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IST-Village
Evaluation of the Exhibition at the
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Abstract

This report describes and evaluates the joint exhibition that was given by seven projects in the EC D2 IST cluster Interfaces and Enhanced Services, Signal Processing & Mixed Reality at the IBC 2003 in Amsterdam. The demonstrations of the projects are described, the relationships between the projects and the feedback from the visitors are presented.

Keyword list

IBC2003, exhibition, new media, IST projects, standards, MPEG-4, MPEG-21, DVB-MHP, TV-Anytime, networked services, home networks, iTV, peer to peer

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1. Introduction

Projects in the IST clusters Interfaces & Enhanced Services and Signal Processing & Mixed Reality presented a joint demonstration in the ISTV - Information Society Technologies Village - at the IBC2003, which was held in Amsterdam from September 12-16, 2003. The IBC exhibition is one of the world's premier broadcast media events. It has a strong commitment to new media, interactive television and convergent content development.

The IST projects, ASSET, Future Home, ICE-CREAM, MOSES, MUFFINS, Share it!, and Spation presented their latest R&D results in the IST Village, showing the full potential of bringing connected, digital technologies to the home. Together, they represented some 50 European R&D organisations in the area of A/V networked services and platforms. They showed that cooperation and combined efforts between research projects and between participating partners is key to achieving success in the rapidly changing worlds of consumer electronics, communications and broadcasting.

At the ISTV new concepts for interactive user applications were demonstrated. Peer to peer technologies including rights management solutions suitable for consumer electronics equipment, as well as home systems allowing users easy access to content which they stored on multiple interconnected consumer electronics devices were shown. Connectivity and interoperability between equipment and applications for multimedia content management and exchange, components and tools for content identification and representation, information and intellectual property rights management, the wireless home network, the usage of IPv6 and mobile IP protocols, and unified user interfaces to different media were the major technological challenges addressed.

The seven projects showed several well balanced aspects on new media technology, mainly based on networking, wireless technology, digital rights management and interactivity.

2. Objectives

The objectives for demonstrating the achievements of the projects in the D2 IST cluster Interfaces & Enhanced Services, Signal Processing & Mixed Reality at the IBC 2003 were:

- To present the core research results in relation to the development of open standards and their importance for the development of enabling technologies for the end-to-end service chain
- To communicate the strengths of collaboration in European R&D projects for advancing the state-of-the art in interactive digital television and networked multimedia services.

The projects opted for a unified presentation in one booth and for collaboration to achieve a professional appearance at par with presentations of large professional

organisations and industries and to attract the intended audience of professionals and decision makers in the field.

Seen as a whole the ISTV booth was a very successful concept giving the projects an industrial level platform for dissemination of their results.

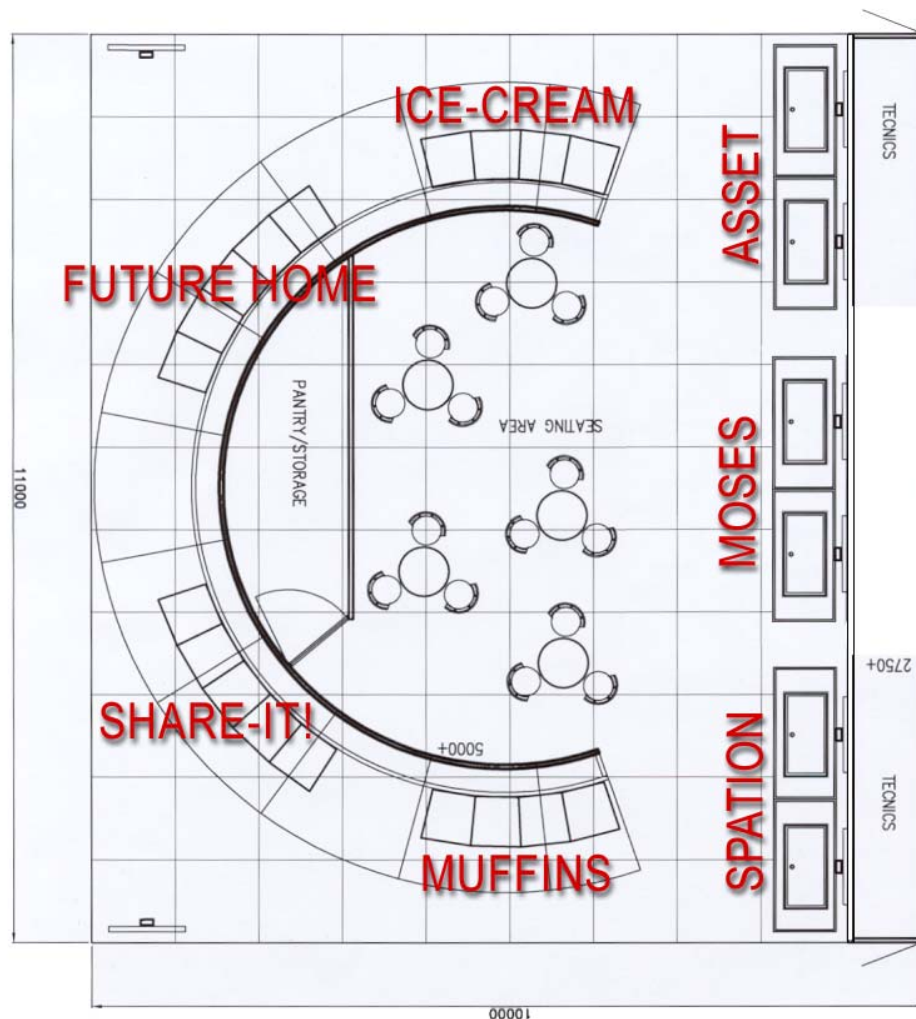
The audience at IBC is the professional, managerial, marketing and technical community of the broadcast, production and audio-video consumer businesses. The main target group for the projects' demonstrators is the company management and senior technical staff involved in standards setting, strategy and direction of the future TV and consumer businesses. These are key people to reach, as many of the concepts piloted in the participating projects depend on standards and their effective deployment to reach their full maturity. Companies have to be convinced that sustainable businesses can be built from the technologies being developed. IBC is a valuable trade show as it is widely attended by this group.

