Report on Dissemination and Standardisation Activities Y1

Deliverable D7.2.1

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2	2014-09-09	BBC related activities added
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1 Executive Summary

This document is a report on dissemination and standardisation activities carried out by the project partners during the first year of the project.

In the first year the main effort was dedicated to the set-up of the project web-site at http://icosole.eu/ and an accompanying account on Twitter. Two public deliverables have been delivered during Year 1. Seven papers and articles have been released in international publications. Project partners have made presentations in four international symposiums or conferences. Deliverables and presentations (if possible) are available from the project web-site.

Furthermore, the plans for dissemination and standardisation for the second year of the project are described.

2 Introduction

2.1 Purpose of this Document

This document summarises the dissemination and standardisation activities of the project in the first 12 months.

2.2 Scope of this Document

The document lists the activities and provides pointers to further documentation (e.g. publications, slides, etc.)

2.3 Status of this Document

This is the final version of D7.2.1.

2.4 Related Documents

Before reading this document it is recommended to be familiar with the following documents:

- ICoSOLE Description of work (as a reference for planning data)
- An overview on the project can be found on its website http://www.icosole.eu.

3 Dissemination Tools and Mechanisms

3.1 Dissemination Mechanisms

The project uses the following mechanisms for disseminating project results.

- **Papers at scientific conferences:** During Year 1, ICoSOLE results have been presented at 9 international and regional scientific conferences (e.g.MediaEval Workshop).
- **Demonstrations:** During Year 1, the project has participated in a demonstration at IBC 2014 .
- **Presentations related to FP7 activities:** Representatives of ICoSOLE are active in the EC networked media related concertation activities. ICoSOLE is participating in the EC concertation meetings, in particular in the “Media Search” cluster. Due to the recent reorganisation of DG Connect the projects in the “Media Search” cluster aren’t any more all belonging to the same unit and as a consequence the future of concertation activities is currently unclear.
- **Targeted media and publicity activities:** The broadcasters in the group, the BBC and VRT, both can self-publicise using their web-sites. Larger conferences, such as IBC, also attract the media, so provide the potential for project-related demonstrations to be reported.
- **Information activities within ICoSOLE partner organisations:** During Year 1, ICoSOLE partners have kept their senior managers about ICoSOLE, its progress and its benefits. This acts as a catalyst for disseminating ICoSOLE results. It also helps to keep ICoSOLE business, dissemination and exploitation focussed.
- **ICoSOLE public Website:** The public ICoSOLE Website ensures that all interested parties are informed about the project and its progress, and can access the publicly available results of the ICoSOLE project. The address of the public ICoSOLE Website is http://icosole.eu/ .
- **Social Media:** In this respect Twitter was used in continuation of the activities in the first year.
- **Individual partners’ homepages:** Project partners will provide information about ICoSOLE on their homepages (with a focus on their share of the work, of course) and will link to the project’s homepage for further information (which will also increase the search engine ranking of the ICoSOLE homepage).
- **Liaison with other projects:** SCENE-NET, SocialSensor.

4 Dissemination Activities

4.1 Public Website

The ICoSOLE website http://icosole.eu/ serves as the primary source of information for the public. It provides extensive information about the project ICoSOLE such as the idea behind this project, work plans, list of milestones and technical sections.

It also provides information about the consortium, contact details linked to partner's website, each partner's description and their rolls within this project.

The scientific publications and presentations, and the public deliverables generated from the project are presented at this website and are updated regularly.

The news section presents the partners and the public on upcoming presentations, conferences, events, development and released technologies associated to ICoSOLE. The news section also offers visitors the possibility to comment on the news to increase the exchange of information in relation to the research articles and news. This interactive section of the website provides us very useful information about the opinion of the website's visitors and their potential interest on the project researching area.

The section "contact us!" allows every visitor to contact the project coordinator Georg Thallinger directly.

Using the social media Twitter on the ICoSOLE website aims, to broaden the audience for the project.

