Chapter 7

Managing Distributed Conferences with ISABEL

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Abstract: ISABEL provides a platform for development of new multimedia services, including distributed conferences, with presentations and attendances located in rooms at different sites. ISABEL permits the definition of new services adapted to the specific requirements of each case. It builds its own communication network providing a uniform Quality of Service through the variety of interconnected sub-networks. Nevertheless, technical problems are not the only problems on this kind of events. Planning, management and realisation of a Distributed congress covering several continents are issues directly related with technology management and co-operation between persons and computer systems. This paper reviews technical and organisation problems involved in the realisation of a Distributed Congress and proposes an organisation model based on the ISABEL platform to deal with them.

1. INTRODUCTION

Many multimedia applications have been developed during the pass years to support co-operative work, tele-teaching and many other activities involving groups of persons distributed at different locations and communicated by means of telecommunication networks. Until now, most of this effort has been devoted to deal with technical problems: network design, network interconnection, robust applications, etc.). But we must also deal

with problems related with the organisation of these activities as distributed events, involving sophisticated equipment and the users of the system.

Using a multimedia application we may organise and carry on a large number of distributed activities: videoconference, co-operative work, courses and congresses involving a large number of auditoriums located at different cities. This paper describes the material, the activities required for the organisation, and management of a distributed Congress using a service creation platform (ISABEL [5]).

World coverage implies the usage of long distance communication, with the problems inherent to protocol interconnection. It produces co-ordination problems like time differences, cultural diversity (language is one of them, but not the most important) and all the problems related with the organisation and management of spread groups.

Setting up a distributed event comprised: building a network able to support the interchange of multimedia and control information during the event; the use of a suitable tool for providing a service that fulfils the requirements of the event we are organising; and the use of tools and organisation methods to deal with planning, management and realisation of the event

2. ISABEL: A PLATFORM FOR SERVICE PROVISION

ISABEL is a CSCW application for co-operative working designed into the Broadband Programs of the European Union RACE and ACTS, that allows the creation of new remote collaborative services in the field of real time interactive interconnection of audiences [1]. The interconnection of remote audiences is understood as the communication of groups of persons located at auditoriums, or any other type of meeting rooms, using a terminal based on a CSCW application.

ISABEL has been used to build service platforms of a great variety of services with a high degree of inter-activity, such as tele-working sessions involving development groups of the same company; distributed courses among Universities at the same or different country; or the realisation of distributed conferences. ISABEL is based on the use of TCP/IP and has been optimised to work over heterogeneous sub-networks as ATM (based on ground or satellite links), Ethernet, ISDN, etc.

The application has been validated in a big number of large scale, local and international events. Some of the intentional more relevant events are ABC96, Global360 and IDC98. Among the local (Spanish) events, we must

remark the organisations of TelecomI+D (Spanish Telecommunication Congress) during years 97, 98 and 99.

It has been specifically this intensive usage, even during the first phases of the development, that tuned ISABEL to specific requirements of the organisation of distributed events. It is important to remark that the final users of those events were persons not directly related with this technology.

Services based on ISABEL offer a set of facilities that make them especially suitable for developing global communication services in areas where the international co-operation is required:

Figure 1 : Phases of the event organization with ISABEL

1. It offers a scalable architecture that may support the coverage of large
2. geographical areas and connect a large number of sites.
3. It offers the capacity of performing the global management of the event form a single point. It allows the design of strategies and service management in a very effective and user-friendly way.
4. It allows the definition of new services or the adaptation and tuning of already defined ones.
5. It works over heterogeneous networks, providing a uniform Quality of Service (QoS) by the use of a special adaptation agent (IROUTER [4]).

A distributed conference involves the participation of several auditoriums, from where speakers make presentations and people can attend at local or remote premises. The resulting event is a combination of a real time TV program with several studios, and a standard congress.

ISABEL provides a framework for the creation of new services(Figure 1) comprising three steps for the event realisation:

We start installing the ISABEL software and customising already defined services or defining new ones from scratch. Examples of ISABEL services are: tele-conference, tele-meeting- tele-working, etc.

1. During a second phase, once the service we want to provide has been identified, we set up a service that may be used for the realisation of several events. We need to assign to each node involved on the service one of the types defined by ISABEL, specifying which roles it will play during each mode. Combining the application characteristics and the participating nodes, we will define the Multimedia Network that will support the service.
2. Finally, combining a Service with contents information we carry events.

