Remote Collaborative Real-Time Multimedia Experience over the Future Internet

ROMEO

D8.3.1

First dissemination, standardization and exploitation plan

Document description	
Name of document	First dissemination, standardization and exploitation plan
Abstract	This document describes the first dissemination, standardization and exploitation plan of the ROMEO project. All dissemination and standardisation activities in year 1 as well as planned activities in the second year are listed and described in detail. Furthermore, the initial exploitation plans are described individually by each project partner.
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1 INTRODUCTION

1.1 PURPOSE OF THE DOCUMENT

This document presents the Dissemination, Standardization and Exploitation plan of the ROMEO project.
The document describes the planned and already executed dissemination and standardization activities within the scope of ROMEO in the first year of the project, as well as future planned dissemination and standardization activities in the second project year.
Furthermore, individual exploitation plans of each project partner are described.

1.2 OBJECTIVES AND ACHIEVEMENTS

The aim is to present and promote the project results to the various stakeholders and interest groups. For this, the project will present the project and work results to the broader public and research communities (dissemination), prepare for the usage and industrial uptake of the project results by the consortium partners as well as by other interested parties (exploitation), and prepare for a substantial and long-term impact by promoting the project results for standardization.

1.3 STRUCTURE OF THE DOCUMENT

This deliverable is structured as follows:

In Section 2, already executed and planned dissemination activities are listed in a table and described in detail.

In a similar structure, the standardization activities (executed and planned) are described in Section 3.

Finally, the initial and individual exploitation plans of each project partner are depicted within Section 4.

2 DISSEMINATION

This section presents current and planned (within the next 12 months) dissemination activities per partner, as described in DoW Section 3.2.1.1 [2]. Furthermore, it describes the Project Web Site Structure and the content management system. Moreover, it provides a report from the first Workshop that was held at Athens, Greece.

2.1 DISSEMINATION ACTIVITIES IN YEAR 1 (OCT 2011 – SEPT 2012) OF THE PROJECT

The dissemination activities of the first project year are listed in Table 1 and described in detail below.

No	Event	Type	Date	Location	Activity	Responsible partner(s)
1	Project Website	Website	Since Oct 2011	http://www.ict-romeo.eu		UP
2	IRT Website	Web	Since Nov 2011	http://www.irt.de/en/research/online.html#c3354		IRT
3	MulSys Website	Web	Since Oct. 2011	http://www.mulsys.com/news.htm		MulSys
4	1st ROMEO Workshop	Workshop	09. Jul 2012	Athens, Greece	Paper presentation	ALL
5	EUSIPCO 2012	Conference	27-31 August 2012	Bucharest, Romania	Paper presentation	UP
6	PCI 2012	Conference	5-7 October 2012	Athens, Greece	Paper presentation	UP
7	MSWiM 2012	Conference	21-25 October 2012	Paphos, Cyprus	Poster presentation	UP
8	Turk Telekom Website	Web	Since Jan 2012	http://www.turktelekom.com.tr/tt/portal/About-TT/RD-Technology/International-Projects/		TTA

Table 1: ROMEO dissemination activities in the first year

2.1.1 Project Website

2.1.1.1 Web Tools Characteristics

The purpose of the current section is to provide some insight on how the project web page was created, which are the major tools and software components that make it operational on a daily basis as well as point out some further activities regarding the projects' online promotion with the use of novel platforms and technology trends. Provided that all external dissemination material will contain a pointer to the aforementioned web page it immediately becomes the centre of information of this whole scientific attempt.

The website supports the cooperative work between the project partners and beyond, by disseminating project objectives, innovations, and achievements and further popularizes the project ideas among a wide community of potential users.

The website of ROMEO consists of two distinct and completely separate parts, from a functional point of view:

- The Frontend (Figure 3 and Figure 4)
- The Backend (Figure 5)

The Frontend is the publicly available site, i.e. the site that web users view when they access the URL: http://www.ict-romeo.eu/, while the Backend is the collaborative section of the web page having only a link on the main part of the site, depicted as a certain button on the main navigation bar of the web page under the name "Private Area". The Backend can be also accessed through a web interface, i.e. by using a web browser, but its URL is different (http://www.ict-romeo.eu/mediawiki/) and the access is allowed only to authorized users.

The Frontend of the web site was build using current web technologies such as HTML, XHTML, JavaScript and CSS.

For accessing the Backend, users need a password provided only by the administrator of the web page. Any unregistered user is unable to access the data the Backend contains, thus maintaining a certain level of confidentiality. The Backend also includes the collaboration tools of the consortium such as a wiki page and provides document upload and storage capabilities available to all partners. For the creation of the Backend a certain framework called Mediawiki was installed.

Mediawiki, building upon MySQL technology, uses a free MySQL database for storing the wiki's data (text, images, etc.), as well as the structural and appearance details of the site. Once the user input his/her credentials and accesses the Backend is being transferred to the Main Page as shown in the Figure 6 (placed in the Appendix B of this document).

Currently, the ROMEO Wiki is undergoing an update process since many partners provided feedback regarding their experiences and expectations from it and the new much more improved version is going to be online until the end of the month. The exploited hardware and software infrastructure for hosting the ROMEO website consists of a Linux system on a custom-made server machine with an Apache web server installed, as presented in Table 2.

Hardware Technology	
Processor	Intel Core i5, Quad-Core, 3.00 Ghz, 3Mb Cache
Memory	8 Gb RAM
Storage	2x500 Gb HDD in RAID1
Software Technology	
Operating System	Ubuntu Linux 12.04 LTS Server Edition
Web Server	Apache 2.2.14
Database	MySQL 5.1.44
Scripting Languages	PHP 5.3.2, HTML

Table 2: Web Server Hardware Specification

2.1.1.2 Statistics

Only through great visibility will the project be able to attract the users, such as industry professionals, to participate in early adoption and industrial uptake of ROMEO proposals and technology.

This website is a key element of the future ROMEO strategy in terms of reaching out to the relevant end user and to industrial communities. Its final objective is to stimulate the early adoption of the project's technology by the end user community, to promote the projects activities and results across the scientific community and ultimately, to support the uptake of the technology for future commercial or industrial exploitation.

Within ROMEO we will aim to heighten the projects visibility by publicizing the results of technology trials, by the identification of, and participation in key showcasing events, and by forging strategic links with national and international projects around the world that are related to the work of ROMEO. Such initiatives are of prime importance for the technology adoption and industrial uptake of the proposed solutions.

In order to acquire essential information via the web page, administrators have accessed several tools both local (hosted in the ROMEO server) and online, for instance Google Analytics. The results derived from those tools are presented and analysed on the Figure 7 – Figure 13 placed in the Appendix B of this document.

Figure 7 illustrates some overall information regarding the Web Page traffic over the last several months. The http://www.ict-romeo.eu URL had over 1460 visitors, 509 out of which were unique. The distinction between unique visitors and overall ones clearly indicates a trend of visitors to re-visit the web page in order to seek some more or maybe an update in information or available technology. With a percentage of 65.2% of returning visitors and a 34.8% of new visitors accessed the Web Page, it is more than certain that anonymous users that visit the project's site tend to return after finding the information useful and interesting. Users are not only accessing the main page but also others as indicated by the increased number of 1774 page views as well as the average visit duration which is almost a minute long.

Figure 8 and Figure 9 show the distribution of visitors in a worldwide basis. As depicted, there are also visitors from countries well outside the consortium such as South Korea (which also ranked 10th in the top ten countries of page-hit origin), United States, Canada, China, India and Australia. This fact indicates that the promotion activities of ROMEO project such as conference participation and paper submission on a regular basis really improve the reputation of the project worldwide. More and more potential contributors and clients become aware of the research this consortium is doing and a significant momentum is likely to be created.