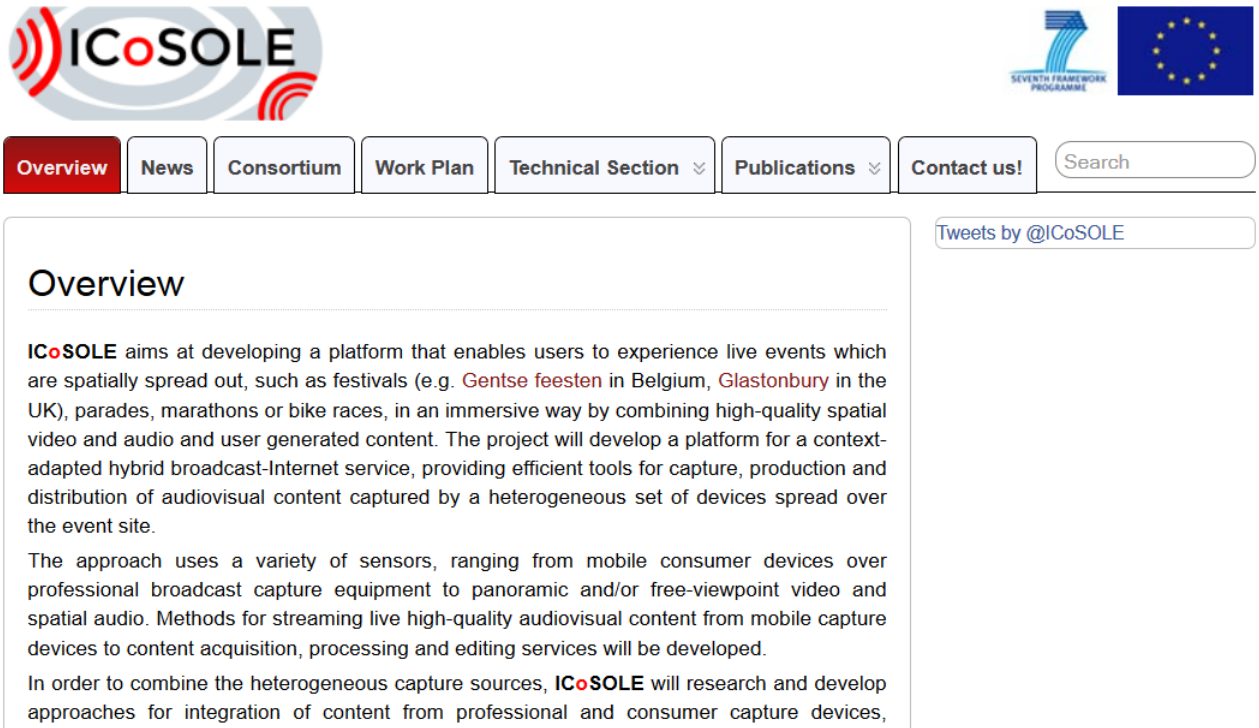

Figure 1: The ICoSOLE Website

Fehler! Verweisquelle konnte nicht gefunden werden. above shows a screen shot of the ICoSOLE website which contains the following main sections:

- Overview
- News
- Consortium
- Work Plan
- Technical Section
- Publications
- Contact us!

4.2 Social Media

The @ICoSOLE Twitter feed is available at https://www.twitter.com/ICoSOLE and tweeted 48 times and has 63 followers as of the 6th October. All partners have access to the twitter account.

Figure 2: The ICoSOLE Twitter channel

4.3 Public Documents

Public documents are available through the ICoSOLE website:

- Public deliverables: http://icosole.eu/public-deliverables/ .
- Publications and presentations: http://icosole.eu/scientific-publications-presentations/

4.4 Scientific and Technical Publications and Presentations

#	Category	Status	Partner(s) responsible/involved	Author(s)	Conference, Journal, Event	Date of publication / event	Location of event	Title
1	Standardisation activity	Published	BBC	EBU (incl. Dave Marston)		01.02.2014		EBU Tech 3364, Audio Definition Model
2	Standardisation activity	Published	BBC	EBU (incl. Dave Marston)		03.04.2014		EBU Tech 3293, EBU Core Metadata Set v1.5
3	Popular	Published	BBC	Chris Pike	BBC Website Blog	07.04.2014	-	ICoSOLE Test Shoot
4	Presentation	Published	ICoSOLE Consortium	ICoSOLE Consortium	Concertation Meeting	June 2014	Brussels (BE)	Immersive coverage of spatially outspread live events
5	Conference/ Workshop	Published	BBC	Chris Pike, Frank Melchior, Tony Tew (York Uni)	AES 55th Conference on Spatial Audio	27-29.08.2014	Helsinki (FI)	Assessing the Plausibility of Non-Individualised Dynamic Binaural Synthesis in a Small Room
6	Conference/ Workshop	Presented	BBC	Chris Pike, Frank Melchior, Richard Day, Dave Marston, Matt Paradis	IBC 2014	12-16.09.2014	Amsterdam (NL)	Object-Based Broadcasting