3. Information Society Technologies Village - ISTV

The overall organisation of the ISTV is described in the FP6 proposal FP6-507927 CommonDemo@IBC2003.

The stand was designed and delivered as a turn-key product. Picture 1 gives an impression of the stand. Each project had a demonstration table and two 42" flat panels available for demonstration. A convenient technics area, a separate pantry and a sitting area completed the stand. All projects had the same design, look and feel with regard to presentations, folders and video attractors. The booth was held in dark blue and built as a large cylinder. The outer surface of the cylinder was a big illuminated transparent poster. Picture 2 shows the lay-out of the booth and the location of the projects. Especially popular was the seating area in the rotunda where interested visitors could meet and talk in detail about the different projects.





4. Participating projects, their demonstrations and consortium

4.1. ASSET

The ASSET project specifies a software architecture for unified management of digital TV content that covers the complete operational workflow. The project showed this universal system architecture and especially the easy and flexible interfacing between digital television equipment, improved interoperability in broadcasting environments and the reduction in the overall system costs. The project showed technologies, APIs and software tools that enabled both users and vendors to use/create media applications and integrate them into systems, in a way that is independent of device manufacturer, programming language and underlying middleware platform. The specification of the ASSET architecture takes advantage of open standards and emerging technologies, like MXF, standard data models for describing essence, XML and distributed system

technologies. The structural design of the ASSET solution wraps the standard software layered architecture into a middleware approach that provides:

- abstraction of broadcast software and hardware devices as logical resources;
- generic, openly defined and extensible interfaces to control devices, data distribution and data flows;
- added value for system logic: optimised decisions to configure devices, convert/move data and handle workflows.

The ASSET consortium consists of Thomson Broadcast systems (coordinator), COMPAQ-HP Group, DALET A.N.N., INESC PORTO, INRIA, IRT-Institut für Rundfunktechnik, Front Porch Digital Inc., and SHS Multimedia SPA.

4.2. Future Home

The Future Home project showed at IBC 2003 its relevant contributions to home networking technologies and infrastructures, by implementing several applications and services and by demonstrating the functionality of the developed Home Network Service Point (HNSP), based on innovative open standards like IPv6, UPnP and HAVi.

The project's demonstrator installed at the ISTV booth had the following components:

- HNSP implementation, including database, wireless and UPnP gateways, home navigator, IPv6 compatibility and other components;
- A personalisable service application on training recommendations, connected to an ergo meter training bike and integrated into the simulated home network;
- An UPnP-compliant programmable electric oven simulator and a white goods-power line gateway, allowing to download recipes from the internet and send them to the oven over the HNSP;
- A HAVi/ UPnP gateway enabling the control on HAVi devices in the home network, demonstrated by a controllable stereo CD player and a car status monitoring application;
- A surveillance camera, connected to the HNSP, offering security functionalities to the home system;
- A SMS/ MMS messaging platform integrated at the HNSP and a personal photo album application to demonstrate it.

By implementing this demonstrator, Future Home intended to disseminate its results on powerful, scalable home network components based on open standards. The feedback of the public to this demonstrator gave important information about the further project work towards a fully integrated final demonstrator, which will be provided at the final project audit in December/ January.

The Future Home consortium consists of VTT Technical Research Centre of Finland (Coordinator), CiaoLab, Nokia, Wrap, Cefriel, Fraunhofer FOKUS, Tomorrow Focus AG, and Thomson.

4.3. ICE-CREAM

The ICE-CREAM project investigates how to make compelling experiences for end-users based on enabling technologies for interactive media, such as DVB-MHP, Internet and MPEG-4. The goals of the project are to extend the notion of interaction, to exploit domestic activities and familiar settings, and to make the user environment part of the visual experience. The project showed three applications of interactive TV in which different technologies were integrated.

The first application showed a real-time sport event (soccer) which was enhanced with real-time on-demand data. This demo showed video sequences of a football match reconstructed in 3D, allowing the user (with a remote control for TV or a mouse for the internet) to navigate into the action and to select any players' point of view.

- Integration of Internet, MPEG-4 and MHP in trimedia set-top box
- Delivery of real-time interactive multimedia event clips which were generated by tracking tools and camera's on the field
- Presentation of video events on-demand
- Combination of background "cold" and timely "hot" contextual information during the football game
- Playback of the event clips while watching the program
- Replay of interactive 3D animations of goals and game situations on-demand

The second application presented an interactive travel magazine comprised of various travel videos, which were enhanced with additional information about specific attractions presented in the videos, as well as further interactive features, such as ticket booking, a quiz, SMS message presentation, video and content book marking. Information about user selected events and attractions was transferred to a mobile electronic city guide for use during actual travel. An editor to enhance travel videos by attaching additional content to specific parts of the video was presented as well.

- Integration of Internet, MHP and mobile device
- Multiple application 'modules' on MHP set-top box
- Interfacing to existing XML-based attraction database
- Mixture of broadcast and Internet based content
- Triggering of additional content display by video stream
- Communicating with existing ticket booking system
- Use of bookmarks for video position as well as for content marking
- Separation of application, layout and content

- Support of SMIL-based 'style sheets' to present different layouts
- Presentation of updated information on mobile device
- Combination of chapter markers and video bookmarks in one interface
- Rewinding of video to any previously marked position / PVR functionality
- Mobile city guide application containing point of interest information, routing, mapping, localisation, event information / ticket booking, movie programme and dating
- Personalisation of mobile city guide application by accessing book marked content over connected PDA device
- Easy to use editor for MHP travel application

The third application showed a prototype of a fully interactive 3D movie, i.e., a deep-sea adventure. Apart from the combination of video streams, 3D computer graphics, texts, still pictures, soundtrack and multilingual interfaces, it also enhances the user's experience by distributing interactive media objects to multiple devices (lights, portable displays, robotic toys) to create ambience effects in the user's environment.

