Designing a Truly Integrated (Onsite and Online) Conference: Concept, Processes, Solutions

1.0 Introduction

IEEE is the single biggest organizer of conferences in the world, sponsoring more than 900 conferences annually. These events offer IEEE members and engineering community at large a great opportunity for professional communication and publishing their research results in the IEEE Xplore database—the world's highest quality collection of technical literature.

IEEE conferences occur in a variety of formats. A conference could be very large (with several thousand participants) or rather small (with under a hundred attendees). In this paper, we focus on a conference model, which is arguably the most common one—single location, several concurrent tracks/symposia, several hundred international attendees.

Internet and various web applications are used in virtually all domains of human activities. Preparation and delivery of conferences is one of the examples, where internet is widely used for dissemination of the information about a forthcoming event (through email and websites), collecting paper submissions, registering attendees, adding value to both organization and participation, and finally, storing conference papers in the online databases.

Using internet for various types of collaboration has become a mainstream in the industry and academia. Almost any email from a product or service vendor would include an invitation to attend a webinar, and most of us participate in the corporate online meetings on a regular basis.

It is obvious that similar types of the web conferencing technologies could be used in the delivery of the IEEE conferences. It is just a matter of time when these technologies will be mature enough to meet all the business needs of the conference organizers, and organizing committees will become fully aware of potential benefits and develop skills to incorporate web conferencing technologies in standard conference procedures.

The purpose of this paper is to draw attention of the conference organizers to the opportunities of the web conferencing, and share the knowledge and experience which have been accumulated during the preparation and delivery of the IEEE Toronto International Conference - Science and Technology for Humanity (TIC-STH) 2009 [1].

This publication is a concise version of the article. For the details see [15].

2.0 Truly Integrated Conference Concept

The use of the web conferencing technologies has been envisioned as a differentiating feature in the delivery of the IEEE TIC-STH 2009 since its inception. The objective of the conference (as it was announced in September 2008) was to deploy the following model: A multi-point worldwide-distributed network of conference authors/participants will enhance the standard (centralized) IEEE conference model, which requires attendance of the participants in person at the main conference location. The participants will be given a choice of delivering conference papers, tutorials, etc. either at the central conference site (hotel) or from their home/office computers wherever they are, eliminating the need of costly and time-consuming travel. This model will require seamless integration of the onsite and online conference systems, including data/presentation, video, audio, feedback, etc. We call this model a "Truly Integrated Conference" (TIC).

Please note that the abbreviation "TIC" also stands for "Toronto International Conference", but in this meaning it is used only as part of a complex abbreviation "IEEE TIC-STH 2009".

The main features of the TIC are:

- Use of technology allows onsite and online attendees to have similar opportunities to participate in a conference, have access to information and collaboration.

- Online attendees can deliver their papers live on the internet, as well as watch/listen to the broadcast from the conference site.

- Use of the web conferencing solution which includes web conferen-

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Abstract

Web conferencing tools have entered the mainstream of business applications. Using web conferencing for IEEE conferences has a good potential of adding value to both organization and participation. Authors propose a concept of Truly Integrated Conference (TIC) according to which a multi-point worldwide-distributed network of conference online authors/participants will enhance the standard (centralized) IEEE conference model, which requires attendance of the participants in person at the main conference location. The concept entails seamless integration of the onsite and online conference systems, including data/presentation, video, audio channels. Benefits and challenges of the TIC concept are analyzed. Requirements to the web conferencing system capable of supporting the TIC conference are presented and reviewed against commercial web conferencing tools. Case study of the IEEE Toronto International Conference - Science and Technology for Humanity, which was the first realization of TIC, is presented which analyzes various aspects (organizational, technological, and financial) of the integrated conference.

Sommaire

Les outils de conférences web font maintenant partie du quotidien des applications d'affaires. Les utiliser pour des conférences IEEE apportera sans doute des bénéfices aux organisations et aux participants. Les auteurs proposent un concept de Conférence réellement intégrée (CRI) selon laquelle un réseau mondial multipoints distribué de conférences en ligne auteurs/participants améliorera le modèle standard (centralisé) des conférences IEEE, qui exige la présence des participants au lieu principal de la conférence. Ce concept implique l'intégration uniforme des systèmes de conférences sur le site et en ligne, incluant les données/présentations, vidéo, canaux audio. Les bénéfices et défis du concept de CRI sont analysés. Les exigences relatives aux systèmes de conférences web capables de supporter une CRI sont présentées et comparées à ce que fournissent les outils commerciaux. Une étude de cas est présentée sur la Conférence internationale de Toronto - Science et technologie pour l'humanité, qui a été la première réalisation de CRI. Divers aspects (organisationnels, technologiques, et financiers) de la conférence intégrée sont analysés.

cing application integrated with video and audio technology means at the conference site.