7	Conference/ Workshop	Presented	DTO	Jan-Mark Batke	Technicolor Scientific Week	02-07.06.2014	Princeton (USA)	Live Broadcast Mixing User Generated Content & Professional Production Tools
8	Conference/ Workshop	Published	JRS	Markus Thaler	Audio-Visual Gestalt	30.09.2014	Bremen (DE)	ICoSOLE Project Overview
9	Conference/ Workshop	Published	DTO	Jürgen Schmidt	Audio-Visual Gestalt	30.09.2014	Bremen (DE)	Acquisition and Data Flow
10	Presentation	Published	JRS	Werner Bailer	NHK Scientific and Technical Research Lab	04.07.2014	Toyko (JP)	ICoSOLE
11	Paper	Accepted	JRS	Pawel Nowak, Marcus Thaler	MediaEval Workshop	16.-17.10.2014	Barcelona (ES)	JRS at Event Synchonization Task
12	Paper	Accepted	JRS	Werner Bailer, Harald Stiegler	MediaEval Workshop	16.-17.10.2014	Barcelona (ES)	JRS at Search and Hyperlinking of Television Content Task
13	Poster	Published	JRS	Georg Thallinger	EC Concertation	25.06.2014	Brussels (BE)	Immersive Coverage of Spatially Outspread Live Events
14	Poster	Accepted	JRS	Hannes Fassold, Jakub Rosner	Real Time Image and Video Processing	10.02.2015	San Francisco (US)	A real-time GPU implementation of the SIFT algorithm for large-scale video analysis tasks

15	Standardisation activity	Published	BIT	Christian Timmerer	107th MPEG Meeting	January 2014	San José (US)	
16	Standardisation activity	Published	BIT	Christian Timmerer	108th MPEG Meeting	April 2014	Valencia (ES)	
17	Standardisation activity	Published	BIT	Christian Timmerer	109th MPEG Meeting	July 2014	Sapporo (JP)	

4.5 Other dissemination activities

4.5.1 Publication of test data

We have made the data set from the Salford test shoot with the BBC Philharmonic Orchestra publicly available. The data consists of video and audio recordings of orchestra performances in different setups, using a wide range of professional and consumer devices.

The data is hosted by VRT at the ICoSOLE content exchange platform[1]. The data is provided under the Creative Commons Attribution-Non Commercial 4.0 (CC-BY-NC) license. Interested parties can register for an account in order to access the data.

4.5.2 Participation in benchmarking activities

JRS has participated in three benchmarking initiatives, for which the technology being developed in ICoSOLE is relevant. The TRECVID Instance search (INS) task[2] aims at finding instances of the same object shown query shot (given the video of the shot, a set of key frames and masks identifying the target object) in a large video database. While some of the objects may be similar to object of interest in ICoSOLE use cases (e.g. a phone booth), many are much smaller than the objects expected in ICoSOLE content. Thus only some of the queries are relevant for assessing technology used in ICoSOLE. The MediaEval benchmarking initiative runs a task called Search & Hyperlinking of Television Content, which is relevant for ICoSOLE as far as linking by the visual modality is concerned. JRS has applied the visual matching technology to re-rank related video shots. The Event Sychronisation task is new in MediaEval, but quite relevant for ICoSOLE. The aim is to synchronise photo streams taken by one user (called galleries) that cover the same large event (e.g., Olympic Games) and partly overlap when users attended the same sub-events. As time stamps are not always reliable (due to wrong settings of the camera) the alignment is done by visual matching and identifying synchronisation points between galleries of different users. While this task only deals with still images, the problem of matching and aligning user contributed video in ICoSOLE requires similar technology.

4.5.3 Concertation activities

JRS participated in the concertation event organised by DG-Connect G1 on June 25th 2014 in Brussels. ICoSOLE was shortly introduced by help of a poster. In the course of the concertation meeting a loose contact to SocialSensor has been strengthened. As topics for potential collaboration, MPEG-DASH where Univ Klagenfurt (who has good contacts to bitmovin) has implemented technology for mobile devices and visual similarity has been identified. Another contact has been established with SceneNet (FET, scenenet.uni-bremen.de/) which is also addressing the use of user generated contact captured on mobile devices. Members of ICoSOLE have been invited to participate in the “Audio-Visual Gestalt Workshop” organised by SceneNet on Sept. 30th 2014 in Bremen.