- Distributed interfaces enable cooperative interaction with the movie among multiple users, which proposes a social approach of content consumption.
- Synchronized lighting effects and robotic behaviours connect the virtual 3D world to the reality, which creates an immersive surrounding.
- Grabbing and storing media objects for later reviewing by using a portable display (iPronto) extends the user's experience to a broader time span than just during the movie.
- The users have a wide range of the interaction possibilities, such as customisation of the journey, interaction with media objects, and full control of navigation, according to the skills, moods and interests of the users.

The ICE-CREAM consortium consists of Philips Research (Coordinator), De Pinxi, NOB Cross Media Facilities, Imperial College London, Tomorrow Focus AG, Fraunhofer FOKUS, Bitmanagement, Symah Vision, Euskaltel.

4.4. MOSES

The MOSES (MPEG Open Security for Embedded Systems) project extends and modifies the OPIMA interfaces and architecture to achieve compliance with the most recent security standards, some of which are still in the making, for example MPEG IPMP Extensions. The project extends current business models to encompass operational scenarios where the full set of functionalities pertaining to IPMP systems is implemented and tested, including means for controlling copying, moving, exporting and importing protected content as well as the relevant business and service data. The MPEG-4 based client is ported to devices other than the PC, addressing typical CE platforms based on open development suites, like WinCE and Symbian, and point out additional actions needed for subsequent full and successful commercial exploitation.

The project demonstrated the use of MOSES technology in a music download scenario. Using PCs and/or PDAs, based on WinCE and Symbian OSs, a user will be able to select and purchase music in an MP4 file format from a web site, download it and play it. In a number of extensions to this base scenario the protection of the music by licenses based on standardized Rights Expressions Languages will be illustrated by showing how for example, time limitations or the number of playbacks can be used in a super distribution application.

The MOSES consortium consists of Central Research Laboratories (coordinator), Adetti, Avanti Communications, Ecole Polytechniques Federale de Lausanne, ETRI (Electronics and Telecommunications Research Institute), Telecom Italia Lab, Testawebdv.

4.5. MUFFINS

The key objective of the MUFFINS project is to investigate the problem of description, delivery and protection of rich-media content, and to propose a complete solution framework for sample scenarios of usage of that content. The MUFFINS demonstrator showed the implementation of an end-to-end framework for content discovery, delivery and protection and showed standard based ISMA encryption technology on various types of media resources. The MUFFINS consortium was demonstrating the MUFFINS on-line store, a web store of media items, that is supposed to be the first implementation of (parts of) the emerging MPEG-21 standard.

The following MPEG-21 elements were demonstrated:

- MPEG 21 DID/DII – digital item description/digital item identification descriptors based on XML, representing each media item and wrapping it into the concept of the MPEG 21 digital item.
- MPEG 21 DIA – digital item adaptation. This standard element was used to match content to terminal capabilities. The MUFFINS demo can emulate eight different terminals (selectable by the user). The search procedure by the demonstrator application takes the DIA descriptors to clearly distinguish the digital items that either can or can not be consumed on a current terminal, given the terminal capabilities. The main terminal characteristics used in the demo were: display resolution, resource bit rate, number of audio channels etc.
- MPEG-21 REL – the rights expression language. This standard element was used to describe licenses to content. Each digital item sold by the MUFFINS online store needs an associated license: In the demo we demonstrated how the REL infrastructure can be used to express three different types of licenses: unrestricted license (unlimited number of plays), restricted number of plays, and restricted validity time interval.

In addition to MPEG 21 technology the MUFFINS project demonstrated:

- Encryption of video content based on ISMA crypt
- Watermarking of content in real time and real-time watermark extraction
- Content audio search (based on a few seconds of recorded audio)

From the user perspective the MUFFINS demo consisted of the following:

- Accessing a live encrypted stream from a camera positioned at IBC
- Accessing various types of content from the MUFFINS online store (A/V, audio, 3D)
- Buying licenses for content, consuming licenses and transferring licenses to other users
- Searching for content based on text keywords or short audio clips.
- Watermark extraction from the live stream (Current date and time were inserted for demo purposes).

The MUFFINS consortium consists of Optibase (coordinator), IMEC, University of Ljubljana, ITRI, Philips, Imperial College London, Fraunhofer IIS, SUN Microsystems.

4.6. Share it!

The Share It! project demonstrates how peer to peer technologies can be used in CE equipment in a rights managed fashion. It allows people the benefits of being able to find the content they want, whilst protecting them from breaking the law. Another important aspect of the Share It! demonstration is its ability to run enhanced MHP applications that can make use of peer to peer technologies. This enables broadcasters and third parties to write applications to provide new services, or add value to their existing services.

As the project has another six months to run, it was not intended to be a demonstration of everything that has been worked on in the project. In the event we put together a demonstration containing most of the key elements of the work. It consisted of:

- A network of three networked share it boxes (set-top box + hard disc video recorder).
- Two TVA Anytime metadata servers
- An Audience Research Server
- A Peer-to-Peer gateway to a gateway to a mobile phone network. This enabled streaming video over a GPRS network to a hand-held terminal.
- An extensive resident navigator and software stack for:
 - Peer-to-peer communication
 - A delegated, "light touch" rights management system.
 - Messaging and transfer of content between devices in the network.
 - An embedded data-base and extensive system for handling TV Anytime metadata coming from a multiplicity of sources.
 - APIs to extend MHP to give application writers access to the content stored locally and in the network, to the metadata whatever its source, and for access to the peer-to-peer network.