3. MANAGEMENT LEVELS AT A TELE-CONFERENCE

The management of a Standard Conference implies the co-ordination of two groups of persons that will work in parallel: contents groups and infrastructure group. The management of the contents of the conference is in charge of the conference diffusion, organising the call for papers, papers review and selection, chairmen identification, and the design of a program to organise the presentations of the selected papers. The infrastructure group will: reserve rooms and auditoriums, allocate secretariat of the congress, manage audio-visual equipment of the auditoriums, edition of the proceedings, management of inscriptions, selection of auxiliary personnel, publicity of the Conference, etc.

3.1 Communications Infrastructure (Network)

The provision of communication network with a sufficient Quality of Service (QoS from now) is today a research topic. The usage of a large variety of networks is required in world-wide coverage events, where different connection providers, network technologies and equipment suppliers must be involved. This scenario makes impossible the usage of a common QoS uniform for all of them. To deal with this problem ISABEL

provides application level network software that helps to build its own communications network with end to end QoS.

This network is the essential element that connects the participating sites. The setting-up, configuration, maintenance, and operation of such network are complex problems by itself. When the Congress offers world-wide coverage, involving a large number of sites, configuration and management of such network becomes a critical problem. Increased by the fact that usually communication resources are only available in the last moment, by technical or economical reasons.

ISABEL as application is ready to work over a large variety of network technologies: optical fiber ATM links, satellite links, ISDN public lines (multiplexing several B channels), etc. All these sub-networks should be interconnected building an IP network. ISABEL will run over such IP network adapting multimedia flows to provided QoS.

3.1.1 Homogeneous network

The network is considered homogeneous when all ISABEL terminals can use the same network capabilities regarding available bandwidth, delay and packet drops. This is the simplest case, where it is possible to follow the conference with the same end user quality from every site. All terminals will share same multimedia flows (audio, video, slides,).

An important point is how multimedia flows are sent from sender to receiver. ISABEL supports several options depending on the network. If native IP multicast is supported by network, ISABEL will make use of this facility to replicate multimedia flows. Only one copy of each flow will be sent from senders to network, and network will deliver a copy to each receiver. If IP multicast is not available, ISABEL provides a Multipoint Control Unit called flowserver. Each sender will send a copy of each flow to the flowserver and this will deliver a copy to each receiver. During a conference, several flowservers can be connected building a distribution tree. Each ISABEL terminal must be connected to a flowserver.

It is possible to run a conference without flowservers. Each ISABEL terminal can act as MCU for other terminals. Only performance reasons impose a limit on the number of connected clients to each ISABEL terminal. The last option is to force each ISABEL terminal to work in a pure unicast basis, where each terminal will send a copy to each other participant site.

3.1.2 Heterogeneous network

In practice it is difficult to build world-wide coverage homogeneous networks. Each ISABEL terminal is connected at IP level but using different

subnetwork technologies such as satellite links or fibber optic ATM circuits. We call this network heterogeneous cause each terminal will have a different network quality, different bandwidth, delay or packet drops. From the user point of view, this is perceived as different multimedia quality.

ISABEL is ready to work properly on these networks. Flowserver must be used in this case. Each ISABEL terminal will be connected to a flowserver using its particular network parameters, such as bandwidth available to the flowserver or expected delay. Flowserver will take care of bandwidth adaptation and proper buffering for each client. When bandwidth is severely reduced, flowserver can be requested to perform multimedia compression. This is possible because flowserver is an application level transport agent with lots of knowledge on multimedia flow contents and structure. This allows flowserver to receive multimedia flows, decoding and coding again using another algorithm on a per client basis.

Another useful function of flowservers is unicast to multicast flow conversion. When a terminal wants to join a multicast ISABEL session, but native IP multicast is not supported in its network, a flowserver must be configured to accept the unicast connection and feed multimedia flows in the multicast network and viceversa. One flowserver will be placed in the border of each multicast network and configured to exchange multicast traffic over a unicast connection.

3.2 Sites

An ISABEL Site is whatever place from where any body attends/participates on the conference. Those sites are also nodes of the Service. The Sites that will participate in the Conference may be classified as follows:

- **Interactive Site (IS):** from where attendants may interact (send and receive audio, video and data) with other Sites. IS may be classified for organisation and management:
 - **Main Site (MS):** a special IS, where there is audience, and the **speakers** will make presentations. It is highly recommended that they offer fail recovering facilities with back-up networks and equipments.
 - **Control Site (CS):** it is the most important site of the event, because it is in charge of the management of the whole conference, also performing remote control of the IS. The CS may be located at one of the MS, or may be an independent place without public nor speakers.

- **Watch Point (WP):** Sites that only receive multimedia flows sent by IS. They will not actively participate in the Conference, so they do not need a very well equipped Auditorium. They are simple passive receptors of information, and they do not interfere in the normal evolution of the Conference.