- Web conferencing solution provides all of the following channels to facilitate collaboration and make communication "natural": data/presentation, video, audio, chat.

- The whole conference (not selected parts or tracks) is equally available to onsite and online attendees.

A literature review did not reveal any conferences which would utilize a concept similar to the TIC. Some conferences experimented with web casting of selected sessions (e.g. 2008 IEEE Geoscience and Remote Sensing Symposium [3]). Others completely moved to the online model (e.g. International Joint Conferences on Computer, Information, and Systems Sciences, and Engineering [4]).

Our search has shown that IEEE TIC-STH 2009 was the first IEEE conference delivered according to the TIC concept.

3.0 TIC Concept Benefits

TIC benefits are multiple and largely quantifiable.

3.1 For Participants

TIC allows participants to avoid travel to the conference site. An average direct savings per person per conference could be up to one thousand dollars. Also, avoiding travel (especially, international) will "create" a couple of additional productive days for a researcher. An important benefit is increased flexibility, e.g. should the working plans change and preclude travel, an attendee who initially was going to participate onsite can easily re-register to online participation.

The authors would like to emphasize that they are not promoting online conferences as a replacement for traditional onsite events. Nothing could be more stimulating for a researcher than an in-person interaction and exchange of ideas. A significant intangible value of the TIC concept is that it offers participants a freedom of choice—which events to visit in person and in which to participate online.

3.2 For Organizers

Having a certain percentage of participants online allows organizers to reduce conference food expenses, which could constitute a significant part (up to 50%) of the registration fee. This statement is based on the assumption that onsite and online attendees pay the same fees. Also, organizers have a good potential to attract many additional attendees without papers who will be only watching the conference online.

3.3 Environmental

Avoiding travel will have a certain environmental impact. It is easy to estimate that if 30% of the IEEE conference attendees will select the online option, it will result in a significant reduction of CO_2 emissions.

4.0 TIC Concept Challenges

Using the TIC concept to organize a conference requires addressing many challenges.

4.1 Psychological

As any new endeavour, integrated conferences will have a certain number of enthusiastic supporters. However, there will be even more people either neutral or reluctant to embark onto unknown soil. Some of them just do not want to take the risks (which certainly exist). Others see TIC as more of an online conference (which is not true), and are concerned that wide spread of this practice would become a roadblock for them to get funding for travel, and limit their opportunities for face-to-face communication with colleagues.

4.2 Technological

Selecting an appropriate web conferencing tool that meets the conference requirements is a serious challenge. Incorporating this tool into an onsite audio/video environment could be an even more complicated task.

4.3 Organizational

Documented procedures for web conferencing according to the TIC concept do not exist. It is not only that the technology means must be integrated. Creating a seamlessly integrated conference process requires collaborative efforts from web conferencing and all other conference committees. For example, such well-established processes as paper scheduling need to be performed taking into account local time of the online attendee to avoid inconveniences such as delivering a paper at 4 AM. Operating web conferencing technology requires additional human resources, which need to be recruited and trained.

4.4 Financial

Despite the potential savings for the organizers, web conferencing is not free. TIC implementation requires due diligence in assessing acquisition of services. At a first glance, hourly rates for web conferencing look reasonably low. However, mere multiplication of these numbers by eight (number of the working hours per conference day) and then by a range of seven to ten (number of the conference parallel tracks/symposia), and then yet by two to three (number of conference days), could shock any treasurer.

4.5 Legal

IEEE has rigorous and clear policies regarding copyright of conference papers. Paper presentations (PowerPoint slides) are not subject to the same scrutiny—they "exist" for several minutes during the conference and are available to a limited number of attendees in the conference room. Web conferencing actually turns verbal presentations into "documented content" through data, audio, video channels. This content could be delivered to hundreds and thousands of people around the world, and potentially could be recorded/stored both at the conference site and by any attendee. Lack of regulation of this issue should be a matter of concern for both organizers and presenters.