4.5.4 Individual partners’ homepages

BIT added a section on their website with information about the project, which can be accessed via http://www.bitmovin.net/2152-2/.

The BBC published several articles on their R&D pages related to immersive and object-based audio. This included a blog post on the Salford test shoot: http://www.bbc.co.uk/rd/blog/2014/04/icosole-test-shoot. VRT published a page dedicated to the project on their website, which includes a report of the Salford test shoot (http://innovatie.vrt.be/project/icosole).

[1] https://icosole.lab.vrt.be/

[2] http://www-nlpir.nist.gov/projects/tv2014/tv2014.html#ins

5 Standardisation Activities

5.1 BBC

The BBC's area of standardisation relating to the project in the first year was audio metadata. The Audio Definition Model (ADM) was published as EBU Tech 3364 (https://tech.ebu.ch/docs/tech/tech3364.pdf), with it also being part of the updated EBU Core schema in EBU Tech 3293 v1.5 (https://tech.ebu.ch/docs/tech/tech3293.pdf). This now allows anyone to access the specification of model and use it. The ADM will be at the core of the audio manipulation in the ICoSOLE project, allowing it to be processed and rendered correctly. The EBU FAR-BWF group (chaired by Dave Marston) is responsible for working on this standard.

The ADM is also in the process of standardisation in ITU-R Working Party 6B. Currently it is a Working Document towards a Preliminary Draft New Recommendation, and the aim to turn this in to a Recommendation at future ITU meetings. A rapporteur group (WP6B-RG13, "Audio File Formats"), which is co-chaired by Dave Marston, is also tasked to work on the model.

Other standardisation bodies that the ADM is being discussed in, is SMPTE, MPEG, DVB and the AES. All these bodies are becoming aware of object-based audio and the needs for metadata related to that, so the BBC has become involved in these groups to ensure their standardisation processes head in a coherent direction.

5.2 JRS – MPEG Compact Descriptors for Video Analysis (CDVA)

In August 2013, MPEG has started an activity on defining compact descriptors for video analysis tasks, complementing the existing work on compact descriptors for visual search (CDVS), which focus on similarity matching of still images. JRS has been involved in these efforts from the beginning, and Werner Bailer is co-chairing the Ad-hoc group on this topic.

ICoSOLE has provided the data set captured in the Salford for use in MPEG CDVA, and has contributed to requirements, use cases and assessment of existing technology. The following input documents on CDVA have been submitted during the reporting period.

- *106th MPEG meeting (October 2014)*
  - m30762, Input Requirements for Visual Search in Video, Alberto MESSINA, Werner BAILER
  - m31092, Initial Analysis of Existing MPEG Technologies for Visual Search in Video, Werner Bailer (JRS), Danilo Pau (STM), Alberto Messina (RAI), Emanuele Plebani (Politecnico di Milano)
- *107th MPEG meeting (January 2014)*
  - m32234, Annotation tool for creating ground truth for CDVidS, Werner Bailer, Albert Hofmann
- *108th MPEG meeting (April 2014)*
  - m32942, Concert recording data set, Werner Bailer, Chris Pike
- *109th MPEG meeting (July 2014)*
  - m34066, Multi-view concert recording data set, Werner Bailer, Chris Pike
  - m34068, A study of the temporal redundancy of visual descriptors, Marcus Thaler, Harald Stiegler, Werner Bailer
  - m34576, Tools for video annotation, Jean-Ronan Vigouroux, Attilio Fiandrotti, Werner Bailer

5.3 BIT – MPEG DASH

Input:

- *Meeting: 106th, October 2013, Geneva, CH*
  - m31391: Proposed draft for Amd.1 of MPEG-DASH conformance and reference software
  - m31392: Updates for MPEG-DASH reference access client (libdash)
  - m31393: Updates for MPEG-DASH MPD Schema Validator
  - m31405: MPEG-DASH over Emerging Protocols
  - m31474: SVC Bitstream Reordering for SVC-DASH
    - *Meeting: 107th, January 2013, San Jose, CA, USA*
  - m32390: Input on DASH reference software and conformance (libdash update)
  - m32391: Input on DASH reference software and conformance (MPD validation updates)
    - *Meeting: 108th, April 2013, Valencia, Spain*
  - m33279: MPD Schema Updates
  - m33280: MPD Validator updates
  - m33281: Top-level Descriptor for MPEG-DASH
  - m33282: Input for MPEG-DASH reference software and conformance
  - m33283: MPEG-DASH and Quality of Experience

Conclusion:

Meeting: 106th, October 2013, Geneva, CH

The MPEG-DASH reference software has been updated based on the input contributions (m31391, m31392, m31393) and m31405 has been included into the technologies under consideration document.

Meeting: 107th, January 2013, San Jose, CA, USA

The MPEG-DASH reference software has been updated based on the input contributions (m32390, m32391).

Meeting: 108th, April 2013, Valencia, Spain

The MPEG-DASH reference software has been updated based on the input contributions (m33279, m33280, m33282). m33281 will considered as part of the on-going corrigendum. Finally, m33283 has been acknowledged and a liaison with ITU-T SG12 has been established.

We uploaded a summary of our standardisation activities to the ICoSOLE platform, where links to the public available MPEG output documents can be found. [https://iis-bscw.joanneum.at/bscw/bscw.cgi/413548/ICoSOLE-BIT-MPEG_Meeting_Report-V01.docx]

5.4 DTO – MPEG –H

MPEG, ISO/IEC JTC 1/SC 29/WG 11, has started a new standardization activity, MPEG-H, ISO/IEC 23008 “High efficiency coding and dynamic media delivery.” The standard will provide a coordinated suite with three parts, Systems, Video and Audio.

MPEG-H Video will specify video coding for Ultra-HD (UHD) displays with 4K or 8K. To complement the visual envelopment, it is envisioned that in a “home theatre” system MPEG-H Audio, or “3D Audio” will use a large number of loudspeakers to provide a similar degree of audio envelopment.

In addition, there may be a “personal” system having a tablet-sized visual display or hand-held smart phones with many speakers built into the device. Headphones using binaural spatialisation with a Head Related Transfer Functions (HRTFs) would also be a means to deliver an immersive audio experience for all systems. In January 2013 MPEG-Audio started a “Call for Proposals for 3D Audio” (CfP), where DTO was actively involved. The following requirements were discussed and agreed by MPEG-audio, all proposals should fulfil these requirements:

5.4.1 Primary Requirements (excerpt from MPEG w13441 CfP)

- **High quality**: For high-quality applications, the quality of decoded sound shall scale up to be perceptually transparent with increasing bit rate.
- **Localization and Envelopment**: Accurate sound localization shall be supported and the sense of sound envelopment shall be very high within a targeted listening area. Perceived audio sound source distance shall be supported as a part of sound localization.
- **Rendering on setups with fewer loudspeakers**: the bitstream/compressed representation shall support decoding/rendering with a lower number of loudspeakers than are present in the loudspeaker setup used for the reference rendering of the program material. The decoded/rendered output signal shall have highest possible subjective quality relative to the reference rendering.
- **Flexible Loudspeaker Placement**: the bitstream/compressed representation shall be able to be decoded and rendered to a setup in which loudspeakers are in alternate (i.e. non-standard) positions and possibly fewer positions while providing highest possible subjective quality.
- **Latency**: technology shall have sufficiently low latency to be able to support live broadcasts (e.g. live sporting events). One-way algorithmic latency shall not exceed 1 second.
- **Audio program inputs to envisioned 3D Audio standard:**
    - Shall accept channel-based PCM signals of at least 22 full-bandwidth **channels** and 2 LFE channels (i.e. 22.2) that are configured to directly feed reproduction loudspeakers.
    - May accept discrete **audio objects** as PCM signals with associated rendering/position/scene information.
    - May accept PCM signals that use **Higher Order Ambisonics (HOA)** representation.
- **Rendering for Headphone Listening**
    - The standard shall be able to do binaural rendering for headphones.
    - **HRTF Personalization**: Decoder shall support a normative format for reading in a user specified Head-Related Transfer Function (HRTF) for spatialisation, e.g. for headphone listening.

5.4.2 Time Table

The Call for Proposals contained two phases:

Phase 1 is a first call for technology that satisfies the Primary Requirements for a limited range of encoding bitrates. Technology selected at the end of Phase 1 is designated as Reference Model 0 (RM0).