Relevance of the Sites is very important for the organisation and management of the Conference. The next levels of relevance has been identified:

1. The core of the Conference, composed by CS and MS. The disconnection of any IS allows other IS to continue with the conference. ISABEL allows that any IS assumes the role of CS, immediately and without disturbing the Conference development. Contingency plans must be scheduled to deal with problems at CS or MS.
2. The IS have also a big relevance, because they usually collect a larger number of attendants, that will participate in the turns of questions and discussions. Individual problems of the IS are not relevant problems for the Global Conference, but IS with frequent problems may jeopardise the development of the Conference.
3. Finally, Watchpoints are passive receptors of the distributed information. They do not interfere at any moment with the core of the Conference.

3.3 Contents

Contents provision and management using a distributed conference includes all the works requires for a standard congress, and tasks related with the distributed nature of the event: coordination of people placed in different sites and collection, transformation and distribution of the information material. To be distributed during the Conference

The Program Committee will produce Program with a number of sessions, presentations of each session and timetable of the Congress. In the case of a distributed Congress, the responsible of the Contents part of the Congress must coordinate with chairmen and speakers in order to decide from where they will participate in the Congress.

3.4 Services created with ISABEL

As shown in section 2 the first step in the definition of services using ISABEL, is to define the Types of Sites to be connected, the interaction modes and the roles that participants will play during each Interaction Mode. The definition of a new service is made by the creation of one **ISABEL activity**. Each activity is defined using a text file, that specifies the

configuration of the ISABEL environment to behave in a specific way, and that defines, among another things:

- ISABEL modes (see 3.4.2.)
- Quality and format of sound.
- Control and interaction capabilities that each participant may use.
- Who may connect to the conference.
- Adaptation of the application to the underlying network

The main facilities offered by ISABEL are:

- Management of the Distributed Conference from a Central Site.
- Distribution of documents and presentation from all the connected Sites.
- Diffusion of video and sound from any Site to all the connected.
- Independent selection and configuration of video and sound.
- Presentations with slides
- Blackboard for collaborative edition
- Display of the result of any program executed in any site.
- Control and management of questions and discussion panels.
- Definition and configuration of predefined ISABEL Modes.
- Definition of a detailed program and load it in the application, to facilitate the operation during the realisation of the Congress (see 3.3).

3.4.1 Conference Preparation and Control

Service preparation is fully based on Internet communications. Service operation features are centralised in a Web Server currently located at <http://isabel.dit.upm.es>. This server offers capabilities for: event description and creation, network definition and configuration, program creation and transformation, contents collection and transformation, test and rehearsal scheduling, coordination of people responsible for infrastructure and contents as well as of speakers and chairman.

ISABEL also allows the control of the whole conference from a single point using a graphical interface.

3.4.2 ISABEL Modes

The ISABEL Modes are screen layouts of different components (videos, slides, display sharing, etc). Typical ISABEL modes are:

1. **One video:** shows a single full screen video.
2. **Two videos:** the screen shows videos from two different auditoriums.
3. **Tree videos:** three videos from three different sites.

4. **Slides show:** the background of the screen shows the slides of the presentation provided by the speaker, and one video of the speaker is shown near one of the corners of the screen, usually the right top corner.
5. **Question mode:** the chairman selects one of the remote sites when questions arise, then the videos of the remote site and Speaker are shown on the Screen. A panel shows sites waiting for questions.
6. **Panel with 4 videos:** four videos from four different sites are displayed on the screen.
7. **Application Demo:** shows the execution of any application to all the IS connected to the conference by the use of a DISPLAY-SHARING.

Figure 2. ISABEL modes at work

These are the most representative ISABEL modes, but new ones may be. ISABEL modes may be sequenced to produce a dynamic show, with a high degree of interaction and participation of sites. Figure 2 shows ISABEL modes at work.

4. PREPARATION OF THE DISTRIBUTED CONFERENCE

A Distributed Congress with ISABEL is organised in two parallel planes:

- **Contents plane**, which includes all the elements related to the information that participants will exchange during the Congress. Elements to take in consideration in this plane are relatively similar to the elements of a standard Congress.
- **Technical organisation plane**, which includes all the problems, related to the distributed organisation of the Congress. It includes the usage of a large communication network, a sophisticated application (ISABEL) and efficient coordination before and during the Congress

The persons involved in this group will be in charge of coordinating the Global Process, defining and maintaining links between the contents and the technical organisation planes. Their main objective is that the use of such a sophisticated technology is as transparent as possible.