- Third party applications to:
 - Implement a broadcasters “Portal” extending a TV programme with a number of novel ideas aimed at building viewer loyalty and providing access to related content. This included a demonstration of the TV Anytime segmentation system from an MHP application.
 - “Content bundling” where a user can easily assemble his own audio, video and still pictures into a presentation and send them around the network
 - A still picture photo album and messaging application
 - A content annotation application where a user can mark up, comment on and discuss TV programmes with other users
 - A chat application, coupled to gathering statistics that are sent back to an audience research server.

Things we did not show either because of a lack of time and the limitations of a trade-show format for presenting complex technical work ideas:

- Network storage devices for caching popular content in the network to reduce network load.
- A “Heavy Touch” rights broker to enable purchase of rights to content when they are not already available
- A home gateway to provide firewall protection to the P2P network. This has been implemented but we chose not to deploy it at IBC as it is hard to demonstrate it in a way that would be visible to visitors to the show.

The Share it! consortium consists of Philips Research (coordinator), BBC, Elisa Corporation, TNO-Telecom, Fraunhofer FOKUS, NDS, Linköping University, NOB Cross media facilities, University of Ljubljana.

4.7. SPATION

The Spation project demonstrated how in a home-network of connected CE-devices it is possible for users to find back and navigate their content. The system consisted of a personal video recorder (based on PC implementation), a Streamium Internet radio system, a PC, an iPaq and an iPronto interconnected using a combination of wired and wireless Ethernet.

The iPaq and the iPronto were used in the demo system to:

- Browse a personal video collection
- Organize digital photographs
- Find audio content and play it back on the device of choice
- Get an overview of connected devices

The demo proves that by using UPnP it is possible to control devices and playback content on any device in the home where content is stored on any device. The most essential point here is that the PC does not act as the central master in the house. The devices in the network are all more or less equal.

Browsing and searching was supported by content analysis methods. To browse through a TV program, scene change detection can be used to allow the user to see a key frame from every scene. We used a key frame clustering method to reduce the amount of key frames, which makes it easier to navigate through a TV program. Furthermore, two summarization methods were demonstrated; automatically generated pictorial overviews and automatically generated trailers. In the first a selection of 15 to 20 of the most representative frames from a TV program is presented to the user. In the second approach interesting scenes are detected and concatenated to form a trailer.

The SPATION consortium consists of Philips research (Coordinator), Technical University of Denmark, Università Degli Studi di Brescia, Institut Eurecom, Tomorrow Focus.

5. Synergies between projects

The IST village introduced a good opportunity to speak to other project representatives and understand more about their work.

Besides the normal activity at a trade fair of showing and explaining results to interested visitors, it was also very important for the projects to gain a deeper insight on the possible research synergies with some other projects exhibiting at ISTV by watching their exhibits and discussing with them.

With regard to the Future Home project, especially two other projects showed very interesting intersections:

- the concepts of distributed storage, cross-platform content delivery and access of the SPATION project are very relevant to the kinds of service concepts, which are related to the infrastructure which Future Home proposes; one of the consortium partners, Tomorrow Focus AG is member in both project, they will potentially carry out further information exchange between these projects.
- the multi-home interconnectivity of set-top-boxes and applications, shown in the Share it! demo is impressive and important for the future service and networking concepts of interlinked homes, and should also be taken into account as a prerequisite of the home server technologies themselves (e.g. by offering appropriate gateway solutions for enabling the multi-home interconnectivity).

Also interesting approaches for the Future Home activities were shown by Asset (concerning the software architecture allowing easy interfacing between digital television equipment), and by Muffins (concerning digital rights management of cross-terminal/cross-platform delivery of content). In conclusion, the direct cooperation with other IST FP5-projects in the fruitful environment of a joint booth such as ISTV, gave the Future

Home project deeper insights into the overall context of connected homes, especially from the services perspective, and will allow us to better carry on with our work with this gained knowledge about the research surrounding.

Digital rights management technology was covered by three projects each aiming for a different application: 1) MUFFINS aiming for video streaming based on MPEG-21 and upcoming ISMA standard, 2) MOSES aiming for music delivery based on download to wireless handheld players using initially ODRL and later MPEG-21, and 3) Share It! aiming for consumer home equipment to share privately generated content secured within user groups.

The exhibition brought forward several synergies between MOSES and projects such as ASSET and MUFFINS who also handle multimedia content, mostly video, in relation with digital rights management. The technology developed in these projects can be seen as complementary to the MOSES project. Although the background of these projects is the same, MOSES is unique in its approach to facilitate standard based approaches (MPEG-IPMP, Web Services) to achieve its goals. Muffins is based on ISMA and streaming while MOSES is based on MPEG IPMPX and downloading. Standards (MPEG, IPMPX, ISMA, DVB, etc.) harmonization needs to be further addressed perhaps in Concertation meetings. In addition to the above, there are many points of relevancy between MUFFINS and MOSES projects. During the past year MUFFINS and MOSES exchanged ideas and technologies. As discussed during the event, exchanging information between MUFFINS and MOSES will continue.

The Share it! and Spation projects both lead by Philips are most relevant for MUFFINS as they deal with related subjects to the MUFFINS framework. Share it! addresses the possibility to introduce an alternative content distribution chain to the broadcast environment. This alternative comes in the form of a home-to-home peer-to-peer network for sharing stored broadcast and home produced content. Given the nature of content there are several DRM related issues that need to be addressed ranging from sharing rules and their distribution to the actual content protection. It is noteworthy that Share it! has implemented its own simple DRM system that supports the major TV distribution models. The Share it! project is very much broadcast oriented and consequently builds heavily on TV-Anytime forum's metadata specifications. The Spation project deals with seamless integration of all storage space within a home and access to content irrespectively of its storage location. The Spation project is based on UPnP technology.