All challenges need to be taken into account and addressed by the organizing committee through the best practices of project risk management. Any improper decision may be harmful not only for the web conferencing part, but also for the conference as a whole. Some experiences and recommendations are provided in the IEEE TIC-STH case study below.

5.0 TIC Requirements to the Web Conferencing Solution

Selecting a web conferencing application and building a TIC solution for a conference is a complex task. To streamline and facilitate this process we developed a set of requirements presented in [15]. These requirements address the business needs of both the conference site and equipment of the online attendees.

Some requirements need to be highlighted.

Most important is to identify conference business scenarios that are to be supported by the web conferencing application. Our analysis has shown three types of business scenarios that could be found at most conferences:

- Scenario 1. Keynote/Tutorial/Training Presentation. Training scenario refers to the pre-conference educational events aimed at providing organizing committee, symposia TPC and conference technology assisting personnel with knowledge and skills necessary to support web conferencing.

- Scenario 2. Symposium Session (See Figure 1). Up to Twenty Five (25) symposia sessions hold simultaneously and independently.

- Scenario 3. Conference Discussion Panel (Round Table Session) or Committee Meeting.

The web conferencing tool should provide an environment with seamlessly integrated Data/Presentation, Video and Audio channels of communication for the collaboration of the conference participants onsite and online. Although most of the vendors provide tools which support all three channels, some either do not have a video channel, or do not recommend activating it in order to save the bandwidth and accommodate higher numbers of online participants.

Ideally, the web conferencing tool should be a truly web-based application, which will not require any other software installed on the computers of the online participants (exception could be made for a commonly used software like Flash). This requirement is driven by the intention to make participation more convenient, avoid possible problems, and accommodate restrictions faced by corporate users in the installation of additional software. The problem with this requirement is that in the "share the screen" mode, which is supported by many tools, installation of additional software/patches is mandatory (although that may not be acknowledged upfront by the vendor). "Share the screen" mode could be very useful, e.g. it could be used for demonstrating any online applications during presentation of papers. Organizers must choose if they want to limit possible formats of presentations to PowerPoint slides, or to accept risks of allowing screen sharing. That is one of the examples of how choice of web conferencing tools affects a conference as a whole (as the onsite participants will also be bound by the decision).

Each conference at the early stages of preparations has to review the suggested requirements based on its own needs, and develop a set of individual requirements to the web conferencing system.

