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D5.3 Dissemination and exploitation activity report – M30 Issue

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2.9	8.4.2015	Sami Jylkkä	Executive summary refined. Exploitation document integrated. Also *IPR ASSET Table* in Annex section updated to the same version as in the provided exploitation document. Activity reporting updated.

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1. Executive Summary

The objective of this document is to report the 3D LIVE project dissemination and exploitation activities towards the societal, scientific and industrial communities. This document focuses to describe content and results of the project. This M30 Issue focuses on activity during project months from M13 to M30 i.e. August 2013 to February 2015.

The 3D LIVE specific dissemination strategy, suitable for achieving the expected impact and dissemination objective, was a baseline for project activities. The dissemination strategy was supported by processes and engagement mechanisms which were set up and used during the project first year by all the partners involved in the dissemination campaign (these include the mechanisms for the planning of 3D LIVE dedicated events and for managing the participation of 3D LIVE partners in identified suitable events, meetings and workshops).

3D LIVE dissemination and exploitation activities were based on the following results, which have been made available by the Project:

- The 3D LIVE User eXperience model, suitable for designing the user experience and, hence, for capturing users suggestions to be used back in the design loop of FI applications. The methodology will therefore put practitioners and designers in a position of involving users in a structured and optimised way, making them focus on the different aspects which contribute to the building of their fruition experience, at the different phase of the design and experimentation process. Full details are provided in D1.1 and D1.2;
- The 3D LIVE Teleimmersive environment prototype, consisting of the platform embedding all the different modules, suitable for hosting specific sporting applications, developed for 3 sport use-cases that are Golf, Ski and Jogging;
- The 3D LIVE 3 sporting use-cases and relevant applications, that are Golf, Ski and Jogging;
- Arrangements and reports of the 3D LIVE specific sporting experimentations (skiing, golfing and running).

As by products, the 3D LIVE project also contributed to the improvement of the adopted FIRE facilities after the user experiment, including new potential service and to the development and adaptation of Open Innovation methods, to be applied to FIRE facilities and Future Internet environments and relevant applications and services.

The development and implementation of the dissemination and exploitation activities were conceptually driven by the identification of the results previously described as they contributed to the identification of the dissemination targets and channels.

The approach to support the 3D LIVE dissemination activities was based on the following elements:

- Identification of the main dissemination streams for 3D LIVE, to determine 3D LIVE target audience (and relevant engagement mechanisms), which consists of:
    - FIRE and Future Internet community at large;

- External Communities, including other related national and international research initiatives as well as potential customers' groups.

By determination of the main dissemination streams and correct target audience it was possible to optimize 3D LIVE Project dissemination effort by targeting specific, well characterised disseminations streams and managing the relevant initiatives.

- Identification and adoption of specific implementation measures for the dissemination activities, including:
  - Specific process for the selection, participation and reporting of the events in which partners of the 3D LIVE Consortium participated. This includes:
    - The characterization of the events for which a 3D LIVE attendance was proposed (in terms of type of intervention, expected audience typologies and quantity, expected impact to be achieved through the participation). Proposal for attending events outside Europe had to be authorised by the European Commission Project Officer.
    - The reporting from the events, according to a predefined format, suitable for providing the basis for a harmonised and quantitative evaluation of the integrated impact,
    - Set-up and management of an overall 3D LIVE project dissemination schedule.

The 3D LIVE Consortium did also define a specific joint exploitation strategy, based on a joint venture approach, aimed at collaborating with main players in both the sporting / gaming market and the IT industry. Contacts have been established with one of the major players in the sector of AR goggles and sporting equipment's. Contacts with the other initiatives (i.e. the People Olympics one, suitable for promoting healthy living on a mass scale) have been initialised, as the 3D LIVE social approach to sport is seen as an important motivation factor for engaging users on both indoor and outdoor basis.

The dissemination and exploitation work package can be also assessed on a set of impact metrics, which are reported in the Chapter 10.

The main activities completed during report timeframe are listed here and in more detail in chapter 6 Activity Reporting and chapter 7 Dissemination Materials.

- The 3rd and 4th newsletters were produced and released via different channel.
- Success Story created to the FIRE 2015 brochure.
- Web site improvement done according reviewer's comments.
- Amount of the visitors by looking origin country of the visitors and visitor numbers in 3D LIVE web page has increased drastically in the last quarter of the project
- One pagers, project brochures and banners have been produced for VRIC 2014, FIA Athens and Munich WT Conference. Also FIRE Brochure was provided.

- World's 1st Mixed Reality Ski Competition a huge success at Munich WT Conference. News forums globally found this event ground breaking and reported it widely, which created lots of new visibility for the 3D Live Platform.
- 3D LIVE consortium members participated to several events to publish new papers and sharing 3D LIVE platform information with different presentations.
- CERTH contributed to standardization work in MPEG.
- 8 Academic papers published from which one was the joint paper created by the members of the 3D LIVE consortium.
- Exploitation activities with contacts towards potential customers/partners for 3D LIVE.

Capability and result of the 3D LIVE project has been acknowledged also by external organizations and the project has received 2 awards:

- In the Laval Virtual 2015 conference 3D LIVE won an award in category "*Sport & Leisure"*
- In the NetFutures 2015 conference 3D LIVE project won coolest pitch award

2. Introduction

2.1. Description and content

This report describes the dissemination activities related to the 3D LIVE project over the 2nd reporting period of the project, starting on September 1st, 2013 and ending on February 28, 2015.

The report first describes the brief summary of main results of the 3D LIVE project. Then it gives an overview of the dissemination strategy. Then, the report describes the dissemination towards external communities and gives details of the 3D LIVE specific events. The report also describes infrastructure and materials used to disseminate information related to 3D LIVE. Finally, it gives an overview of exploitation strategy and summaries of the work done.

In addition to Chapter 1 "Executive Summary" and to this Chapter 2 "Introduction", this document consists of the following sections:

- Chapter 3 "3D LIVE Results", in which the main results of the project are described. The aim of this section is to establish consensus on the main items which were the focus of the dissemination actions.
- Chapter 4 "3D LIVE Dissemination Strategy" reports the way the results previously described were brought to the different communities which the project identified as relevant, so that to maximise the impact potential.
- Chapter 5 "Dissemination towards external communities" describes the way the 3D LIVE project engaged with external communities and established an agreed dissemination master plan for impact creation and collaboration activities with the FIRE community.
- Chapter 6 "Activity reporting, participated 3D LIVE events"; describes in which potential events the 3D LIVE project team has participated and done dissemination. Events are selected not only from dissemination or impact point of view but also to avoid overlapping with other FIRE events.
- Chapter 7 "3D LIVE dissemination materials and tools" describes how dissemination was performed and what kind of dissemination materials was produced together with what channels 3D LIVE community uses on social media.
- Chapter 8 "3D LIVE exploitation strategy" starts profiling an exploitation strategy, based on the initial expected results, on the analysis of the potential partners' role and on initial assumptions on how to group the expected results to have sellable services/products.
- Chapter 9 "Individual Exploitation Plans" describes how the results which 3D LIVE is generating can be exploited by the partners at individual level. Each member describes which results of the project are planned to be exploited, implementation plan and potential benefits for the member.

- Chapter 10 “Conclusion and Impact Indicators” summarises the work done.

2.2. Applicable Documents

AD(1). EC Communication Guidelines for Projects
http://cordis.europa.eu/fp7/ict/participating/communication-best-practices_en.html

AD(2). 3D LIVE DOW

AD(3). 3D LIVE D5.1 Dissemination material

AD(4). 3D LIVE D5.4 Collaboration and engagement with FIRE Community

3. 3D LIVE Results

In this paragraph, a brief summary of the main results which were produced by the 3D LIVE is provided. This is done in order to put the dissemination activities into context.

The 3D LIVE produced and delivered the following major deliverables:

- The 3D LIVE User eXperience model, suitable for designing the user experience and, hence, for capturing users suggestions to be used back in the design loop of FI applications. The methodology puts practitioners and designers in a position of involving users in a structured and optimised way, making them focus on the different aspects which contribute to the building of their fruition experience, at the different phase of the design and experimentation process. Full details are provided in D1.1 and D1.2;
- The 3D LIVE Teleimmersive environment prototype, consisting of the platform embedding all the different modules, suitable for hosting specific sporting applications, developed for 3 sport use-cases that are Golf, Ski and Jogging;
- Completion and reporting of the LIVE2 & 3 experimentation with skiing, golfing and running use cases. Results of each experiment were evaluated and feedback obtained to create new requirements and implement these requirements in order to improve 3D LIVE platform user experience;
- Arranged and completed world's 1st Tele-Immersive ski competition for demonstrating working prototype of 3D LIVE platform

As by products, the 3D LIVE project has also contributed to the improvement of the adopted FIRE facilities after the user experiments, including new potential service and to the development and adaptation of Open Innovation methods, to be applied to FIRE facilities and Future Internet environments.

3.1. 3D LIVE User eXperience model

Work Package 1 (WP1) activities were concluded during the first project year. A summary of the activities performed is anyway given here below.

WP1 developed a User eXperience model and methodology, suitable for supporting the design of 3D LIVE real time applications by considering users' contributions and feedback since the early stage of the design. WP1 had the following objectives:

- To create an overall design framework that supported the development of the 3D-LIVE Tele-Immersive Environment;
- To investigate and formalise an innovative Experiential Design Process that allowed to take into account other vital aspects than only technological issues in involving all stakeholders, and especially users, at the earlier stage of R&D;
- To study and create a holistic model of User Experience taking into account several perspectives such as Technological aspects (e.g. ergonomic issues, usability), Social

aspects (e.g. socio-cognitive issues), Economical aspects (e.g. business model, adoptability) and societal aspects (e.g. legal and ethical issues, acceptability);

- To explore, evaluate and refine the resulting Experiential Design Process and User Experience Model according to the use cases feedback.

Two deliverables about UX process design and 3D LIVE UX model were delivered and duly updated after the first review meeting.

3.2. 3D LIVE Tele-Immersive Environment (TIE)

The 3D LIVE project is about developing and experimenting with a Tele-Immersive Environment (TIE). Work in the project focused to three pre-selected (Golf, Ski and Jogging) sports use-cases. Work Package 2 (WP2) represents the conceptual design phase where partners co-designed the overall architecture and specified functionalities and properties of the 3D LIVE TIE. The Experiential Design Process and the User Experience Model defined in the WP1 were utilized during the WP2 work to be able to properly asses the QoS and QoE in the TIE evaluation phase.

Work Package 2 output guided platform implementation work done in the Work Package 3. Main inputs from WP2 were:

- user interfaces for the three scenarios,
- activity recognition algorithms and appropriate datasets,
- environmental 3D reconstructions and 3D reconstructions of humans,
- issues related to integration and algorithmic components that increase the sense of realistic reproductions into the virtual environment

The main results from WP3 were:

- 3D Reconstruction
- Data compression & transmission including content to network adaptation
- Data fusion

A prototype of the 3D LIVE TIE was delivered at the end of the project after having undergone three different stages of experimentation. Experimentation stages were used as incremental input for the project, each experiment level gave more information and created new requirements about how to improve final TIE prototype.

All together nine experiments were designed, scheduled and executed between M18 and M30. Each of the three venues selected for experimentation hosts three separate experimental phases:

- 1st phase with a purely technical focus (referred to as ‘LIVE 1’)
- 2nd phase (‘LIVE 2’) included invited users and captured additional quality of experience data. Based on the 2nd phase results numerous improvements were implemented to 3D LIVE TIE as well game scenarios themselves

- 3rd phase ('LIVE3') was final round for user trials and finalizing 3D LIVE TIE prototype

The primary focus of LIVE 1 experimentation was on testing and evaluation of 3D-LIVE technology to determine its technical, operational fitness in the field. Additionally, LIVE 1 experimentation provided the opportunity to assess and refine the experimental design and procedure 'in the field' before inviting external users to take part (in LIVE 2). The outcomes of LIVE 1 experimentation were a) QoS data collected to support the assessment of the technical fitness of the current 3D-LIVE prototype and b) additional notes and logs to be used to guide improvements of future prototypes and experimentation design.

LIVE 2 ad LIVE 3 experimentations were conducted with externals users and during experiment execution both QoS and QoE data was collected. QoS & QoE data was used in the evaluation of technical and experiential impact of 3D-LIVE system usage. During both experiments also additional notes and logs were stored to guide further improvements to the 3D-LIVE prototype and experimental processes.

More information related to executed experiments (LIVE 1, 2 and 3) can be found from 3D LIVE web page http://3dliveproject.eu/wp/?page_id=420.

3.3. LIVE experiments

In the following sub chapters objectives from Research and Commercial point of view for all three LIVE experiment scenarios are described in details. Each scenario shared some same research objectives:

- Embed social aspects (notion of team and followers) in the 3D-TIE application for each scenario with various internal and external parameters and assess their impact on the immersion
- Experimentation of the scenario appropriateness through the 3D-TIE prototypes
- Evaluation of the user experience (UX) of indoor and out-door users in the scenario immersed in a 3D-TIE
- Refining the 3D-TIE platform design based on the resulting UX
- To explore the "Twilight Space" (a space between Augmented Reality and Augmented Virtuality) impact on people's behaviour and feelings

3.3.1. Golfing Experiment

The golfing scenario took place in the context of scramble play, that enable users to play together to reach a common objective: put the ball in the hole.

From a research point of view, the main objectives additionally to common ones for the golfing scenario were:

- Co-creation a 3D-TIE with users for Golf and explore its technological feasibility
- Embed training aspects thanks to Activity Recognition through the fusion of Skeleton data from the user

- Exploring the "Twilight Space" (a space between Augmented Reality and Augmented Virtuality) impact on people feelings and behaviour

From a commercial point of view the main expected results were:

- To demonstrate the potential of the use of 3D TIE for golfing like activities and for sports industry
- To highlight the impact of Tele-Immersion for training activities, for ICT companies (sensor manufacturers), golf simulator companies and golf courses
- To highlight the impact of social interactions in simulated golf activities, for golf simulator companies

3.3.2. Skiing Experiment

The Ski scenario involved 3 participants, one on the real ski slope and two participants in indoor conditions (one using high end immersive equipment, and a second one using a low cost solution).

This measure allowed us to test different degrees of cost/immersion solutions simultaneously and in particular to experiment human live capture and transmission.

From a research point of view, the main objectives additionally to common ones for the skiing scenario were;

- To explore the technological feasibility (visualization rendering, data transfer, real-time skier 3D reconstruction, realistic avatars, platform for realistic movements, stereoscopic view) and propose a library of components which could be gathered to create the user experience
- To experiment the scenario appropriateness through Ski 3D TIE prototypes
- To explore the technological feasibility of Tele Immersion for in-situ outdoor skiers
- To evaluate the user experience of skiers immersed in a Ski 3D TIE by different rendering ways

From a commercial point of view;

- To demonstration the potential of the use of 3D TIE for skiing activities
- Highlighting the impact of Tele-Immersion for ski simulators companies and for ICT companies (sensor manufacturers)
- Highlighting the impact of social interactions in simulated sports activities

3.3.3. Jogging Experiment

The jogging scenario enables users to run together on the same track, regardless of whether they are indoors or outdoors. Jogging experiment involved one real world user and two virtual world users, though the design and implementation of the experimentation is scalable for many more users jogging at the same time and place.

From a research point of view, the main objectives additionally to common ones for the jogging scenario were;

- To explore the technological feasibility of a 3D TIE for Running
- To test technical solutions for the outdoor runner

From an commercial point of view;

- To demonstrate the potential of the use of 3D TIE for running activities in different environments
- To highlight the impact of Tele-Immersion for Treadmill manufacturers, Wearable Technology companies, Sports Clubs, Gyms and Sports- and ICT-industry (sensor manufacturers)
- To highlight the impact of social interactions in simulated sports activities

3.4. World's 1st Tele-Immersive ski competition

World's 1st Tele-Immersive Ski competition was conducted by using same setup as in LIVE 3 Ski experience at Schladming ski resort. The Tele-Immersive Ski competition occurred on the following week at Wearable Technology conference 2015 in Munich.

Competition was divided to 4 separate races where 3 participants were racing. Race competitors were:

- 1 competitor skiing at Schladming ski resort slope
- 2 competitors racing virtually in the same slope in 3D TIE
    - 1 physically at WT conference stand
    - 1 at Thessaloniki CAVE environment

Views of the all racers were gathered to one single monitor, which was located at the WT conference and enabled visitors to follow race on real time. Monitor content was also streamed real-time to the internet where people who were not participating to WT conference were able to follow competition.

Competition was successfully held and it received wide global interest; 52 Online articles published by end of February (Appendix 11). 327 persons were following races real time via provided live stream. Interest towards 3D LIVE web portal also increased by publicity gained from the competition; web page hit record was achieved on the February 2015.

Successfully arranged and completed virtual competition was excellent demonstration of the TIE environment and how it is possible to be utilized in sport events. Working prototype also proofed that it is possible to have race competitors geographically distributed and still able to share same virtual space on real-time without trouble of synchronizing each competitor individual race data and able to have rich social experience.

4. 3D LIVE Dissemination Strategy

The 3D LIVE dissemination strategy is based on the maximisation of the impact of project results on the following main dissemination streams:

- The overall FIRE Community and more in general the Future Internet Community, interested in learning the outcomes from the 3D LIVE project and in understanding any possible beneficial impact it may have on FIRE and Future Internet advancement;
- External Communities, including other related national and international research initiatives as well as potential customers' groups.

In order to pursue this strategy, the 3D LIVE consortium refined the management structure of the project by introducing two roles, the FIRE impact creation manager (in charge to IT Innovation) and the 3D LIVE Product and Service Dissemination and Exploitation manager (in charge to SportsCurve and CENG).

The mission of the FIRE impact creation manager within 3D LIVE is to oversee the impact creation plan of the Project with respect to the FIRE and FI communities and to ensure its implementation. To this end, 3D LIVE offers valuable usage scenarios for FIRE facilities in the domain of the Future Media Internet demonstrating novel requirements for infrastructures and test bed technologies, including federation examples. More information are provided within chapter 5 and above all in the parallel document D5.4 (see Applicable Documents (4)).

The mission of the 3D LIVE Product and Service Dissemination and Exploitation manager is to engage with external communities and with potential customers and to oversee the exploitation plan and Intellectual Property Rights (IPR) related issues for the products and services generated by the Project. To this end, the 3D LIVE project connected to other related national and international research initiatives in order to maximize the European added value and impact on the scientific side as well as potential customer categories.

More information on this part can be found in Chapter 6.

The 3D LIVE consortium fully supported the events identified in both stream and did made available the dissemination material produced in terms of posters, brochures and demo. The 3D LIVE Dissemination Manager was responsible to ensure that the supporting dissemination material:

- was updated and aligned with respect to the project outcomes;
- reflected original contents and developments achieved within the projects;
- provided accurate and adequate view of the increasing maturity of 3D LIVE methods, platform and sectorial applications (i.e. demos were delivered in the last project quarter when the project maturity was at the highest).

In addition to this, the 3D LIVE consortium did seek to engage potential customers, especially during the last stage of the projects.

3D LIVE is addressing two major industries, the ICT and Sports Industry. Both industries are merging in the field of consumer electronic devices. Especially the big ICT companies such as Chip Manufacturer or components provider are spending strong efforts in the fitness and sports market with electronic devices.

- Sports industries: Target social augmented sports
- ICT Industry: Real time augmented data for industry applications
- Private companies, producing sports apparels, equipment and facilities

5. Dissemination towards external communities

The 3D LIVE project dissemination strategy towards external community was originally based on the plan described in the 3D LIVE project proposal and updated during project to reflect the development of the targeted communities.

The 3D LIVE consortium established in the first version of a dissemination plan targets for the events which are relevant (and potentially beneficial) to the 3D LIVE project.

5.1. 3D LIVE target groups

The 3D LIVE dissemination strategy targeted primarily the following dissemination main targets and groups: The intended audience consists therefore of:

- The **3D LIVE project Consortium** itself, in order to raise the awareness of the proposed dissemination strategy, the committed events and the proper way to handle and disseminate project information, some of which are confidential.
    - Consortium members participated to dissemination activities, more closely all members had responsibility to extend 3D LIVE dissemination activities within their own networks, e.g. distributing 3D LIVE related achievements in there.

- The **European Commission reviewing team**, with the twofold objective to communicate the established strategy as well as the work done, and to seek for feedback and advice.
    - Two reviews arranged, after 1st period (1st year) and interim review after 24 months (2nd year). Disseminated Project progress and achievements together with financial reports. Review recommendations taken in account for the work to be done in next phase.
    - The Final Project review 24th of Apr 2015.

- The **FIRE and Smart Cities communities** are additional, extremely relevant communities to tackle for both dissemination and impact creation for our experiment. In this context, Future Internet Research and Experimentation (FIRE) facilities represented useful tools for providing product development services in an optimised and economically affordable ways and 3D LIVE was disseminated as a successful example of connection between FIRE facilities and business, especially small and innovative ones.
    - 3D LIVE participated to FIA Athens, scientific conference.
    - Project dissemination responsibilities has been part of the FIRE dissemination working group, where project insight has been bought to other FIRE group members.

- 3D Live has participated in collaboration activities organized by the AmpliFIRE project.
- 3D LIVE project integrated tightly with the EXPERIMEDIA project result, incorporating EXPERIMEDIA to the 3D LIVE project sports experiences.
- 3D LIVE participated to the 19th ICE Conference at Hague (June 2013) and organised the afternoon session in day 2.
  - The 3D LIVE project participated in the "User Experience Based Applications for Smarter Cities in the Future Internet" track, aimed at providing Industry as well as Living Labs and their Stakeholders with methods and tools to profit from User eXperience, especially for Smart Cities in Future Internet scenarios.
  - The objective of the specific 3D LIVE session was to introduce 3D LIVE design concepts, the applications scenario and to stimulate the audience in jointly considering new media and creativity applications, starting from a common platform and approach.

- **European Living Labs**, on collaboration with the ENoLL association. In particular, collaborations were established with some activities within ENoLL having specific industrial relevance, such as the "Living Lab's Domain Networks" (focus on specific thematic application sectors, such e-Health, Energy Efficiency, Media) and "Horizontal Themes for Living Labs" (more focused on methodological and process aspects, such as Socio Economics, Business, Job creation, User Experience and Behaviour, Models and Metrics). The basic idea is to exchange results and approaches, in order to maximise both the dissemination and exploitation potential of 3D LIVE.
  - Project has been introduced to the members of ENoLL and new ideas has been exchanged mutually
  - OULLabs (Oulu Urban Living Labs) co-operation has been on test user hiring from PATIO (Test user Community, www.patiolla.fi) and using OULLabs test environments (Cave at CIE, University of Oulu) for Jogging experimentation.
  - 3D LIVE status updates distributed via ENoLL channels to disseminate results to other Living Labs
  - Evaluated the applicability of the 3D LIVE platform to the deployment of the People Olympics for Healthy Living and social innovation at 4th ENoLL Summer School

- The **ESoCE-Net network of multipliers** in the IT overall domain, and specifically, in the Future Internet. Multipliers are organisations that are normally grouping SMEs, interested in reaching a critical mass for the provision of services. The

ESoCE-Net network of multipliers comprises about 500 suitable organisations. 3D LIVE project results have been presented in ESoCE-Net Industrial Forum events in Rome. 3D LIVE actively contributed to the overall ESoCE Industry Forum 2012 and 2014 in a view to:

- Disseminate the 3D LIVE UX Concepts and emerging sporting scenarios, and to contextualise them in the Smart Cities and Future Internet landscape alongside with Living Labs. The objective of this event was also to start to create a critical mass of 3D LIVE related User eXperience applications and to evaluate the role of the users and citizens in driving the development of new ICT.
- Disseminate project's findings and results to an audience composed by Living Labs and members of FIRE Community, which are among the intended stakeholders of the 3D LIVE Project
- Evaluate the applicability of the UX methodology developed within 3D LIVE in other contexts, namely Living Labs and other FIRE-related environment and establish contacts for potential joint exploitation
- Evaluate the applicability of the 3D LIVE platform to the deployment of the People Olympics activities.

5.2. 3D LIVE Dissemination master plan

In this section, the 3D LIVE consortium presents original plan for the dissemination of the project results in additional events (other than the ones scheduled within the FIRE stream).

This dissemination master plan lists all the events which were potentially relevant and therefore beneficial to the 3D LIVE project. Listed events were identified as key events for 3D LIVE, devoted to a specific communications towards the external communities. There are changes in the final project plan due some events were changed to new more better suitable events from 3D Live project point of view. The chapter 6 describes the events 3D LIVE team participated with dissemination plan and report for each particular event.

N.	Events	Date	Place	Type of activity & Context (Scientific, Industry, Societal, IT industry)	Audience& Target	Other information	Dissemination Level (1)
1	Multimedia Signal Processing MMSP 2013,	30th September 2013	Sardinia Italy	Research, Scientific	Researchers, industry	first prototype demo presented	internatinal
2	*3D LIVE Project Review*	*Oct 2013*	*Brussels (BE)*	*Project Report*	*EC*	*Report*	*International*
3	AMpliFIRE	Oct 2013		FIRE Board/Forum & workshop sessions	Researchers, Living Labs, other projects	Scientific Conference	International
4	FIA Meeting	Dec 2013		Research, IT Industry	Industry, Researchers, Living Labs, other projects	Scientific Conference	International
5	Wearable Technologies Show at ISPO 2014	January 2014	Munich	Sporting Goods and Gaming Industry, ICT	Sports retail, Gaming Industry, ICT	Exhibition Space	International
6	VR Sports Conference	Spring 2014	tbd	Wearable Technologies, Sporting goods, ICT & Gaming Industry	R&D, ICT & Gaming Industry	Exhibition Space	International
7	Wearable Technologies Conference	March 2014	San Francisco, USA	Wearable Technologies, