at Bath University handled the provision, set-up and operation of the film and sound equipment - a single professional standard video camera, with internal and external microphones was utilised. It is useful to have the sound recorded on the video tape (for quick archiving and post event re-use), but external microphones provided important flexibility and quality - especially bearing in mind that several speakers were involved, plus questions from the audience. The video and audio stream was broadcast out on to the Internet via an academic network connection.

The audio amplifier and video 'feeds' were connected directly to the PC (Pentium level, 64 Mb RAM) - a video mixer not being necessary as only a single camera was used. Two test sessions were conducted prior to the event - firstly a 'dry run' so that PC, camera and microphone positions could be decided, final lists of required equipment agreed, and the various activities and responsibilities discussed. Any 'live' webcast is a complex event, needing numerous people carrying out various important tasks - often the participants do not have experience of such an event, and so this introduces a further complication to what is already a difficult technical challenge. The second test run was a full set up of equipment - to set sound levels, check positioning, verify compatibility of equipment and technology in use, and deal with any queries and problems identified by any of the team. This last point reveals a fundamental aspect of this type of activity - the very important need for a close and supportive team. Two other necessary characteristics is that each team member needs to be confident with their role, and that there is someone appointed as co-ordinator - and perhaps managers appointed for certain activity groups [6]. The R5 encoder was used, with the 'talking heads' default encoding setting selected. The Real Server software ran on a Unix platform hosted on one of the main networks sited at the conference location, which itself is linked to the JANET academic network [21].

During the webcast, online email support was provided - via an advertised email address and link on the webcast/conference website. A great deal of care has to be taken to design webcast pages so that people with varying experience levels can easily make the connection, and navigate the site successfully. Even so, we did have queries in this area, which suggests

more work is needed to perfect the style and content of the guidance pages utilised [20]. Email, or another readily accessible support service, is essential as people trying to connect often only have a short time to resolve the problems and hence need speedy assistance. In advance of CE '99, the website carried the facility for interested parties to register for the online session - providing the opportunity to assess levels of interest, and to communicate directly with instructions and help.

The webcast was successful in that audio and video transmission was available for the whole duration of the session, there was a reasonable number of connections to the online panel session, and post event feedback was good and positive. A second PC was utilised at the venue to monitor the quality of the webcast audio/video, with email and telephone feedback being received from members of the team situated inside and outside the 'confines' of the institution computer network.

4. INTERACTIVITY COMPARISONS

The earlier sections have described primarily two novel types of conferences: virtual and real-with-webcast, with the real (traditional) conference being used as the context in which to view their success. Although several further combinations are possible of these three types, it will be more useful to compare these basic types and to look at the relative benefits offered by each of them. In the light of the authors' experience in organising real and virtual conferences, this section compares the various aspects of communication in each type of event. Other aspects such as financial and management aspects have been ignored as they are beyond the scope of this paper however a discussion of these can be found in [11].

The 'satisfiability' of communication needs and impact of virtual and webcast events are assessed in comparison with the traditional conferences. The criteria used emphasises the point of view of the user (the attendees) of the conference:

Content of information: integrity, accuracy, completeness, flexibility in message synthesis, effort in building content, richness (depth, variety). Compared to a traditional conference, the virtual conference allowed synthesis of the formal content (contributed papers) with the same quality and integrity. However, it provided a more frequent opportunity for updates and revisions. The webcast of the live panel discussion gave a low-cost duplication of live content with some deterioration of the liveliness implied in a panel discussion.

Effectiveness of delivery: understanding of the message, impact of message, lasting effect, flexibility / adaptability, archiving, reviewability.

The virtual conference provided an effective delivery of the prepared technical papers, and was browsable and printable with similar ease as the material in a traditional conference. It provided no means of delivering an oral, live message but was good for off-line interactions. The webcast, transmitting live, was less effective than a real event in its impact but understanding and impact were good compared to the effort involved on the part of the user.

Type of information: textual, graphic, audio, video. Both the virtual and the webcast events were capable of capturing the information in all these forms. However, due to the nature of the subject matter, the webcast was dominated by audio and video content whereas the virtual conference by the textual and graphic information. The traditional conference in comparison offers a seamless integration of all media types.

Mode of interaction: formal/informal, active/passive, online/off-line, synchronous/asynchronous, simultaneous multiple 3D presence, session hopping. The traditional conference provides opportunity to interact flexibly with respect to formal/informal mode, adjustable degree of activity and in real-time, with the constraint of single location on the part of the attendee. The virtual conference primarily offered the asynchronous mode of interaction between the delegates and presenters. They were however able to move from the discussion (bulletin board) of one topical session to another with ease due to the off-line interaction. The amount of message frequency was however at least comparable to the discussion generated in a live session which tends to be constrained by time limits. The speed of interaction was however very slow, requiring sessions lasting a week or more, and the delegates to adjust to this email-like interaction over a week. The webcast was constrained by the same time limits as the real live session and offered a limited number of questions, answers and comments. The mode of interaction was however near-synchronous and would have allowed hopping sessions with equal or greater ease than in a live conference, had several sessions were being webcast simultaneously. The degree of (in)formality was less than in the live conference that allows the inter-session gaps to be used very effectively for informal interactions.

Social needs: interpersonal bonding, networking, collocation/interaction, awareness about the audience, overcoming cultural barriers, peer group/hierarchy, cultural norms. The traditional conferences have the greatest strength in developing interpersonal links and networks between the delegates. Quite often, the social need to interact with the peer group is as strong a motivator as the technical content, for people to attend conferences. The effectiveness of virtual and webcast events in satisfying the social needs is the most difficult to achieve due to the novelty of these media and lack of experience with their effective exploitation. However, the fact that the

virtual conference had over 500 registered attendees and the webcast had over 50 (generated within a very short publicity period), shows that people are willing to use these new low cost, low effort media to browse the possibilities for interaction in a low to medium commitment mode. The virtual conference provided a significant acquaintance generation between the delegates as evidenced by their subsequent joint projects and return to the following years conference.

Psychological needs: human proximity, familiarity (people, place, content), own space (protection) (creation of) shared space, common cause/group thinking, enthusiasm; ambience, expressibility, level of participation, attendees' commitment, break from routine work schedule. For the delegates used to working in the computer-based environments, the psychological barriers to participation were largely absent and their psychological needs were sufficiently addressed by the virtual and the webcast events. Still, mimicking the human proximity and shared space in the 4D space and time of real life was neither the objective nor was it achieved by these events. They did however provided a similar level of group dynamism and common purpose as a real event.

Robustness: linguistic, technological, communication attitudes, reconfigurability, re-scheduling, parallelism of streams, fault-tolerance in delivery modes, interruptions/noise, flexibility in attendance, retrieval of missed sessions. The real conferences are robust with respect to the range of abilities in the use of natural language, use of technological aids, reconfigurability of sessions and their scheduling. Large conferences however tend to have a pre-planned schedule that remains inflexible. In comparison, the virtual conference offered a similar pre-configured session layout, though the schedule was flexible and was extended from 7 days to 10 days due to continuing discussion in many of its off-line sessions. It was fault tolerant to some extent due to the use of several mirror websites - this did not apply to the discussion bulletin boards that were not mirrored. It allowed active as well as passive communication attitudes, just like in a traditional conference, and was not affected by the problems of missed sessions. The webcast was pre-scheduled like the related live session, however it was possible to archive the proceedings allowing them to be reviewed. The fault tolerance was lower, due to the experimental nature of the technology in place as well as possible lack of training of many users in dealing with faults in receiving the webcast. Both events offered reasonable flexibility in attendance on the part of the virtual delegates.

Spontaneous creativity: generation of novel ideas, dissemination of novel ideas, mutation of novel ideas, interplay between ideas. The virtual conference offered reasonable quality off-line discussion on the bulletin boards to generate new ideas and their sharing with greater numbers than

would be possible in a real-life face-to-face discussion. It did however do this only with respect to the formal framework of technical papers, and lacked the free-format ambience of an Internet cafe. The webcast lacked the psychological proximity and informal opportunities of interactions that often generate many new ideas spontaneously.

Role of media vis-à-vis the content: content-driven communication, media-driven communication, usability of communication tools, user training (in the use of tools). The traditional conference is driven by the technical content and social/psychological needs for interaction; various media are used to enhance the effectiveness of the technical content. The virtual conference deployed mainly the HTML content delivered via a browser, and it can be said that it was primarily content driven. This was truer in 1998 than in 1997, since by then the users were more naturally adept in the use of the web. The webcast deployed a higher level of technology and, due to the relative lack of training on the part of a broad set of users, was considered media driven. In a few years' time when the tools such as RealPlayer™ have become commonplace (like a web browser has in the past 5 years) it may also become a content-driven event.

5. CONCLUSIONS

Conferences have become an essential part of professional life. However they require a great deal of resources in terms of time and money required in attending them. Virtual conferences and webcasts offer two alternative modes of attendance at low cost reducing the resources needed by 90%. The paper has presented the authors experience in organising these events and assess their effectiveness in terms of satisfying the communication needs of a professional conference. Whereas the traditional conference is still a high-cost, high value solution, the virtual conference offers an off-line solution of low cost and medium value. The technology for virtual conference is relatively simple and sufficiently mature now for its use to spread widely in the coming years. The webcast offers a low cost medium value solution for organising and attending live or near-live events. Its technology is yet to be adopted by a majority of professionals on an equally broad level as a plain web browser. However with increasing webcasts of news channels on the Internet, it is likely to find a place in a generic desktop within 5 years, making it a feasible means to include virtual delegates with traditional conferences.

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