The complexity of a Distributed Conference requires careful planning, and the realization of tests and rehearsals to minimise the number of incidents and problems during the Congress. The next elements must be planned and tested:

- **Set-up of the event on the web server.** It will provide basic support to: configuration and operation of the Communication network; installation and operation of ISABEL; identification of the auxiliary equipment required for the Auditoriums; scheduling and execution of tests and rehearsals; coordination of speakers and chairmen. E-mail list is used for the coordination of the previously identified control planes.
- **Network definition.** Allocation and configuration of network resources combined with ISABEL facilities for reaching suitable end to end QoS.
- **Testing Plan.** Must take include: testing backbone and access network, individual testing plan for each Site, interconnection and interoperability among MS, and MS and IS, tests and rehearsals of specific sessions
- **Detailed program.** It is the central element for defining the contents, scheduling and organisation of a Congress. All persons involved in the organisation (contents, technique and management) must have a deep knowledge of the detailed program to ensure a good coordination

Figure 3. Program Management

The main input for the contents organisation is the program of the congress. This program must be converted into a standard electronic format to be processed. This standard format also includes information about the location of speakers and chairman during the sessions. It generates two outputs: the detailed script for ISABEL and a textual script to be used by the ISABEL operators during the event. The process is summarized in Figure 3.

5. REALISATION OF THE DISTRIBUTED CONFERENCE

The first element to define is the communication infrastructure that the organisation will use.

Figure 4. Communications during the Conference

Figure 4 describes the main communication mediums that will be used during the conference:

- The Communication Multimedia Network that connects the Sites that will support the Conference.
- Both the Application and Network Operators will use the standard Internet communication mechanisms. The use of IRC (Internet Relay Chat) has proved to be very useful as a private communication mechanism for co-ordination, notification of incidences, etc. If Internet connection fails, telephone will be used to connect the MS with the CS.

- For large and complex events, an audio-conference service has been successfully used for co-ordination sessions among the Congress Manager, the Program Managers of each Site, Spokesman, and eventually the Contents Manager.

A graphical interface allows to manually configure the application in real time during the event to fix last minute modifications to script.

5.1 Monitoring

In order to reduce the number of incidences perceived by the attendants during the Congress, tree elements must be continuously monitored:

- **The Network:** to anticipate any problem that may impact the QoS that allows the Application to offer a good quality to the attendants. In this kind of situations it is always better to apply preventive actions such as introducing breaks or modifying the Program while the network is fixed. Waiting till network problems produce a big malfunction of the application it is not acceptable.
- **The Application:** to avoid local problems propagate to other sites. Special attention must be paid to the sites with repeated and continuous problems. Sites with frequent problems will degrade dramatically the behaviour of the application, and jeopardise the evolution of the Distributed Conference. In this situation the Congress Manager may decide to disconnect some Sites during a period of time, until they have solved the problems.
- **The Contents:** to solve problems, usually considered as minor ones during standard congress, but that are in this context specially relevant. Like the late arrival of one of the speakers, the large duration of a welcome speech, etc.,. It is important that all the sites receive precise and in time information about this incidences, its causes (if they are known), duration (if we may foresee), and which will be the next step.

6. CONCLUSIONS

The organisation and development of a Distributed Congress using Multimedia Application and Networks suitable for supporting multimedia traffic requires a wide usage of human and material resources. Solved, almost in part, the technological problems related with network bandwidth, and the creation and usage of new and powerful tools for services creation (ISABEL), organisation problems start to be the main problem. Facilities

and tools for helping in the management of such services and event must be part of the Applications that will be used in the organisation of this kind of Distributed events. These requirements affect to the network management, the exchange of multimedia flows or whatever element that is part of the organisation. The information and their management must be considered an important element in every management organisation, even more if there are involved groups of persons spread along the world. A good information management, using the most advances technologies and tools available, will be one of the keys to success.

A good preparation, including tests and rehearsals of the real situations that will happen during the event, is the best way to ensure that every body will know what to do during the real event. Motivation and implication of persons involved in the organisation, including the participants in the contents part, also the speakers, is an essential element to have a successful Congress. The organisation must be supported by a wide communication platform that allows a fast decision agreement with the best and large information possible during the duration of the event.

Unexpected problems must also be foreseen. We must define back-up plans and alternatives for dealing with big problems as general failure of Communication Networks, unavailability of one or more MS, etc.

In this context becomes necessary the development of applications specially dedicated to the organisation, management and coronations of the events. In a short time, we plan to produce a workflow tool that will be integrated with ISABEL supporting the management of events.

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