Figure 10 shows the results regarding the Frequency and Regency of Visitors. On Figure 11, pagehits and pageviews can be seen. Figure 12 and Figure 13 illustrate the statistics of user agent browsers and providers.

2.1.2 IRT Website

A short description (English and German) of the ROMEO project was published at the website of IRT beside other EU funded projects in which IRT is involved. A news item was added to IRT's welcome page during the start of the project.

2.1.3 MulSys Website

The successful start of the ROMEO project was published as news for MulSys at the company website to highlight the importance of the project.

2.1.4 1st ROMEO Workshop

The first ROMEO Workshop took place in Athens, Greece on 9 July 2012. Several papers from ROMEO partners and invited speakers were presented in the sessions. The workshop session structure (Table 6) can be found in the appendix. Figure 1 shows the attendees during the workshop.

In particular there were three keynote speakers, Dr. Frédéric Dufaux of Paris Tech in France, who gave a talk on 3D video representation and coding, Dr Thanos Demiris from Micro2Gen in Greece with a talk over a brief survey on merging the real and the synthetic in augmented 3D worlds and Dr Marcus Barkowsky from Nantes University in France with a talk on assessing the Quality of Experience of 3DTV and beyond and more specific on tackling the multidimensional sensation.

The total amount of participants on the overall workshop event, including consortium members, was about forty individuals. Some of them originated from Hellenic Universities and others from small or big companies in Athens and the suburban area.

2.1.5 EUSIPCO 2012

A paper entitled ""On the performance of H.264/MVC over lossy IP-based networks" will be presented at EUSIPCO Conference, (Bucharest, Romania, 31st of August 2012)

2.1.6 PCI 2012

A paper entitled “”Performance evaluation of 3D stereo video streaming over IP networks” will be presented at PCI (“Panhellenic Conference on Informatics”) Conference, (Athens, Greece, 5th of October 2012).

2.1.7 15th ACM International Conference on Modeling, Analysis and Simulation of Wireless and Mobile Systems (MSWiM 2012)

Poster paper presentation entitled “A comprehensive simulation study of Low Latency Handoffs in Mobile IPv4 for VoIP in IEEE 802.11b WLAN” at the 15th MSWiM(“ACM International Conference on Modelling, Analysis and Simulation of Wireless and Mobile Systems”).

2.1.8 Turk Telekom Website

A short description (English and Turkish) of the ROMEO project was published at the Turk Telekom web site as one of the international R&D project that Turk Telekom is working on.

Figure 1: 1st ROMEO Workshop Attendants

2.2 PLANNED DISSEMINATION ACTIVITIES IN YEAR 2 (OCT 2012 – NOV 2013) OF THE PROJECT

The planned dissemination activities of the second project year are listed in Table 3 and described in detail below.

No	Event	Type	Date	Location	Activity	Responsible partner(s)
1	27. Tonmeistertagung (Sound engineering symposium)	Conference	22.-25. Nov 2012	Cologne, Germany	Paper presentation	IRT+US
2	VISAPP 2013	Conference	21-24 Feb 2013	Barcelona, Spain	Paper presentation	IRT
3	Medientage München	Fair	Oct 2013	Munich, Germany	Demonstrator	IRT
4	2nd ROMEO Workshop	Workshop	Jun 2013	Istanbul, Turkey	Paper presentation	ALL, led by TTA
5	High Performance Mobile Opportunistic Systems (HP-MOSys)	Workshop	21-25 Oct 2012	Paphos, Cyprus	Paper presentation	IT
6	IEEE GLOBECOM	Conference	09-13 Dec 2013	Atlanta, GA, USA	Paper presentation	IT
7	International Conference on Communications (ICC)	Conference	9-13 Jun 2013	Budapest, Hungary	Paper presentation	IT
8	MediaSync 2012 - Media Synchronisation Workshop	Workshop	11 Oct 2012	Berlin, Germany	Paper presentation	US
9	International Conference on Image Processing (ICIP 2013)	Conference	15-20 Sep 2013	Melbourne, Australia	Paper presentation	US + MulSys
10	International Conference on Multimedia and Expo (ICME 2013)	Conference	15-19 Jul 2013	San Jose, USA	Paper Presentation	US
11	International	Conference	09-13	Budapest,	Paper	UP

	Conference on Communicatio ns (ICC 2013)		Jun 2013	Hungary	Presentation	
12	International Symposium on Personal Indoor and Mobile Communicatio ns (PIMRC 2013)	Conference	08-11 Sep 2013	London, UK	Paper Presentation	UP + IT
13	European Signal Processing Conference (EUSIPCO 2013)	Conference	09-13 Sep 2013	Marrakech, Morocco	Paper Presentation	UP MulSys US
14	Arçelik Dealers Network	Arçelik Dealers wide internal network	Starting from Apr 2013	Throughout Turkey	Short description of project, project video-clip and project presentation	ARC
15	Arçelik Homepage	Web site	Starting from Oct 2012	Internet	Short description of project, project video-clip and project presentation	ARC
16	Arçelik Info Day in Universities	Information Day	Starting from Apr 2013	Ankara, Istanbul, Izmir	Information day in Universities	ARC
17	MWC - Barcelona	Congress	Feb 2013	Barcelona, Spain	Flyers for the mobile terminal and ROMEO project	MMS

Table 3: Planned ROMEO dissemination activities in year 2

2.2.1 27th Tonmeistertagung

IRT submitted two papers to the 27. Tonmeistertagung in Cologne, Germany. This event is an internationally renowned sound engineering symposium, which takes place on a regular basis for more than 50 years. One paper will deal with the applied 3D audio capturing approach of the ROMEO recordings and will be a joint work along with US. The second paper provides an overview about the object-based audio approach of ROMEO.

2.2.2 International Conference on Computer Vision Theory and Applications (VISAPP 2013)

IRT plans to submit a paper to the International Conference on Computer Vision Theory and Applications (VISAPP 2013). The paper will deal with an approach of automatic saliency region detection. VISAPP aims at becoming a major point of contact between researchers, engineers and practitioners on the area of computer vision application systems.

2.2.3 Medientage München

IRT currently investigates regarding a potential presentation of the ROMEO project at Medientage 2013 in Munich – an annual media fair and convention. The final decision is still to be taken and also depends on external factors.

2.2.4 2nd ROMEO Workshop

The 2nd ROMEO Workshop will take place in Istanbul, Turkey in June 2013. In this workshop, it is planned to have keynote speakers and people from similar European projects as well as paper presentations by ROMEO partners. It will be considered to have short demos / simulations of the components developed until that time if possible.

2.2.5 High Performance Mobile Opportunistic Systems (HP-MOSys)

The paper “Multiple Multicast Trees for 3D Real-Time Content Distribution over P2P Networks” discusses a hypothetical distribution scenario that uses multiple multicast trees over peer-to-peer networks for 3D real-time content distribution and presents a new algorithm for the creation of multiple multicast trees. Furthermore, the paper also proposes a mechanism to deal with peer failures, based on offline computation of backup trees and selective updates upon peer failure.

2.2.6 IEEE GLOBECOM

IT will submit a paper (in cooperation with other ROMEO partners) that describes the ROMEO P2P components and the updated version of multiple multicast tree algorithm used in the distribution of multiple media streams over P2P networks.

2.2.7 International Conference on Communications (ICC 2013)

IT will submit a paper that specifically describes the Resource and Admission Manager and the Resource Controller component for the QoS/QoE assurance in the delivery of 3D content over P2P networks.

2.2.8 MediaSync 2012 Workshop

US is planning to present a paper on the comparison of the synchronisation aspects of ROMEO and DIOMEDES projects.

2.2.9 International Conference on Image Processing (ICIP 2013)

US is planning to submit a paperjointly with MulSys on side-information based multi-view video adaptation for error robust streaming.

2.2.10 International Conference on Multimedia and Expo (ICME 2013)

US in cooperation with UP is planning to submit a paper on the ROMEO approach to Quality of Experience measurement of compression and packet loss artefacts in stereoscopic video. This will be based on the subjective experiments performed for the ROMEO project and also on the metrics that will be developed within the project.

Furthermore, it is also expected to present a paper on multi-view video delivery optimisation techniques over P2P networks. This work will be mainly based on the optimisation activities undertaken in WP4.

2.2.11 International Conference on Communications (ICC 2013)

UP is planning to submit a paper on Unequal Error Protection (UEP) in real-time 3-D Video Transmission over Heterogeneous Wireless Networks presenting both the objective and subjective experiments performed for the Romeo project.

UP is planning to submit a paper examining the impact of flow mobility on 3D mobile video streaming.

2.2.12 International Symposium on Personal, Indoor and Mobile Radio Communications (PIMRC 2013)

UP in cooperation with IT is planning to submit a paper to the International Symposium on Personal, Indoor and Mobile Radio Communications on Cross Layer Optimization Architecture at last Hop of Wireless 3-D Video Transmission. This work will be based on the analysis and description of the architecture and on the experimental results performed for the Romeo project.

Moreover, UP is planning to present an additional paper based on Game-Theoretic vertical handoffs in heterogeneous networks. This work will be based within the framework of WP6 for efficient Resource and Handoff Management in the wireless environment of the ROMEO Project.

2.2.13 European Signal Processing Conference (EUSIPCO 2013)

UP is planning to submit a paper on 3-DMOS-Quality based on Cross Layer Optimization in Wireless 3-D VideoTransmission. This will be based on the subjective experiments performed for the Romeo project.

Furthermore, UP is planning to submit a paper comparing SVC (Colour plus depth) versus MVC stereo streaming in terms of perceived video quality using both subjective and objective metrics.

MulSys is proposing to submit a paper jointly with US on spatial audio coding based on the novel AbS framework for multichannel audio coding. The paper will present new experiment results from ROMEO subjective test.

2.2.14 Arçelik Dealers Network

Arçelik will disseminate the ROMEO project in its dealer network broadcasting system. Arçelik has over four thousands dealers throughout Turkey and they are all connected to Arçelik Dealers Information Network which has its own broadcasting system. The system is controlled centrally at Arçelik Headquarters and each dealer has an interactive multi-touch 42” and/or 46” screen connected to the system. Each terminal receives own broadcast content as well as news, new and existing products information with all details. The system enables the users interactively to get info about products, projects, awards, news and so on. The ROMEO project flyer and poster will be added to this system and the video-clip is going to be played on the system.

2.2.15 Arçelik Homepage

Arçelik will disseminate the description of ROMEO project at own web site in English and Turkish. The project flyer,poster and the presentation will be also added to web site and the ROMEO project web-site link will be added, too. The project video-clip is going to be added to the web site when it is ready.

http://www.arc elikas.com.tr/Cultures/en-US/

http://www.arc elikas.com.tr/Cultures/tr- TR/?Language =tr-TR

2.2.16 Arçelik Info Day in Universities

Arçelik is sponsoring and participating in many University information days in Turkey. ROMEO project flyers and posters will be used in these information days to disseminate project information and mid-term results. There are many info days in Universities and at least four of them will be selected for ROMEO dissemination activities. There will be a press release about ROMEO project in these information days as well.

2.2.17 Mobile World Congress (MWC 2013)

During the mobile world congress in Barcelona MMS will show some of MMS products together with other companies working in the same area. We plan to give to visitors flyers about the ROMEO project as well as flyers for the mobile terminal device, describing the features, functionality, design, etc.

3 STANDARDIZATION

The knowledge that will be gained from this project will have a significant impact on a broader scale, as they will provide a generic methodology for optimized joint source (DVB and P2P) network optimisation in scalable multi-view video for enabling a scalable video distribution over P2P networks. This gained knowledge also includes the 3D audio transmission, rendering and coding, as described in DoW Section 3.2.1.2 [2].

Some of the representatives of ROMEO are participating in standardisation groups and contribute proposals for potential standards as well. In this section, all activities regarding the standardization efforts for ROMEO are listed and described.

3.1 STANDARDIZATION ACTIVITIES IN YEAR 1 (OCT 2011 – SEPT 2012) OF THE PROJECT

The standardization activities in the first year of the project are listed in Table 4 and described in detail below the table.

No	Standardization body	Activity / Type	Involved partners	Comments
1	SMPTE	Disparity map representation	TEC	
2	DVB 3DTV	Transmission 3D content	TEC	Phase 2
3	3D@HOME	Evangelisation of 3D good practices	TEC	
4	FOBTV	Description of use case based on ROMEO scenario (Combined reception of services via broadcast and broadband networks)	R&S	Collection of use cases started by FOBTV in May 2012
5	SpatDIF	Monitoring activities for spatial audio streaming	IRT	

Table 4: Standardization activities in year 1 of the project

3.1.1 SMPTE

SMPTE 10e/Disparity Map Representation: Technicolor is chairing this group, aiming at standardizing the format of disparity maps. A document has been submitted to ballot in January; The FCD (“Final Committee Draft”) document, approved in March, has been submitted to post-ballot comments and replies. All ballot comments have been resolved and will be concluded mid-July

3.1.2 DVB 3DTV

DVB: 3DTV: Technicolor has participated to a call and meetings for the DVB 3DTV phase 2 specification. Usage of MPEG MVC is being discussed for phase 2 as well as signalling for positioning of graphics on 3D content. The set of documents related to Phase 2a

specifications have been presented and approved in the DVB Technical Module meeting on June 7th. Next step is the validation by CM.

3.1.3 3D@Home

Technicolor is chairing ST2 “3D Transmission and Storage”; 2nd release of the 3D ecosystem and 3D Metadata workflow has been completed end of March, uploaded on the web site and presented during the Quarterly Meeting of the consortium at NAB.

3.1.4 FOBTV initiative

The 'Future of Broadcast Television' (FOBTV) initiative started in late 2011 with a declaration signed by American, Asian and European standardisation bodies. The aim is to develop a new global approach to the future of terrestrial television broadcasting. This initiative is open to all interested parties by signing the respective Memorandum of Understanding (MoU).One of the early steps of the work in the initiative was the collection of ideas for use cases, to which R&S provided a short description of the ROMEO scenario of combined delivery of services over broadcast and broadband networks.

The discussion is on-going and currently (mid-2012) focusing on the structuring of requirements which are similar for several of the described use cases.

R&S has been accepted as a member of the FOBTV initiative and plans to follow the process of use case structuring and requirements development closely.

3.1.5 SpatDIF

Due to the experimental and heterogeneous nature of today’s spatial audio systems there is a general lack of standardisation and many research groups define their own proprietary formats to cater for their specific needs. MPEG-4 BIFS audio part was one attempt to standardise 3D audio but is regarded as overly complex or not suitable and thus rejected by many researchers. To address this issue, a community-based format named Spatial Sound Description Interchange Format (SpatDIF) is collaboratively developed and promoted (see http://spatdif.org/). SpatDIF is still in an early development phase – version 0.3 was released in July 2012. IRT will both monitor the activities of SpatDIF as well as try to bring in changes to cater for specific requirements coming from ROMEO.