Table 1 summarizes how other projects from the IST village could influence MUFFINS, while Table 2 shows the opposite – how MUFFINS could contribute to the efforts of other projects.

Projects impact on MUFFINS	Share it!	Spation
Network topology	<i>Distributed. Based on novel P2P networking protocols. The advantages of the distributed topology could be taken in account</i>	<i>Partly distributed. Based on UPnP technology. Similar comment as valid for Share it!</i>

	<i>by MUFFINS that is now proposing a centralized solution</i>	
TV Anytime metadata	<i>MUFFINS could use TV Anytime metadata whenever a live broadcast stream is concerned</i>	N/A

Table 1: Other projects potential impact on MUFFINS.

MUFFINS impact on:	Share it!	Spation
Overall framework	<i>Share it! is broadcast oriented and consequently builds on TVA specifications. Maybe this could be extended to MPEG 21, especially in the field of digital item declaration and identification, where TVA metadata could be wrapped by MPEG 21 envelopes.</i>	<i>All content in the Spation network could be formulated as MPEG 21 digital items taking advantage of the standard description.</i>
Content protection	<i>Share it! has its own encryption mechanism, however it could inherit the ISMA crypt employed by MUFFINS</i>	<i>ISMA crypt adoption wherever content protection is required, although it is assumed that Spation is by definition a secure domain.</i>
Licenses	<i>MPEG 21 REL based licenses could be adopted in place of proprietary solutions</i>	<i>MPEG 21 REL based licenses could be adopted in place of proprietary solutions</i>
Watermarking	<i>Watermarking technology could be used to guarantee content integrity in the P2P network</i>	<i>Similar, but less relevant</i>
Terminal adaptation and DIA	<i>Less relevant, since content in Share it! is DVB TS</i>	<i>DIA records of terminals could be used to match content to terminal capabilities in a standard way</i>

Table 2: Potential MUFFINS impact on other projects.

Synergies were made between ICE-CREAM and MUFFINS about MPEG-4 related IPMP protection and security mechanisms that could be used for all kinds of multimedia, e.g., also 3D MPEG-4 files and streaming.

The ICE-CREAM travel magazine is highly interactive. Since it heavily relies on the availability of local storage and the back channel for downloading further personalized information to the MHP box as well as to access external services like event booking and providing information to the mobile travel guide it cannot run on MHP set-top-boxes as they are currently available on the market. Therefore ICE-CREAM utilizes the Philips MHP set-top-box and its extended APIs which were developed within the Share it! project. Both demonstration scenarios - namely interactive applications from the broadcast, which can also be stored locally and peer-to-peer content exchange between MHP set-top-boxes - complement each other quite well not only from the technical point of view but also from the user's perspective. In fact, the full scenario has been demonstrated by FhG FOKUS at the IFA in Berlin in a joint set-up.

The Spation and the Muffins project share complementary problems. MUFFINS demonstrated a DRM system based on certificates. When the user buys content, the user obtains a certificate. This certificate can be used to playback the content on a device. Additionally it is possible to transfer the certificate to someone else. In the Spation project we have a limited focus on DRM solutions. The technology is complicated and requires an in depth understanding. DRM is something that cannot easily be added to a project without increasing the complexity of the system dramatically. Still, in a system like the Spation system where content is moved from one device to another DRM solutions are important. The demonstrations at the IBC allowed us to discuss how DRM solutions could be integrated in a UPnP based home network. Interesting points are whether the certificate system that is based on a central server can be implemented in such a way that the user never feels the drawbacks compared to a system without DRM solutions. However, integration of the projects results would be impractical. The investigations are complementary and the speed of research would slow down due to the increased complexity. Projects focusing on a part of the system, instead of trying to solve it all will have a higher change of providing a breakthrough. In the case of DRM in a UPnP based network a serious amount of work needs to be done. Even though a working group in the UPnP forum is addressing the DRM issue, it currently has no notion of individual users and hence no authentication. Additionally, there is no privacy protection. In fact it is possible to control any device in the home network without any checks.

Previously the Spation and Share-it project were already in contact. For the Net-atHome tradeshow in Cannes in 2002, an ad hoc connection between the Spation system and the Share-it system was implemented. Since Spation focuses on navigating content on connected CE-device in the home and Share-it focuses on sharing content between homes it makes sense to investigate its connection. For the IBC we decided not to connect the two systems. The main reasons were the increased effort needed to implement the demo system and the complexity of the message of the two demos. However, discussions at the IBC led us to decide to start the investigation of the bridging of the two system in a more thorough way. The Spation system is based on the UPnP network middleware. Share-it uses JXTA to control who will be able to receive content and see what others have available. UPnP is very suitable for home networks, but does not scale over the Internet. Hence, a theoretical investigation of UPnP-JXTA bridging will provide an interesting research topic.

The Spation and ICE-CREAM project have a good working relationship. The projects are complementary. The combination of the ideas from Spation and ICE-CREAM promises to be an interesting future research topic.

The future home project investigates a UPnP based home network using IPv6. Compared to Spation the focus is more on device control and networking whereas Spation focuses on distributing and finding content in the home. The content analysis part of Spation to help users find their content is outside the scope of future home. So it can be concluded that the two projects are largely complementary. Some work like just setting up and understanding UPnP is done by both projects, but organizing the sharing of this software or even just this information is probably more work than just doing it. In any case there are benefits to exchange information between the projects.

6. Feedback from visitors

6.1. Feedback from project members

IBC is a high profile set of demonstrations that provide a visible milestone, an important point of focus for project teams, and a means of selecting and filtering technical ideas. The demonstrations shown were very ambitious in scope and have driven technical work hard during the course of the last year.