- January 2013: Call for Proposals on 3D Audio was issued.
- April 12, 2013: Proponents must register intention to participate in Call.
- May 31, 2013: Proponent processed test items due.
- June, July, 2013: Conduct evaluation listening tests.
- July 2013: Proponent written documentation due and Selection of Reference Model 0 technology.
- October 2013: Proponent(s) must submit Reference Model 0 Working Draft text and Reference Software

Phase 2 is a second submission of technology that should extend RM0 technology in an integrated manner. Technology selected at the end of Phase 2 is designated RM1. Phase 2 will start in 2014.

5.4.3 Listening Tests

Listening test were executed in June and July 2013. Two kinds of tests were proposed for a) channel and object based compression formats and b) Higher Order Ambisonics (HOA) based compression formats. Still the goal is to define one common compression format for all three technologies, e.g. for channel, object and HOA based formats.

Tests were planned for loudspeakers and headphones. The used loudspeaker setups are 22.2 (as shown in Figure X) plus down-mixes to 10.1, 8.1, 5.1 and randomly chosen speaker positions with 5 or 10 speakers. In total 30 loudspeaker positions are needed for the tests at middle, upper, top and lower layer as well as LFEs (Low-frequency effects).

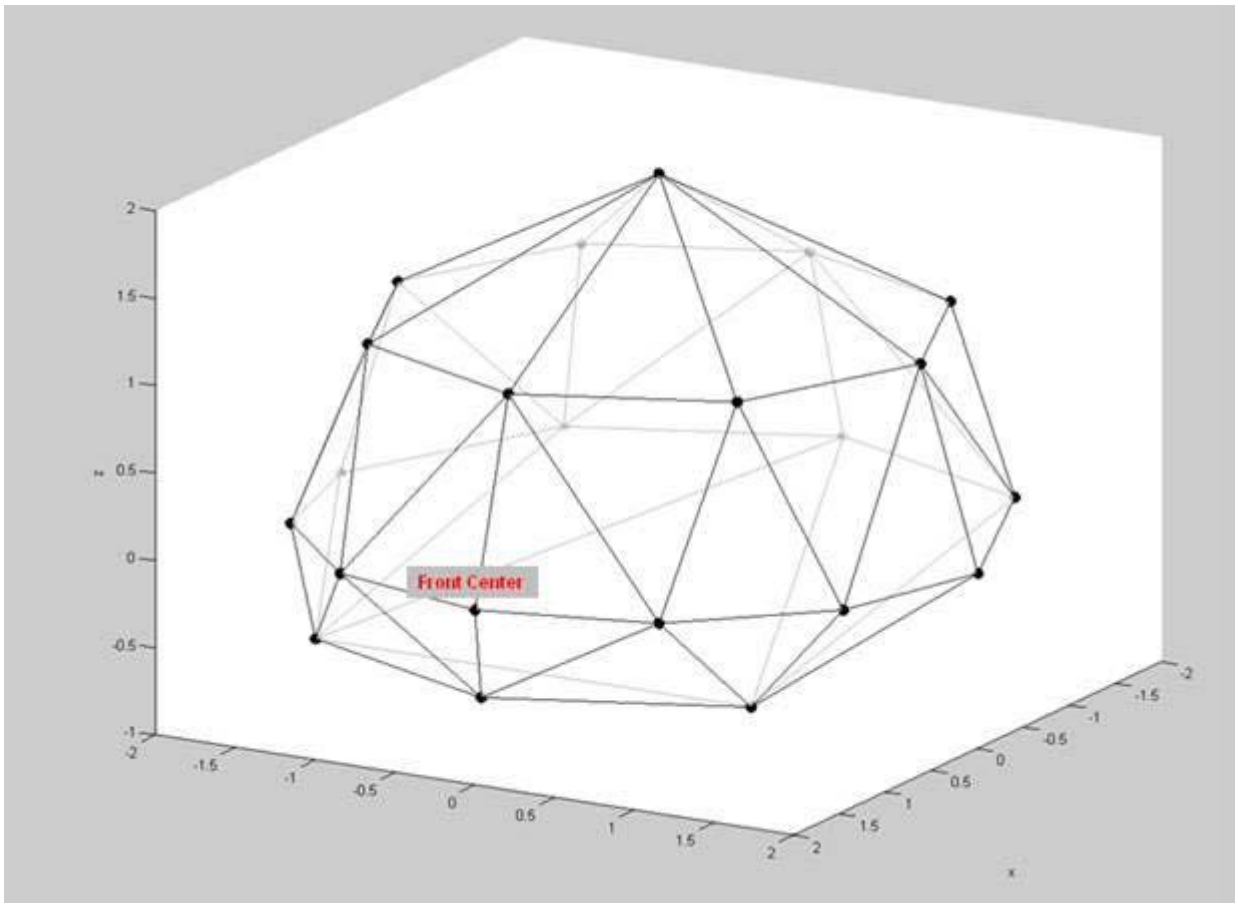

Figure 3: Positions of the 22.2 Speaker Setup without LFEs

Tests were planned for 1.2 Mb/s, 512 kb/s and 256 kb/s in total and the listening position were planned to be “in-sweet-spot” as well as “off-sweet-sport”. Twelve test items were selected for channel and object tests and again 12 items were selected for HOA. The channel configuration varies from 9.0 to 22.2 channels and the number of objects between 1 and 38. For HOA order varies from 3 to 6.

DTO was actively involved with 9 individual listeners performing in total 270 tests of 30 minutes each, plus test setup preparation and results evaluation. Activities in this year also included: editorial work finalizing the Draft International Standard (ISO/IEC DIS 23008-3) and related reference software during and in-between 3 international ISO meetings plus 2 ad-hoc group meetings. We also successfully delivered technology for a technology shootout for low bitrate coding (<=128kbit/s) which will be standardized in the second phase (phase2). Meanwhile, the launch of an MPEG-H audio alliance (http://mpeghaa.com/) has been announced, of which Technicolor (supported by DTO) is a founding member.

6 Planned Activities (Year 2)

6.1 Dissemination

In the second project year the ICoSOLE partners will target the following conferences, events and journals.

6.1.1 JRS

JRS plans to publish initial results of quality analysis and extraction and matching of descriptors for video segments at image processing and retrieval conferences. Targets to be considered are the IEEE International Conference on Image Processing (ICIP) and the ACM International Conference on Multimedia Retrieval (ICMR). A paper about the annotated research data sets created so far is considered to be submitted to the ACM Multimedia Systems data set track. In collaboration with other partners, JRS aims to submit contributions to the ACM International Conference on Interactive Experiences for Television and Online Video (TVX).

6.1.2 DTO

With regard to audio processing research, DTO intends to present preliminary results for audio scene creation using user generated content (UGC). Conferences to be addressed are the 41th annual conference of the German acoustical society (DAGA 2015) in Nuremberg on March 16th to 19th and the 138th Audio Engineering Society Convention in Warsaw on May 07th to 10th. Moreover DTO will contribute to the BBC Audio Conference, “Sound: Now and Next”: 19th-20th May 2015 (see below). Likewise BBC, IBC 2015 will also be considered as high profile event to demonstrate project results

6.1.3 VRT

Media Fast Forward 2014

Every year, VRT Research & Innovation organizes a media event where both VRT R&I and international speakers present new formats, technologies and trends. This year, the ICoSOLE project will be highlighted as a part of the immersive experience research track. This year, the event will be held at the Event Lounge in Brussels at the 4th of December. It attracts about 200 professionals from throughout the media industry in Flanders.

ACM TVX 2015

Tvx 2015 is an ACM international conference on interactive experience for television and online video taking place in Brussels from the 3rd till the 5th of June. We planning to submit the Wall of Moments demo and submit an industry session paper on the ICoSOLE topics.

IBC 2015

IBC (International Broadcasting Convention) is an annual event for professionals engaged in the creation, management and delivery of entertainment and news content worldwide. VRT plans to present the results of the ICoSOLE project together with other partners in the consortium.

6.1.4 iMinds

iMinds potentially targets a technical demonstration submission for MMSys or ACM Multimedia 2015 – which would describe the adaptive pre-caching framework developed for seamless immersive video sequences. Depending on the ability to evaluate the efficacy of iMinds technologies within the next project year, a journal publication in Springer’s Multimedia Tools and Applications is envisaged.

6.1.5 BIT

Nothing planned from BIT.

6.1.6 BBC

The BBC has three main dissemination targets for the upcoming year:

- BBC Audio Conference, "Sound: Now and Next": 19-20th May 2015, BBC New Broadcasting House, London. This conference will be an opportunity to demonstrate an ICoSOLE audio prototype. It will also provide an opportunity for partners to demonstrate their work. As it organised by the BBC audio team, we will have a lot of control over what is demonstrated and publicised. *http://www.bbc.co.uk/rd/events/sound2015*
- IBC 2015 (September 2015). This would be a high profile event to demonstrate prototypes from the project
- The BBC R&D site (*http://www.bbc.co.uk/rd*) will continue to be a location for blogs relating to any interesting developments in the project.

6.1.7 TaW

TaW's main target will be the NVIDIA GTC Conference 2015. We would like to present GStreamer-based optimization for a pure hardware-based video rendering pipeline (decoding, rendering and encoding). This is considered as an optimization to the ICoSOLE playout pipeline. At the same time, we will talk about OpenGL-specific optimization that we are able to employ in our GStreamer-based rendering pipeline.

6.2 Standardisation

6.2.1 BBC

Over the next 12 months the BBC plans to continue the standardisation process with the ADM, in particular in the ITU. It is quite likely the ADM will be extended due to developments in the audio community's work on object-based audio, so there may be a new version of EBU Tech 3364 (https://tech.ebu.ch/docs/tech/tech3364.pdf) being released. A related standard, EBU Tech 3285 (https://tech.ebu.ch/docs/tech/tech3285.pdf), which covers the Broadcast Wave File format (that can now carry the ADM metadata), will also have a new supplement describing the new <chna> chunk.

In the EBU FAR-BWF group there is the intention to generate a set of standard audio configurations for the ADM, allowing for a single reference for common channel and scene-based definitions.

6.2.2 JRS – MPEG Compact Descriptors for Video Analysis (CDVA)

JRS plans to further contribute to standardisation of CDVA, focusing on the instance search use cases, which are most relevant for ICoSOLE. It will be decided in 2015, whether technology will be submitted in response to the call. In any case, JRS plans to contribute to the assessment of candidate technologies.

6.2.3 DTO – MPEG-H

DTO will be further involved in MPEG-H and will be actively contributing to Phase 2 of the MPEG-H road map with a special focus on 3D-Audio compression technology. In particular DTO Hannover is providing technology for rate compression and processing of 3D Audio signals:

- A spatial coding engine to compress and decompress Higher Order Ambisonics (HOA) data
- Robust rendering technology to render HOA to loudspeaker signals
- Technology to apply spatial Dynamic Range manipulations to a HOA signal

Upcoming activities over the next year: Participation in upcoming international ISO meetings, preparing the Phase2 Working Draft and related reference software as well as execution of Core Experiments to improve the technology to be standardized.

7 Conclusions

All originally set objectives have been met:

Public communication plans have been respected through the development of the ICoSOLE website and by the contribution of partners to international conferences and publications. This has included demonstrations of some of the technology used in the project, such as object-based audio at IBC. The partners have also published related activities on their own websites.

ICoSOLE is active in several key standardisation activities covering the areas of audio, video and media streaming. In audio, immersive and object-based audio and related metadata is being standardised through the EBU, MPEG and ITU. For video, video analysis standardisation is being carried out in MPEG (CDVA). For streaming, the work on DASH continues in MPEG.

The ICoSOLE project has helped in the testing and data gathering of the technology behind these standards. For example, the Salford test shoot provided a large set of audio and video data along with associated metadata. The new and proposed standards could be applied to this data and test it more thoroughly. This can allow the proposed standards to be improved and refined. The resulting standards can then feedback into the project as better interfacing between the partners' different developments.

8 Glossary

Terms used within the ICoSOLE project, sorted alphabetically.

ADM	Audio Definition Model
DASH	Dynamic Adaptive Streaming over HTTP
EBU	European Broadcast Union
HOA	Higher Order Ambisonics
ITU	International Telecommunications Union
REST	Representational State Transfer
UGC	User Generated Content

Partner Acronyms

BBC	Britisch Broadcasting Corporation, UK
BIT	Bitmovin Softwareentwicklung OG, AT
DTO	Deutsche Thomson OHG (Technicolor), DE
iMinds	iMinds vzw, BE
JRS	JOANNEUM RESEARCH Forschungsgesellschaft mbH, AT
TaW	Tools at Work Hard + Soft Vertriebsges.m.b.H, AT
VRT	De Vlaamse Radio en Televisieomroeporganisatie NV, BE

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