3.2 PLANNED STANDARDIZATION ACTIVITIES IN YEAR 2 (OCT 2012 – SEPT 2013) OF THE PROJECT

The planned standardization activities for ROMEO are listed in Table 5 and described in detail below the table. It is planned to continue the started standardization work which is described in Section 3.1.

No	Standardization body	Activity / Type	Involved partners	Comments
1	IETF Peer to Peer Streaming Protocol	Actively monitor and discuss: (i) the tracker	IT	

	(ppsp)	and peer signalling and (ii) the design scope, requirements and uses cases for P2P streaming		
2	MPEG 3DV Ad-hoc group	Monitor the on-going view synthesis, depth representation and coding work performed in MPEG, and prepare a future contribution on view synthesis quality oriented depth quality estimation for possible use with depth encoders	US	
3	Video Quality Experts Group (VQEG)	Discuss with University of Nantes, France, regarding collaborating on contributions to VQEG regarding Quality of Experience Metrics and Measurements	US	
4	SMPTE	Disparity map representation	TEC	
5	3D@HOME	Evangelisation of 3D good practices	TEC	Merge with I3DS
6	DVB 3DTV	Transmission 3D content	TEC	Phase 2
7	DVB Technical Module (DVB TM)	Concept of service provisioning over broadband and broadcast networks	R&S	
8	DVB	Monitoring relevant DVB groups	IRT + R&S	
9	SpatDIF	Monitoring activities for spatial audio streaming	IRT	

Table 5: Planned standardization activities in year 2 of the project

3.2.1 IETF Peer to Peer Streaming Protocol (ppsp)

IT plans to follow/review the Internet-Drafts in ppsp Working Group and participates in the discussions in a friendly, helpful fashion, with the goal being the best Internet standards possible. Toward this end, IT plans to write programs that implement partially or fully the current proposals in ppsp Internet-Drafts, since one of the oft-quoted tenets of the IETF is "running code wins". Finally IT also aims to participate in at least one ppsp IETF meeting to present the developed work and discuss future directions under this research area.

3.2.2 MPEG 3DV Ad-hoc group

US plans to attend one of the scheduled MPEG meetings that will be held in Europe (e.g. Geneva) in 2013 in order to make a presentation of a possible contribution on depth quality estimation that takes into consideration the resultant perceptual quality of synthesised views. This is planned to be presented during the ad-hoc meeting of 3DV group, under the “other technical contributions” category.

3.2.3 Video Quality Experts Group (VQEG)

Currently, VQEG is involved in standardizing Quality of Experience assessment techniques in 3D video. As a part of ROMEO work, there will also be assessment of experience in compressed and packet losses concealed stereoscopic 3D video. US plans to start collaborating with University of Nantes from France (an external institution) to investigate possibilities of starting a work group in VQEG for standardizing QoE measurements in compressed stereoscopic video.

3.2.4 SMPTE

SMPTE 10e/Disparity Map Representation: Technicolor is chairing this group, aiming at standardizing the format of disparity maps. The target is to get an approved representation of disparity map

3.2.5 3D@Home

3D@Home is actually merging with I3DS (International 3D Society) even if the 2 names are going to be kept. A Strategic meeting is going to take place in August to refine the objectives of the new organization for the coming year.

3.2.6 DVB 3DTV

DVB: 3DTV: follow phase 2 discussions and participate to the elaboration of phase 2b specifications.

3.2.7 DVB TM

R&S intends to submit a paper to, or give a presentation at a meeting of the DVB Technical Module during the second project year in which the ROMEO approach of combining delivery of services over broadcast and broadband networks is described, highlighting potential problems and possible solutions, as developed in the project.

3.2.8 DVB

ROMEO partners will monitor the relevant groups within DVB regarding standardisation issues important for ROMEO (e.g. DVB CM/TM-3DTV, CM/TM-AVC, CM/TM-GBS, etc.).

3.2.9 SpatDIF

IRT plans to contribute solutions to the SpatDIF consortium for the streaming capability of the audio description format developed in ROMEO.

4 EXPLOITATION PLAN

The consumer behaviour and TV set maker strategies are resulting in widely diverging TV product ranges across the world. The shipments of 3D-TVs have reached to 3.9 million units worldwide at the end of 2010 and the projections for 2014 are around 90 million units.

While the TV industry is truly global, regional differences have increased in recent years, see Figure 2. For 3D, the most enthusiastic regions are Western Europe and China, while the adoption of 3D in North America actually declined in Q3'11, according to the Q4'11 NPD DisplaySearch Quarterly TV Design and Features Report[3]. Despite a soft start in North America, 3D is proving a popular feature in other regions, helping to drive shipments of more than 24 million units in 2011 and an anticipated 74% increase in 2012 to 42 million units. While the outlook for 3D-TV shipments has cooled somewhat, 74% year-on-year growth is still very impressive for a technology entering its third year of availability, and adoption in many regions remains robust.

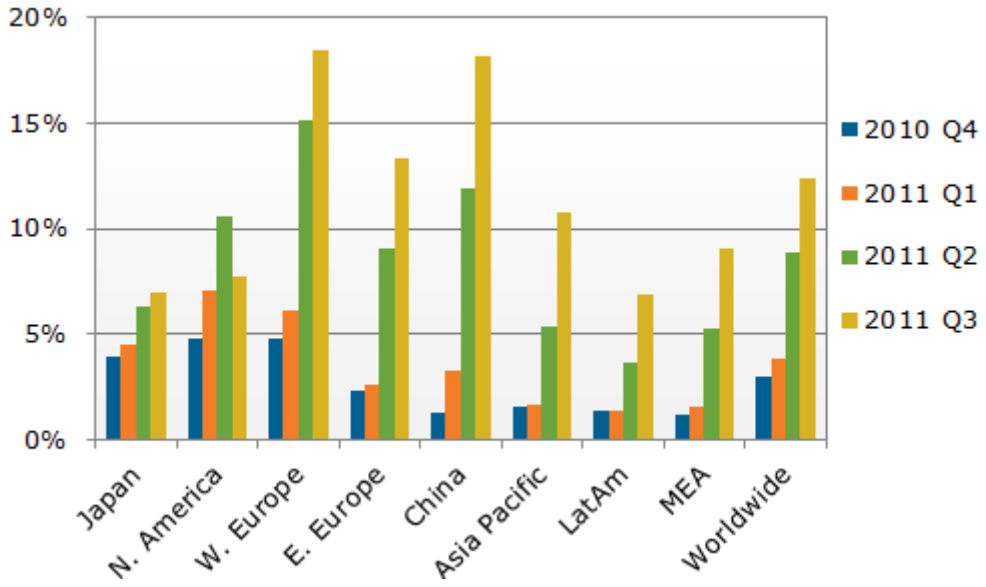

Figure 2: 3D penetration as a percentage of TVs shipped [3]

Both Western Europe countries and China are expected to have almost 30% of their total TV unit shipments as 3D-ready sets, while after a very slow start in North America, adoption is expected to accelerate as the premiums fall, availability grows, and accessories like glasses decrease rapidly in cost according to the report.

Even so, the growth in 3D-TVs depends on better 3D content availability but a broader installed base of 3D-TV sets will encourage content producers in a virtuous cycle. 3D feature has become an essential feature for mainstream and premium product lines in 2012. However, TV premium products are moving from "TV-only" to "TV plus applications" and merge with mobile computing devices. This has changed the differentiation factor from 3D-TV to Smart-TV in 2012.

Over one quarter of TVs shipped during Q1' 2012 were equipped with internet connectivity, as reported in the new NPD DisplaySearch Quarterly Smart-TV Shipment and Forecast

Report[3], which tracks Connected-TV and Smart-TV shipments by brand, region, display technology and screen size. Approximately 27% of TV sets shipped worldwide have internet connectivity, which shows that Connected-TV is largely driven by availability of devices with new capabilities, and availability of content. The Internet becomes a major source of entertainment, where there are compelling things to watch. There is a second step of evolution as Internet video relocates from a PC screen to the TV screen.

Following these trends, the demand for rich and immersive 3D content, such as multi-view video with depth, will increase, and content providers will have to address these demands. More and more 3D content will become available over the coming months and years and the trend towards 3D viewing at home will keep gaining strength. However, unlike stereoscopic 3D content, the delivery infrastructure for multi-view video is times-fold more costly in terms of bandwidth, and alternatives should be provided to the traditional ones (DVB-X). In this respect, the increasing demand for 3D and Connected-TV will make the innovative approach in ROMEO highly attractive for trials and deployments in coming years. We will need more immersive 3D multi-view broadcast content, as well as the relevant standards for the delivery of multi-view video for wide deployment of the solution.

The following part provides an overview about the individual exploitation plans of each partner, according to DoW Section 3.2.2 and 3.2.4[2].

4.1 UNIVERSITY OF SURREY

As an academic institution, it is essential for US to attract newly graduated students to pursue postgraduate research on the relevant subjects of ROMEO for the coming years. Lecturers taking part in the project will therefore promote the advances in ROMEO in related graduate courses (such as video and image coding, signal processing) and organise short tours to the laboratories, in order to demonstrate the project results using the equipment (e.g. 3D displays). In addition, since all UK universities are monitored for the quality of research output, it is vital for US to achieve a consistent track record of high quality publications in prestigious journals and internationally reputable conferences. Hence, the technical research outputs, especially on 3D multimedia processing and coding, and Quality of Experience are planned to be published through international conferences and peer reviewed journals (i.e., IEEE Transactions, Elsevier Image Communication). All developed technology within ROMEO (including the software tools produced for media encoding and decoding, depth quality estimation, QoE modelling and evaluation), will be considered for protection by patenting. Once the rights have been secured, they will be marketed to industry for licensing.

4.2 TELEFONICA

Telefonica plans to use the knowledge acquired in the scope of the project in the definition of its network architecture. Focusing on virtualization techniques, a new layer 2 access network will set the basis to optimize CapEx and OpEx on new fibre deployments. Moreover, this new approach of the last mile stretch will also open the door to new services leveraging the layer 2 visibility until the operator premises (e.g. UPnP media content discovery, device remote management, etc.). Another relevant output of the participation in ROMEO is that fostering the paradigm of deploying no additional infrastructure with new services, Telefonica will ease third parties to provide 3D content delivery services taking advantage of a platform that will provide dynamic quality of service assurance in order to guarantee the coexistence of the different services targeted to the home environment.

4.3 ROHDE & SCHWARZ

The exploitation plans of R&S focus on the test and measurement equipment that is needed for measuring and monitoring Quality-of-Service (QoS) parameters in combined networks that deliver synchronised services.

In the respect, the test terminal that R&S develops in ROMEO, serves as a show case and potential application example for the measurement of relevant parameters. The selection of a subset of parameters from all available parameters in the test environment is expected to be the result of the lab tests and field trials in the project. The best possible solution is anticipated as a minimal subset of parameters, potentially less than a handful, that describe the situation in such a system to an extend that allows service providers and network operators to make the optimal decisions in terms of resource allocation, customer handling, etc.

4.4 UNIVERSITY OF PATRAS

As an academic institution, University of Patras foresees to present ROMEO concepts and innovations at postgraduate level (courses on video networking, advanced networking technologies, P2P-Mobility, etc.). Moreover, ROMEO software solutions will be presented in trade shows and summer schools in order to strengthen research activities and attract new research projects portfolio. ROMEO research results, especially in the areas of 3D multimedia networking, Quality of Experience and mobility are planned to be published at international conferences (i.e. IEEE ICC, IEEE GLOBECOM) and peer reviewed journals (i.e., IEEE Transactions, Elsevier Image Communication, Elsevier Computer Communications.). All developed technology within ROMEO (the software tools produced for media streaming, Media Aware Proxy, 3D QoE evaluation), will be considered for protection by patenting.

4.5 TURK TELEKOM

As a large telecom operator and one of the leading infrastructure providers, TTA will investigate the possibilities to use the results of ROMEO project in the existing IPTV services and focus on the possible market occasions for the 3D services on top of the existing WebTV and IPTV services. TTA is also planning to exploit the results of ROMEO project by introducing new services for real-time collaboration between users, especially for high profile live events. Exploitation of the use of the new P2P architecture for better operational efficiency in its fixed and wireless networks is also considered by TTA.

4.6 INSTITUT FÜR RUNDFUNKTECHNIK

IRT, as R&D institute of the public broadcasters in Germany/Austria/Switzerland, is continuously interested in various research areas of ROMEO. On one hand, IRT plans to make ROMEO's R&D results available to its associates for actual use in a future broadcast landscape. On the other hand, IRT is also non-profit institution and works for the benefit of the public and public free-to-air broadcasting in general. In addition, IRT markets its own products and solutions.

Therefore it is important to follow up different areas of interest related to ROMEO. The gained experience can later be used to develop new products and/or to extend the consulting portfolio including the know-how for certification processes (e.g. for HbbTV). In addition, knowledge

built up in ROMEO can further be extended in other research projects, e.g. the currently running FP7 ICT project HBB-NEXT.

A main aspect of IRT's work in ROMEO is related to 3D audio. The implementation and standardisation of streaming solutions for 3D will improve cross-domain knowledge of experts in the field of networking, 3Daudio and MPEG-TS at IRT. There is already substantial expertise in this area from previous projects, most notably EU-funded porTiVity, where interactive dynamic scenes (animated SVG, encapsulated as MPEG LASeR) were streamed over DVB-H and IP. This expertise will be broadened and adapted from video to audio scenes.

Since the whole field of object-based audio is still at an early stage, IRT plans to use knowledge established within ROMEO for consulting and potential software solutions in the field of 3D audio and especially object-based audio. This will help IRT to support others in bringing 3D audio solutions forward in future broadcast systems.

Another field of IRT's expertise is in the transmission of the signal via terrestrial broadcast networks (for ROMEO: DVB-T2). IRT is expecting to increase its knowledge regarding the complete transmission chain and the interconnectivity with other transmission systems, as well as the synchronisation between them. To test the DVB-T2 performance, especially within a ROMEO-system, is a great benefit of this project. Consequently, IRT also plans to extend its existing DVB-T solutions with DVB-T2 capabilities.

4.7 INSTITUTO DE TELECOMUNICACOES

The knowledge developed in the scope of ROMEO will be exploited by the liaison activities between IT and the top Portuguese Universities, with the potential to contribute/shape curriculums or foster new courses, and also attract new Ph.D. students and PostDocs. IT plans to use this knowledge, including published work and the tools developed in the scope of ROMEO (more specifically in P2P networking), in training actions for the industry and involvement in new national and international research proposals. The researchers involved in the project are also expected to transfer to the industry, through consultancy actions or other methods, their deep knowledge in design, analysis and implementation techniques envisioned for advanced heterogeneous media networking. Furthermore, IT is committed to pursue its participation in standardisation activities during the 2nd and 3rd project years.

4.8 TECHNICOLOR

Technicolor intends to implement ROMEO's results in different domain of his activity. 3D rendering techniques will be re-used in the set-top-box activity to address future display technology such as multi-view auto-stereoscopic displays. Portable displays such as 3D tablets could also take benefit of these technologies. Technicolor will be able to develop his IP portfolio and to license developed technologies outside the company. Technicolor will also ensure a strong participation to standardization bodies such as SMPTE, MPEG and DVB.

4.9 ARCELIK

Arçelik's 3D-TV production has just started in 2011 summer season. Thus, this product has only a very small fraction in Arçelik's total TV production. But, Arçelik expects that market share of multi-view TV sets will be more or less similar to general conventional flat panel display shares on the market. Thus, Arçelik expects to have 20 to 30% multi-view TV sets in its total production. If the transition of 2D to 3D-TV will be similar to colour TV's from black and

white then this percentage will be much higher. But, it is clear that this product will find it place in the market and Arçelik will benefit from the output of ROMEO project. Arçelik expects to increase its total market share to 7% to 10 % in Europe within 5 to 8 years. Thus, the developed products will contribute additional revenue to Arçelik when they are mass produced. The competitors will bring the similar TV sets to the market and the competition will be more or less similar to flat TVs.

Arçelik will create several demonstrative 3D-TV sets for Arçelik's brands (Grundig, Beko, Blomberg, Arctic, etc) sales offices throughout Europe at the end of the project. By this way, the market expectations will be also collected based on the project results. Arçelik will extend its product portfolio with the proof of concept user terminal when it is mass produced.

Arcelik will promote the project results in the Koç Group's (Arçelik is part of Turkey's most prolific conglomerate Koç) ICT companies as well.

In addition to this, Arçelik will exploit the prototype 3D media delivery architecture especially the IPR on 3D media delivery components. The project results will be fed into future product development, and to assist in deciding future business strategies.

4.10 MULSYS

MulSys is a R&D company specialised in multi-media signal processing and application development. The technology advance of 3D audio/video processing, coding and rendering for fixed and mobile platforms to be developed in ROMEO plays an important role for the future direction of the company. It intends to make full use of and extensively exploit the knowledge gained from the project in new research and development activities, specifically the spatial audio synchronisation and rendering techniques over heterogeneous networks. Meanwhile, MulSys is going to explore every avenue to use its QoE assessment experience in ROMEO project to other projects and application development. As a leading research SME in signal processing and wireless communication systems, MulSys has always invested in technology innovation and intellectual property creation. It will continue to maintain its leading position by publishing its research in prestigious publications and filing patents where it is possible.

4.11 VITEC

The technologies developed by VITEC in ROMEO are mainly focused on the pre-processing of multiview video streams before video encoding, in order to calibrate them, to be able to retrieve the third dimension by extracting depth maps and to provide eventually interpolated views. All these tools should help us in defining multicam sets that will use in professional applications, like medical imaging or video surveillance. In complement, we are also expecting to provide encoding tools that will be used to store and transmit in real-time multiple video feeds and we are currently performing, apart from the SkyMedia project, development activities on our range of MPEG-4 AVC/SVC/MVC encoding products. These new products will be demonstrated during the trade fairs in which VITEC is used to show its last developments.

As a seller of digital video components, VITEC is particularly interested by shipping standard technology and more especially by the MPEG family. Demonstrative results will be shown during international commercial fairs like IBC and NAB where it is actually possible to evaluate the market for such technologies.

4.12 MM SOLUTIONS

The exploitation plan for MMS includes developing of similar sub-products based on the technology, which will be prototyped for ROMEO project. These sub-products include portable DVB-T receivers, media players with extended connectivity, tablets and mobile phones with 3D TV reception and rendering. One first step is to develop reference design for a tablet including all the components developed during the project and try to find OEM for commercialization.

5 CONCLUSIONS

This deliverable describes the initial approach to ROMEO's standardisation, dissemination and exploitation plans and the already achieved goals in this respect.

All partners are committed to promoting the project ROMEO in various communities (e.g. standardisation bodies and conferences) and it is planned to further intensify these activities. Partners will advertise the outcomes of this project by presenting papers on relevant conferences, doing public demos and also by preparing inputs to standardisation bodies. Eventually, the Consortium members are striving to make the R&D results exploitable in a commercial manner towards the end of the project and beyond its lifetime.

This document will be updated twice during the project in Deliverable 8.3.2 (due by Month 23) and 8.3.3 (due by Month 35).

APPENDIX A: REFERENCES

[1] “ROMEO Deliverable 2.1 - Mission Scenarios, Service Definition and Requirements, Review of the State-of-the-Art in 3D Immersive Media Services.pdf” ROMEO Deliverable document for reference scenarios

[2] “DOW ROMEO (287896) 2011-06-10_final.pdf” Annex – I “Description of Work” for ROMEO

[3] "NPD Display Search Quarterly TV Design and Features Report" Q4’11, http://www.displaysearch.com/cps/rde/xchg/displaysearch/hs.xsl/quarterly_tv_design_features_report.asp

APPENDIX B: 1ST ROMEO WORKSHOP SESSION STRUCTURE

09:00-09:15	Opening from Workshop Chair
Session on 3D Media Representation and Coding	
09:15-10:15	**Keynote Speech** **Frédéric Dufaux**, '3D video representation and coding', Paris Tech, France
10:15-11:15	**Keynote Speech** **Thanos Demiris**, 'Merging the real and the synthetic in augmented 3D worlds: a brief survey', Micro2Gen, Greece
11:15-11:30	**Coffee Break**
11:30-12:00	**Gabriel Dosso, Erhan Ekmekcioglu and Nicolas Tizon,** 'Multiview acquisition and advanced depth map processing techniques'
12:00-12:30	**Christian Hartmann, Chungeun Kim and Michael Weitnauer, '**A Hybrid 3D Audio Acquisition Approach for the Recording of Spatial Audio Scenes'
12:30-13:00	**Vamsi Kiran Adhikarla, Attila Barsi, Peter Tamas Kovacs and Tibor Balogh, '**View Synthesis for Light Field Displays using Segmentation and Image warping'
13:00-14:00	**Lunch**
Session on Networking Aspects for 3D Media	
14:00-14:20	**Arda Akman, Emine Cimen Ozturk, Selami Ciftci, Soner Ozgun Pelvan, Konstantinos Birkos, Ilias Politis, Miltos Mplatsas, Tasos Dagiuklas, Michele Albano, Hugo Marques, Jonathan Rodriguez, Borja Iribarne, Fernando Pascual and Manuel Nuñez** 'Hybrid Delivery of 3D Video Streams over Heterogeneous Networks: ROMEO Approach'
14:20-14:40	**Arda Akman, Emine Cimen Ozturk, Selami Ciftci, Soner Ozgun Pelvan, Konstantinos Birkos, Ilias Politis, Miltos Mplatsas, Tasos Dagiuklas, Michele Albano, Hugo Marques, Jonathan Rodriguez, Erhan Ekmekcioglu, Demuni De Silva, Safak Dogan and Ahmet Kondoz, '**3D Video Networking – Cross Layer Optimisations: ROMEO Approach'
14:40-15:00	**Evangelos Pallis,** 'Media Aware Networks for user-generated ecosystems'
15:00-15:15	**Coffee Break**

Session on QoE in 3D	
15:15-16:15	**Keynote Speech** **Marcus Barkowsky,** 'Assessing the Quality of Experience of 3DTV and beyond -Tackling the multidimensional sensation'**, University of Nantes, France**
16:15:16:45	**Arda Akman, Emine Cimen Ozturk, Selami Ciftci, Soner Ozgun Pelvan, Konstantinos Birkos, Ilias Politis, Miltos Mplatsas, Tasos Dagiuklas, Michele Albano, Hugo Marques, Jonathan Rodriguez, Erhan Ekmekcioglu, Demuni De Silva, Safak Dogan and Ahmet Kondoz,** '3D Video Networking-Cross Layer Optimisations: ROMEO Approach'

Table 6: Workshop Session Structure

APPENDIX C: ROMEO WEBSITE FIGURES

Figure 3: Main Web Page Screenshot

Figure 4: Main Menu Navigation Bar

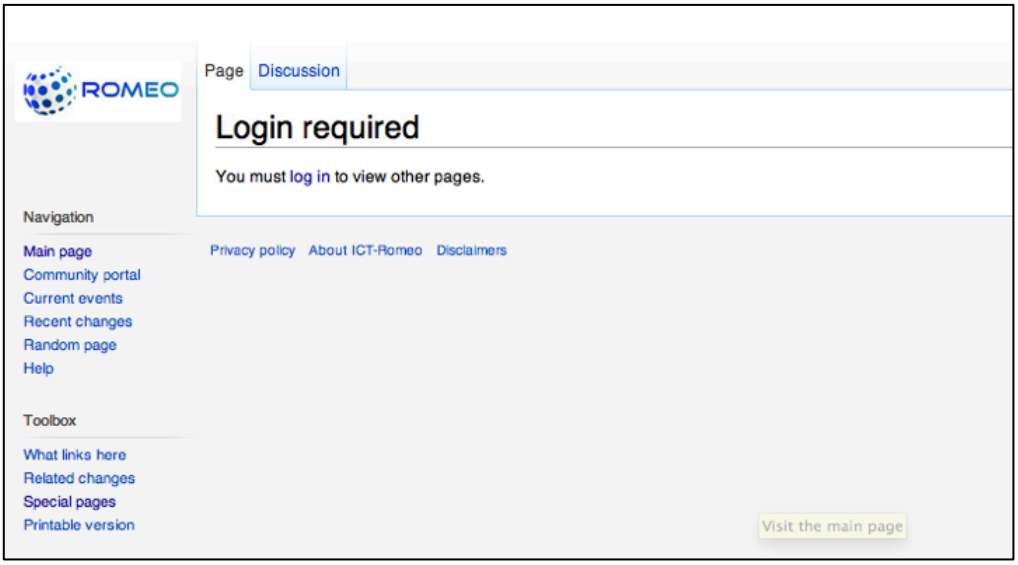

Figure 5: Backend Log-In Screen

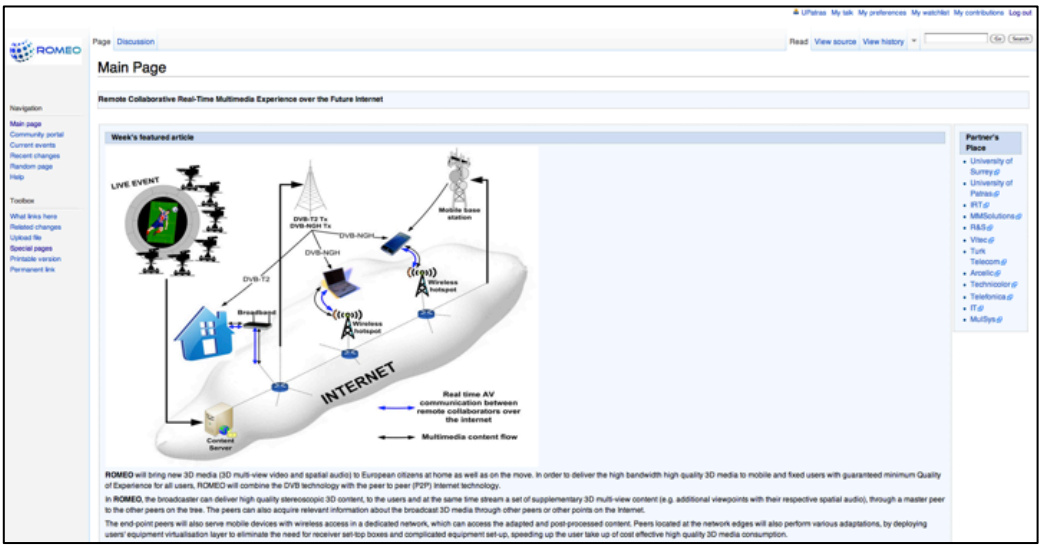

Figure 6: Wiki Main Page

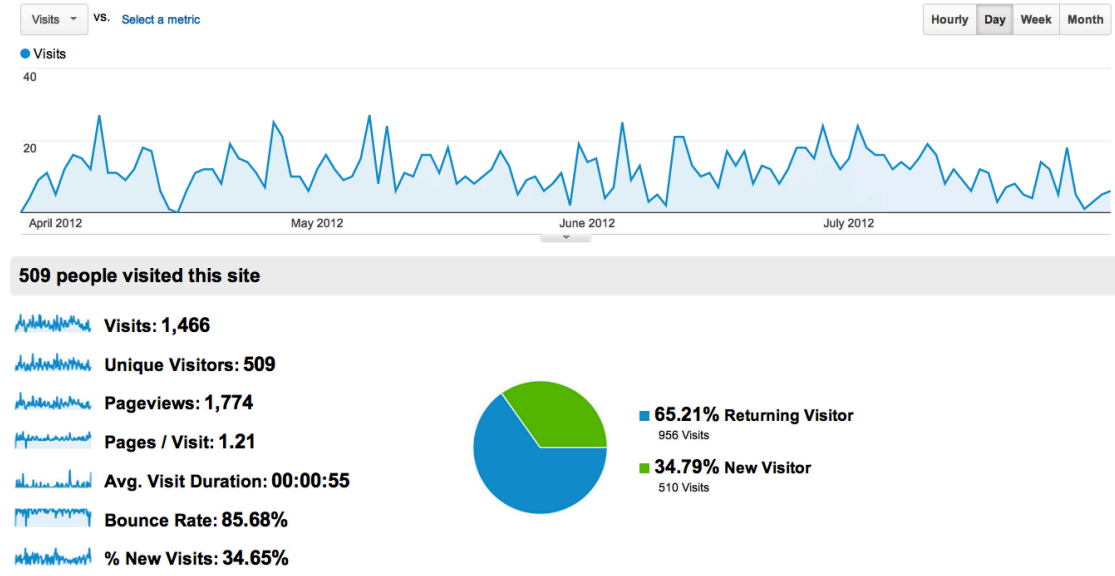

Figure 7: Overview Visitors Information

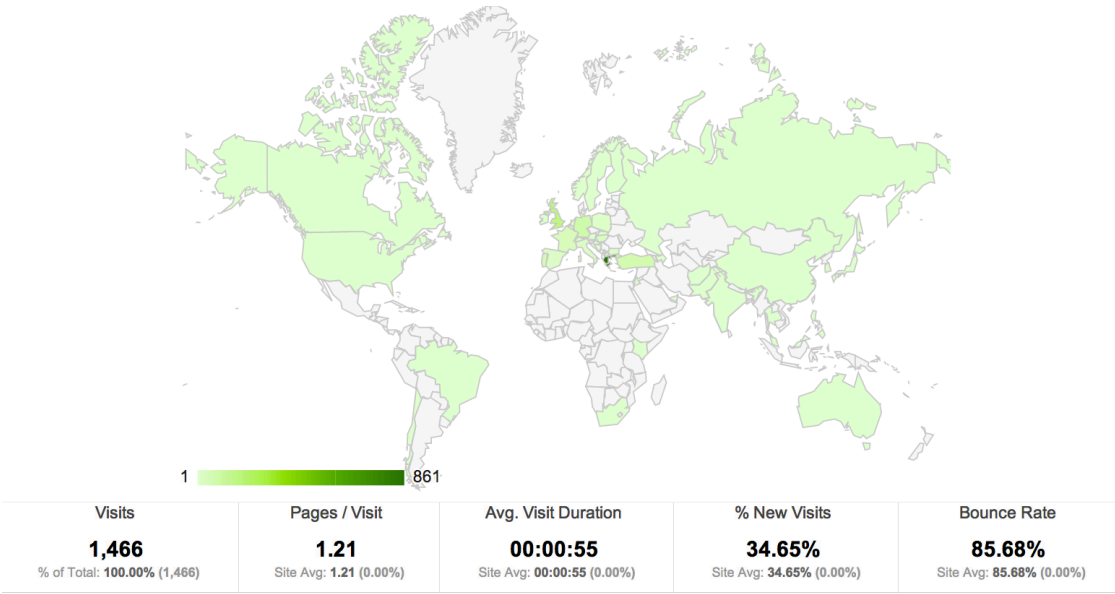

Figure 8: Visitors Worldwide Distribution I

	Country / Territory	Visits ↓	Pages / Visit	Avg. Visit Duration	% New Visits	Bounce Rate
1.	Greece	861	1.13	00:00:38	21.49%	91.41%
2.	United Kingdom	160	1.32	00:02:04	38.12%	77.50%
3.	Germany	78	1.38	00:01:06	47.44%	75.64%
4.	Turkey	67	1.39	00:01:02	56.72%	71.64%
5.	Portugal	48	1.25	00:00:21	50.00%	83.33%
6.	France	39	1.31	00:01:17	69.23%	79.49%
7.	Hungary	24	1.17	00:01:08	29.17%	91.67%
8.	Luxembourg	22	1.00	00:00:00	4.55%	100.00%
9.	Spain	20	1.05	00:00:01	80.00%	95.00%
10.	South Korea	18	1.33	00:01:21	61.11%	83.33%

Figure 9: Visitors Worldwide Distribution II

Visits	Pageviews
1,466	1,774
% of Total: 100.00% (1,466)	% of Total: 100.00% (1,774)

Primary Dimension: **Days Since Last Visit**

Days Since Last Visit	Visits	Pageviews	Percentage of total (Visits / Pageviews)
0	1,181	1,425	80.56% / 80.33%
1	56	60	3.82% / 3.38%
2	34	38	2.32% / 2.14%
3	21	26	1.43% / 1.47%
4	17	20	1.16% / 1.13%
5	14	22	0.95% / 1.24%
6	12	15	0.82% / 0.85%
7	17	22	1.16% / 1.24%
8-14	44	57	3.00% / 3.21%
15-30	50	65	3.41% / 3.66%
31-60	17	20	1.16% / 1.13%
61-120	3	4	0.20% / 0.23%

Figure 10: Frequency and Regency of Visitors

Visit Duration | Page Depth

Visits	Pageviews
1,466 % of Total: 100.00% (1,466)	1,774 % of Total: 100.00% (1,774)

Primary Dimension: **Visit Duration**

Visit Duration	Visits	Pageviews	Percentage of total Visits Pageviews
0-10 seconds	1,266	1,276	86.36% 71.93%
11-30 seconds	25	51	1.71% 2.87%
31-60 seconds	33	71	2.25% 4.00%
61-180 seconds	48	114	3.27% 6.43%
181-600 seconds	42	108	2.86% 6.09%
601-1800 seconds	46	125	3.14% 7.05%
1801+ seconds	6	29	0.41% 1.63%

Figure 11: Pagehits and Pageviews

	Browser	Visits	Visits	Contribution to total: Visits
1.	Firefox	876	59.75%	
2.	Chrome	323	22.03%	
3.	Internet Explorer	157	10.71%	
4.	Safari	97	6.62%	
5.	Android Browser	7	0.48%	
6.	Opera	4	0.27%	
7.	IE with Chrome Frame	1	0.07%	
8.	Opera Mini	1	0.07%	

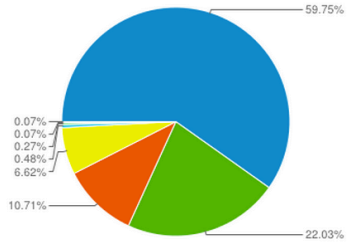

Figure 12: Browser Technology

	Service Provider	Visits	Visits	Contribution to total: Visits
1.	provider	512	34.92%	
2.	university of patras network	183	12.48%	
3.	university of surrey	103	7.03%	
4.	multiprotocol service provider to other isp s and end users	54	3.68%	
5.	hellas on line s.a.	38	2.59%	
6.	institut fuer rundfunktechnik gmbh muenchen	36	2.46%	
7.	greek academic & research computer network	27	1.84%	
8.	banque europeenne d investissement	22	1.50%	
9.	slough residential dynamic	18	1.23%	
10.	business	17	1.16%	

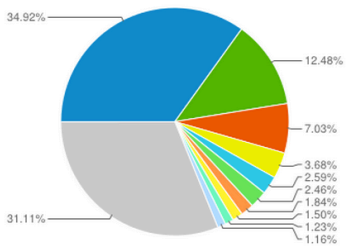

Figure 13: Provider Statistics

APPENDIX D: GLOSSARY OF ABBREVIATIONS

A	
AVC	Advanced Video Coding
B	
BIFS	Binary Format for Scenes
C	
CapEx	Capital Expenditure
CSS	Cascading Style Sheets
D	
DoW	Description of Work
DVB	Digital Video Broadcasting
F	
FOBTV	Future of Broadcast Television
H	
HbbTV	Hybrid Broadcast Broadband Television
HDD	Hard Disk Drive
HTML	Hypertext Markup Language
I	
IBC	International Broadcast Conference
ICT	Information and Communications Technology
IEEE	Institute of Electrical and Electronics Engineers
IETF	Internet Engineering Taskforce
IP	Internet Protocol
IPTV	Internet Protocol Television

L	
LTS	Long Time Support
M	
MPEG	Motion Picture Experts Group
MPEG LASeR	MPEG-4 Lightweight Application Scene Representation
MVC	Multiview Video Coding
N	
NAB	National Association of Broadcasters
O	
OEM	Original Equipment Manufacturer
OpEx	Operational Expenditure
P	
PHP	PHP: Hypertext Preprocessor
P2P	Peer to Peer
R	
RAM	Random Access Memory
S	
SME	Small and Medium Enterprises
SMPTE	Society of Motion Picture and Television Engineers
SVC	Scalable Video Coding
SVG	Scalable Vector Graphics
T	
TCP	Transmission Control Protocol
TM	Technical Module

TS	Transport Stream
U	
UPnP	Universal Plug and Play
URL	Uniform Ressource Locator
V	
VQEG	Video Quality Experts Group
W	
WLAN	Wireless - LAN
X	
XHTML	Extensible HyperText Markup Language