Although public demonstrations consume a lot of effort, they are very worthwhile. Without them a project can too easily drift and become unrealistic. They help the project team to articulate properly what they are trying to achieve. Share it!: 'We felt very happy that we had set ourselves ambitious targets, and by working hard as a team were able to meet them'.

The demonstrations and stand themselves provide a platform to discuss with key industry shapers the technologies that we work on and the likely impact they will have on the future industry. This year at IBC we had a large number of such useful contacts.

Attending IBC provides an excellent opportunity for the individual researchers involved to discuss with colleagues working on different EU projects their approaches and experiences. For instance Spation, MUFFINS, ICE CREAM, and Share it! while working on different topics, share many technical problems and solutions.

The demonstrations also provided a very good avenue for project members to meet directly with our EC project officers and explain their contributions and roles in the project in an informal and casual way.

6.2. Feedback from customers

During the course of the show we demonstrated the system to hundreds of visitors. Most visitors visited all the demo's in the stand. Since the interests of the visitors differed per project, the feedback will be given for each individual project.

ASSET

Most people who came to the ASSET demo did hear about the ASSET project before (SMPTE, ASSET web site, IBC 2003 conference) and wanted to understand more about the ASSET concept. No doubt that the fact to participate in the IBC conference, i.e., in the "Technology Supporting Production" session, on Friday 12 September, has attracted some people (i.e., ZDF: German broadcaster, RAI: Italian broadcaster, etc.).

The feedback of the visitors was very positive ("good-looking", ...). One visitor from the RAI (Alberto Messina) was very interested, especially in the details of the ASSET's architecture. It was interesting to talk to the people presenting the other projects, especially those addressing the DRM (digital rights management), as our project was lacking this issue. Visitors were mainly from broadcast and/or software staffs, for example, Vestel Society, SW Test & Design Verification Manager department was interested in the design and tools used in the ASSET development. Canal+ Technology was interested in the availability of the ASSET Web service interface for integration with

other application products, and Thomson USA was interested in the manner of controlling the THOMSON server by the ASSET framework. Some broadcasters, for example, NTL, BBC, Eurosport, etc. were interested in the new concept of equipment and broadcast application integration via the ASSET framework.

This IBC event was also a nice opportunity to have informal meetings with members of the European Commission (Carlos Morais Pires), the ASSET project leaders from Thomson (Jean-Pierre Lacotte and Daniel Kramer) and Dalet (Edgar Mueller).

Future Home

a) Industry

Since IBC is a broadcast-related exhibition addressing professional target audiences, we received many interesting contacts from the IBC-related domains like manufacturers of set-top-boxes or connected appliances for the home. Overall, the project staff at ISTV made about 40 relevant contacts during the 5 days of IBC exhibition and gave about 50 demos of single components or the full scale of the demonstrator. Amongst others, we have made potentially interesting contacts with Vodafone Pilot Development (interest in multiply connected end-user services), Panasonic Europe (set-top-box as centralised terminals in the home; also interest in cross-platform and cross-device services and applications), and Cisco Systems USA (IPv6, networking protocols for in-home routers). The first reactions to the Future Home concepts and architectures, and also partially to the services shown, appeared to be promising. Future Home will further proceed the contacts by discussion at their next project-meeting and follow-up contacts by relevant partners of the consortium towards the contacts.

b) Journalists/ Public Relations

Several Journalists and Authors showed interest in the vision and details of the ambient intelligence concepts of the future, to be foreseen from some of the Future Home demonstrator components. Also discussion about the nature and quality of future digital lifestyles aroused; a side issue of the technical achievements of home networks, but nevertheless important for the social context of the project's work. Future Home will take up the contacts to journalists for further dissemination of the project's results later on.

c) Research Experts

Also various members of universities, research institutes, dealing with in-home services and networks and also some the scientific personnel of the EC as well as project officers visited the Future Home demo, which allowed us to give more in-depth presentations about the technological backgrounds of the project and so set up substantial communication on items related to the connected homes area, like cross-platform multimedia services, ambient networks in-home and out of home, and middleware technologies for connected homes. Especially important for a research project like Future Home in this context, is the opportunity for dissemination and public discussion of project results besides the normal time-tabling of project audits. This gave us the opportunity of also showing parts of our implementations to experts, which may not become relevant for the audits themselves, but nevertheless are important for single components of the project work.

d) Others

Other visitors were often attracted by the “non-IBC typical” devices like the training bike or the oven simulator, so that also fair passers-by were moved towards the more research-oriented topics of ISTV. We can only estimate, that this aspect of attracting has increased also the overall visitors of the whole ISTV. Anyway, we had wide-spread discussions about the concepts of home networking and the applicability of connected devices in the home from end users perspectives, which is also important referring to the social context of the acceptance of such innovative technologies as Future Home amongst other projects proposes.

ICE-CREAM

The integrated football demo, i.e., MPEG-4 on a MHP set-top box, with the 3D animations based on live data attracted a lot of visitors, especially from the BBC (BBC News, Interactive Television Development management), Turner Entertainment Networks (Senior Management for Broadcast Entertainment, Technology), EBU, IRT, NOB (Strategy management), Microsoft, Accenture, Mitsubishi, Bayerische Medientechnik, ZeelandNet and MPEG-4 professionals from various organizations. Partner Symah Vision conveyed 2 existing clients (Demco in Kuwait and Al Ahram in Egypt) to discuss about football 3D reconstruction for television as they already use Symah Vision technology for sponsorship and editorial enhancements on sports broadcasts. We also welcomed the representative of HBS, the host-broadcasting organization in charge of producing the TV signal for the 2006 FIFA World Cup. These three contacts seem rather serious and Symah Vision is already consulted for a service to deliver 3D football reconstruction for a football event in Kuwait in December this year. We also received the visit of Dubai television that showed a serious interest in the demo as well as many visitors curious to see 3D rendering. Colleagues from the Philips CE-CTO complimented us with this demo as the most original for showing the potential for MPEG-4. An overnight implementation of a 2D reconstruction of a soccer event for mobile devices was made by Bitmanagement at the request of a Philips MPEG-4 specialist.

The travel demo in which we integrated a TV and a mobile application was extremely powerful in illuminating the effectiveness of having good authoring tools for fast implementation of different applications. This was especially of interest to the development management of the BBC News, since they are developing a MPEG-4 trial for News Night and to, amongst others, the Bayerische Medientechnik and ZeelandNet, a local broadcast. The level of interactivity which we offered goes far beyond other MHP applications which have been demonstrated at IFA and IBC. This has been enabled by our close synergy with the Share it! project where we were able to re-use their extended and networked MHP platform, whereas our competitors normally stick to boxes which are available on the market and therefore have to limit their functionality. You cannot provide the same level of interactivity if you only have an analogue modem as back channel. The integration of our iTV application with a mobile end device was also very well received.

The Deepsea demo generated interest from people who were especially interested in applying 3D graphic objects and ambience effects to interactive broadcasting. Although many thought the demo was very futuristic, they considered these features very promising for opening new business models for broadcasters and producers. The strong object-oriented features interested the visitors who know MPEG-4 technology. Some people from the Internet service providers were also intrigued by the fact that media

objects in the movie may also be served from the Internet, which they think may lead to new convergence or competition between Internet and broadcasting services. Interaction with 3D virtual environment and objects in broadcasting context also caught attention of visitors from BBC, who share the similar vision on this topic in some of their projects. The idea of using physical objects (such as lights and toys in the demo) to connect the virtual and the reality generated interests from people who are interested in game-like applications.

In comparison to the IFA, Berlin where ICE-CREAM was shown a week before, the IBC was focused on business visitors mainly. This focus is much more applicable to the R&D project than the end consumer focus of the IFA.

MOSES

The IBC was a full success for MOSES. It was possible to show an interested audience a fully functioning demo. Many visitors were interested to learn how our Digital Rights Management (DRM) architecture could fit their needs and might be integrated in their projects. Although no specific cooperation was agreed it was possible to promote the system and gather crucial contacts that might lead to further projects. The audience was composed of experts that were interested in the technical side of the system, such as, Panasonic, content distributors (Broadcasters) such as Digital TV, and Content Providers that search for a platform for delivering their content to. The discussions showed that the MOSES system could possibly be exploited and adapted to the specific needs of all these groups. The visitors were split into two groups. The bigger one contains leading professionals for companies, such as technical directors and managers. To a smaller extent professional developers and consultants came to the stand. Although some technical expertise was exchanged the exhibition emphasised the promotion of MOSES for content service providers. The following persons visited the Moses project:

MPEG Personnel: Rob Koenen - President of the MPEG Industrial Forum, Pete Schirling - head of USA delegation, MPEG 4/21 Group of Panasonic, Singapore, Japan.

Companies: Digital TV, UK; NDS, UK; New Zealand Broadcasting Corporation, New Zealand; UDCast, France; Adtech, USA; SSH Comms Security (Finland).

MUFFINS

Although somewhat out of scope for the typical visitor of IBC show, the fact that MUFFINS presented the first implementation of MPEG-21 stimulated interest. People were especially interested in the way MUFFINS used various MPEG 21 entities. MUFFINS builds on ISMA and adds other standard components to provide a comprehensive framework. The MUFFINS concept was very well received by the audience of the ISMA session who are eager to see real implementations of their specifications". In particular, MUFFINS has already implemented parts of the DRM framework recommended by the ISMA technical committee for incorporation into the ISMA specifications in the next few weeks.

Share it!

The Share it! project has records of some of the visitors to the stand as part of their demonstration was to photograph the visitor. The records show that they made full

demonstrations of the project to more than a hundred visitors, and short demonstrations to many more. They sorted the visitors into a number of categories:

1. **Industry shapers.** We invited a number of people active in the defining the future of broadcast TV. Many of these people are known to project partners because of their activities in standards and other TV industry bodies. In the area of DRM, we had a number of discussions with people involved in the current work for DVB Copy protection, from all parts of the value chain (from Hollywood companies, the MPA, through to broadcasters and equipment makers). These discussions are helpful to the project, and we found the ideas being presented were well received by visitors.

We also were able to present our work on extensions to MHP to a range of people active in the world of interactive TV. This undoubtedly will help when the DVB TAM starts work on the MHP PVR phase of work during the coming months. (To quote one visitor much involved in UK digital TV standardisation: *"I ... did spend some time with your colleagues on the Share-it demo. Very good it was too and it was the first reason I have seen to move to MHP apart from anything else!"*)

A number of people active in the deployment of TV Anytime phase one standards, were interested to see the demos of the bidirectional metadata services, and how we are making extensive use of TV Anytime metadata standards for new applications. The linkage between our work and that shown in the Pro MPEG forum interoperability suite was commented on by several visitors.

2. **Colleagues of participants.** IBC provides an excellent opportunity to explain the project to your own senior management and colleagues and help to achieve "buy-in" to the investments that will be needed to take the next steps towards deployment. IBC 2003 achieved this for most of the Share it! partners with a range of demonstrations.
3. **Commission staff.** We had the opportunity to show the project's work, concepts and technologies to Leon van Noorden, Eric Badiqué, and Carlos Morais-Pires. The format and time available at IBC gives a much good opportunity to discuss the project in some detail.
4. **General visitors.** We showed our work to many general visitors to the stand. This is always important in raising the awareness of the technical areas and the value of taking part in EU programmes. The feedback we got from visitors was very positive on all aspects.

Spatiation

The audience at the IBC consists mainly of technical people associated with broadcasters, television studios etc. In the past we found that broadcasters are sceptical about new technology, they first have to see whether it will really become a hit. Comments on personal video recorders often were that even though they are on the market for a couple of years now in the US they still are not sold in huge numbers. However, during this IBC we learned that this opinion had changed. During the many discussions we had with visitors of our demo the opinion seemed to be that it is only a matter of time before the general public realizes what a personal video recorder will mean for them. Many people saw the endless possibilities of personal video recorders such as easy recording, pause of live TV, automatic personal profile based recording,

etc. While many of these features can be seen as a thread for current television, benefits were also often mentioned. The PVR can serve as a platform for interactive television.

Since our system is a step beyond this PVR thinking, we expected to meet some scepticism. However, nearly everybody reacted positively (only 2 visitors indicated not believing in a home network, and would not spend money on it). We introduced the demo saying that network technology is cheap and that for future PVRs it would be no problem to add a network connection (supported by the fact that the Streamium audio system already has a network connection). We argued that when a user buys a PVR and a more advanced model 3 years later, it would be cumbersome if one would need to search each device separately for a particular movie. In our system the user can search for content regardless of where it is stored, and when the content is found it can be played back on the device of choice. Visitors of our demo agreed with the benefits of connecting CE-devices and commented often on the use of the iPronto as a 'super remote control' for all devices in the home. It was especially this device that attracted attention. Often just holding the iPronto in the hand made people passing by our booth curious enough to have a look. After seeing the demo many people said that they could envision using such a device in the future to control every device in the home. Most visitors wanted to know whether the iPronto is already for sale, and what it costs. Some people found it surprising that also the PC, is treated as just another device and that also from the iPronto the PC can be commanded to play a song or to show a video. During some demos interesting discussions arose about the ins and outs of UPnP or quality of service implementations on wireless connections.

In general the audience at the IBC is a very interesting audience for us. We think it important to advertise our projects results in the broadcast world, since a large part of the content at home consists of TV programs and the TV is the most important CE device in the living room. Besides informing a large public, we also got a lot of information our selves. As outlined above many people gave useful feedback about our system and often we had interesting in depth discussions.

7. Conclusions

The participation to the IBC2003 was a success for all participants and an excellent way to disseminate the results of the participating projects. It was a good venue for technology transfer between projects and creation of synergy amongst the wide variety of participating organisations. The formula that we used resulted in a 'small investment, high gain' result, since the costs could be divided over all the participating project partners (over 50 organisations). In short, having a common demo is advantageous. It is easier to attract attention with a large, professionally designed booth. It costs no extra time, in fact it saves time and money to have a common demo booth. The discussions and demos of the other projects in one booth form a free bonus and facilitate the creation of contacts between projects. The effort of going to the IBC is time well spent. The impact is significant since we consider the broadcast world important. After all, consumers still spend a lot of time watching television. Hence TV content is an important factor in our applications and in the home network.

The IBC was established in 1967 as a showcase for broadcasting technology. It attracts on average 40.000 attendants annually. The IBC2003 had 25.175 visitors and 11.181 exhibitors. This was lower than, for example, in 2001, but higher than in 2002. About 350 people visited the IST-Village.

The IBC conference covers the key technical, management and creative topics. The major themes for the conference were D-Cinema, Digital Radio, Archive and Restoration, Delivering the Goods, Digital Lifestyles (Gateway to the home) and Production. The ASSET and Share it! projects each had a paper in the conference in the sessions on Technology Supporting Production and Digital Lifestyles respectively. The MUFFINS project had a presentation in the ISMA session. The project coordinators for ICE-CREAM and SPATION organized and participated in a panel session on Content Management and User Navigation in the theme Digital Lifestyles. These activities were very effective to give visibility to our demonstrations in the IST-Village. The panel session on Content Management and User Navigation was rather interesting as it highlighted the time lapse between R&D activities and the picking-up of these ideas and their related problems in the field. That is, most of the issues raised in this interactive session by the audience referred to R&D work that was conducted in the mid-nineties in company research labs and in IST-funded projects. Also, many questions during the session and afterwards came from people who are in the development departments of broadcast companies.

The major objective of the joint demonstration was to disseminate the ideas and technology developed throughout the IST funded projects and communicate it to a wider audience. This goal was well achieved, a very satisfactory outcome given the large scale of IBC. However, there was another, probably more important, impact of the joint exhibition. The projects were presented by a large number of people actually working on these projects. Through demonstration shifts (usually there were 2 or more people presenting a project) these people with detailed knowledge of the underlying technology and full awareness of open issues and problems were able meet in person and discuss their work with their peers. This can be seen as an important complement to the concertation meetings usually attended by managerial project representatives.

The success of a joint demonstration at the IBC could of course be enhanced in the future. Projects that demonstrate in the New Technology Campus have the advantage of public relations organised and featured in the IBC publications and on the IBC web site. Since we moved our demonstrations from the New Technology Campus to the commercial area, our projects are out of this publicity stream. We should try to get back into this stream of publicity organised by IBC, and take our own concerted PR actions to increase the visibility of the work. A related improvement would be to take more advantage of the benefits of being a set of EU-funded projects. EU research projects are almost universally recognised by the target groups of people we are trying to reach. We should make better use of the EU logo and branding on our stands in the future to emphasize and reinforce the message that we are research projects investigating the future and not a commercial organization with a product to promote

The impact of the joint demonstration will be important due to the part-overlap both in terms of goals as well as technology of presented projects. This has lead to a more intense proliferation of ideas and concepts and has given the opportunity for people to discuss their future plans and form new partnerships.

The projects from the ISTV have all demonstrated concepts and ideas that could provide the foundation of future multimedia applications and services. A common denominator of the projects was the search to fulfil the user's expectations driven by the trends summarized as: »consume it anytime anywhere« and by the consumer concern »your home, your ambiance, your media«. At the same time several IST village projects addressed the growing concerns of the content creators in respect to content protection.

8. Appendix Illustrations