6.0 Web Conferencing Applications

According to Wikipedia, web conferencing—also referred to as an e-conference, on-line meeting—is used to conduct live meetings, training, or presentations via the Internet. In a web conference, each online participant sits at his or her own computer and is connected to other participants via the internet. This can be either a downloaded application on each of the attendees' computers, or a web-based application where the
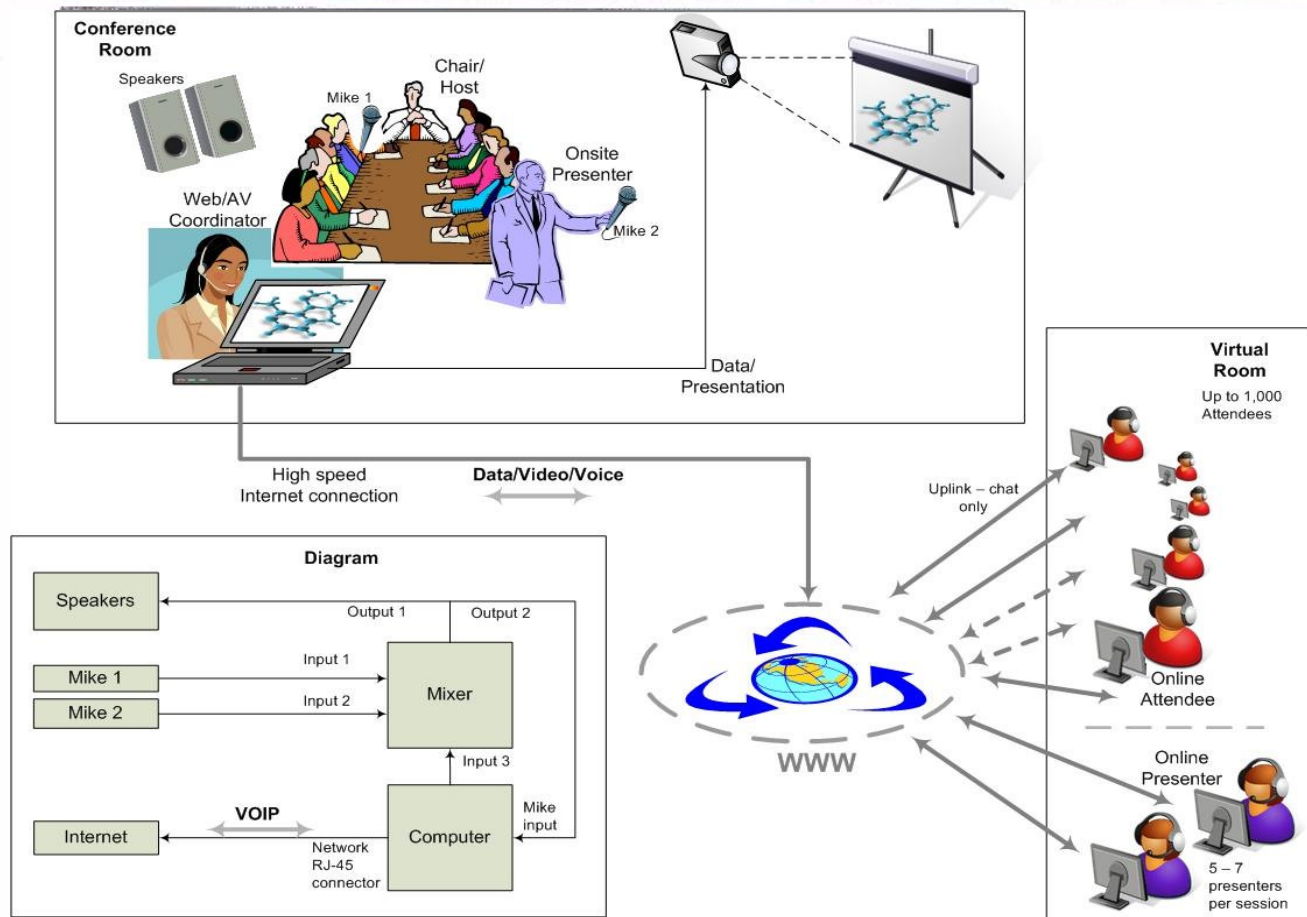
Figure 1: Scenario 2

attendees access the meeting by clicking on a link distributed by e-mail (meeting invitation) to enter the conference [11].

A webinar is a term to describe a specific type of web conference. It is typically one-way, from the speaker to the audience with limited audience interaction, such as in a webcast [11].

Considering the target of the web conference, we use the term "web conferencing" as the most appropriate to describe specifically the live or real-time connection of computers to allow a meeting to be held through the exchange of data, video and audio information.

Software for web conferencing has become increasingly popular in the last few years. In the summer of 1994, there were only two products. Both of them were rather primitive freeware packages. Now, there are well over 60 commercial and freeware products, many of them quite sophisticated, which support conferencing on the web in different kind of forms [14].

For the "application service" offered over the Internet without the need for installation of a server, vendor-independent testing has been conducted with the results reported in [13]; a comparison of the top five is found in [15]. However, when we looked for an appropriate web conferencing solution for IEEE TIC-STH 2009, we could not simply select one of the top ranking solutions. To make a choice, we had to consider operating system support, compatibility with other environments, administrative capabilities, browser support, customizability, and certainly, price.

During preparations of the IEEE TIC-STH 2009, the web conferencing committee reviewed many commercial tools against the conference requirements and conducted trials of several applications including WebEx, GoToWebinar, Adobe Connect, iVocalize, and Instant Presenter.* One of the observations was that there are two types of solutions supporting two models:

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➤ Webinar model—central broadcasting to hundreds and thousands of users, e.g. GoToWebinar

➤ Corporate meeting model (multi-point participants), but the number of participants is limited to 15 - 20, e.g. WebEx.

Both GoToWebinar and WebEx tools were very easy to set up, and no problems occurred during the trials. However, GoToWebinar was not selected for two reasons. First, it does not have video. Second, it requires installation of a software patch, which is not allowed in some corporate environments. WebEx was not selected because the cost projections (for the scenarios with several hundred participants) turned out to be prohibitive for the conference budget.

An interesting solution of the combined use of the GoToWebinar and WebEx has been proposed and tested, overcoming the main problems of the individual tools mentioned above. To realize the solution, several (up to 15 - 20) participants make connection using WebEx, and then one of these participants turns on GoToWebinar in a screen sharing mode and starts broadcast of his screen (with WebEx application running with slides and video) to hundreds of online attendees. Trials confirmed that the WebEx video channel was broadcast by GoToWebinar without a problem. So, this solution enriches GoToWebinar with a video channel and at the same time allows WebEx to be received by hundreds of participants at a low cost. This solution could be helpful to deliver web conferencing according to scenario 3.

6.1 Audio channel

Most vendors provide a choice of voice over internet protocol (VOIP) or teleconferencing. It is revealing that usually the use of a phone line and a conference bridge is the recommended option, primarily for the sound quality reasons. The use of the phone to support a multi-hour conference with participants around the globe will most likely become unfeasible for budgetary reasons as a phone channel is not included in the price of the
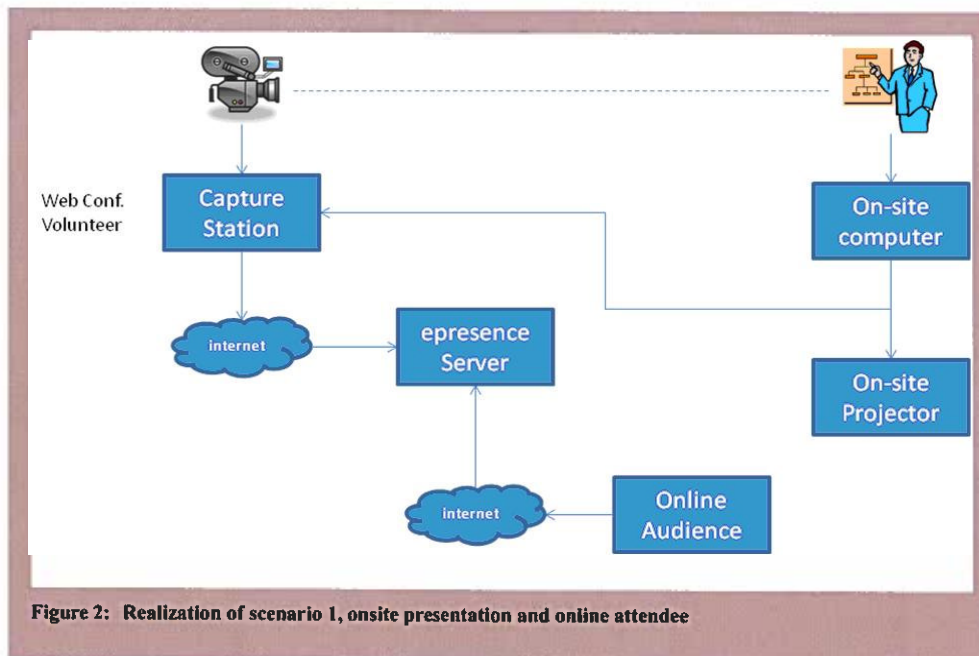
Figure 2: Realization of scenario 1, onsite presentation and online attendee

web conferencing services. Another solution — streaming video and audio — provides an excellent quality of the audio channel. ON24 [8] is an example. However, prices for the streaming video and audio are usually very high.

6.2 Video Channel

This usually worked well for all products. It was noted that lighting of the presenter sitting in front of the camera is as important as the quality of the camera.

6.3 Result of Web Conferencing Evaluation

The conclusion was made that none of the commercially available web conferencing solutions fully satisfies the TIC concept requirements. Organizers have to make trade-offs between functionality, quality and costs based on the individual conference requirements.

Based on the above considerations and IEEE TIC-STH 2009 conference requirements, ePresence [9] was selected as a web conferencing system. ePresence is an Open Source web conferencing and webcasting system that delivers live or on-demand rich media over the internet. Developed by the University of Toronto, ePresence is a complete solution for streaming, capturing, and publishing rich media presentations. Considering ease of technical support, price, availability of ePresence Capture Stations offered by our conference host, Ryerson University, ePresence was eventually selected as a foundation of the TIC solution. In the next section, more details of the TIC implementation are presented as a case study analysis.

7.0 Case Study: IEEE TIC-STH 2009

IEEE TIC-STH 2009 was organized and hosted by the IEEE Toronto Section [2]. Ryerson University was used as a venue. The conference was focused on advanced interdisciplinary problems across a broad spectrum of the IEEE fields of interest. The scope was not limited to the traditional IEEE areas - electrical, computing, and engineering. There were very strong papers in education, social implications of technology and sustainable development of the society.

The conference attracted 360 papers out of which 186 papers were accepted after rigorous peer-review process (~50% acceptance rate). Authors represented 29 countries.

IEEE TIC-STH 2009 turned out to be a huge success story from all perspectives: technical, organizational, financial and customer satisfaction. Realization of the TIC concept was one of the drivers for this success. IEEE TIC-STH 2009 was the first truly integrated conference that realized scenarios 1 and 2 (described in the Requirements Section) for all the scheduled presentations. The facilitation of the online platform was done by ePresence conference services. There were, at most, eight concurrent (onsite/online) presentations to be handled at the same time. For this purpose, 16 volunteers were trained to work with the conference web

conferencing system. Each web conferencing volunteer received 10 hours of training and had to pass the exam to be able to contribute effectively to IEEE TIC-STH in web conferencing. This greatly helped run the online sessions more smoothly during the conference. Online users (attendees/presenters) needed to register beforehand to be able to attend/present. The accessibility level of all the online sessions was restricted to our registered users who had paid fully for the registration fee of IEEE TIC-STH 2009.

Scenario 1 was utilized by ePresence capture stations integrated with the presentation system in each presentation room as is shown in Figure 2.

To assist the online attendees, an instruction manual was produced and uploaded on YouTube [5]. This video manual describes all the required steps for the online attendee to be able to follow a presentation online.

All the concurrent presentations were broadcast online for our online attendees and also for our onsite attendees who wished to follow other concurrent presentations online while attending an onsite presentation. This allows switching between presentations by a click and attending the presentation that fits best within the interest of the attendee. Online attendees, similar to the onsite attendees, could ask questions using chat functionality.

The volunteers in the presentation rooms were advised to screen the online presentation. The coordination of the presentations with online presenter was done by means of chatting in the ePresence platform and backed up by a phone connection.

Keeping the conference completely broadcast online takes a lot of effort in troubleshooting and management. To make sure that the troubleshooting process would be handled as quickly as possible a separate group was hired. The common observed problems before/during the conference were as follows:

- There is a lot of hardware involved to capture/broadcast all the presentations and there is a high chance that camera, microphone, computer, projector and capture station might not work properly.

- The high speed connection with the web conferencing server needs to be monitored and maintained continuously.

- The online presenters need to be connected to a reliable high-speed connection.

- The presentations should be scheduled considering the fact that the online presenters have to present their work according to their local time.

In IEEE TIC-STH 2009, there were altogether 28 papers that were presented remotely out of almost 200 conference papers. The rest of the papers were presented onsite. All the papers were presented either onsite or online and there was no paper which was not presented due to the fact that the authors could not be present at the location of the conference. The web conferencing website was visited 1300 times following the presentations. Another possible benefit of the web conferencing-enabled conference is that not only all the presentations can be broadcast but also all the presentations can be recorded for later publication. The recorded presentations can be even bundled with the paper text and made accessible on IEEE Xplore website. The possibility of watching a presentation of the paper makes it easier for the reader to understand the paper when accessed later on the database. These benefits are supported by the existing technology, however certain legal and organizational issues need to be resolved first.

Although the web conferencing tool is the backbone of the TIC concept, there are other applications that can help organizers, e.g. Google Analytics and FilesDirect [15]

A post-conference attendee survey showed good customer experience of the online attendees. Although the conference was not immune to some roughnesses, the overall level of satisfaction of the online audience was even higher than that of the onsite participants.

8.0 Conclusions and Recommendations

1. The concept of the Truly Integrated (onsite and online) Conference (TIC) has been suggested and discussed. A conference delivered according to the TIC concept presents significant benefits to both conference organizers and participants. Certain environmental impacts also should be assessed and considered.

2. The authors are confident that conferences of this type will soon become common for the IEEE and other organizations.

3. Business and technical requirements satisfying the TIC concept, and its incorporation into an integrated solution, have been developed and tested.

4. Analysis of the commercially available web conferencing solutions has shown that none of them fully satisfies the TIC concept require-ments. Conference organizers have to prioritize requirements based on the specific needs of the conference and, most likely, give up on less important ones.

5. Our search shows that IEEE Toronto International Conference— Science and Technology for Humanity (TIC-STH) 2009, organized by the IEEE Toronto Section, was the first IEEE conference (and maybe first ever conference) delivered according to the TIC concept.

6. IEEE TIC-STH 2009 successfully used ePresence web conferencing application.

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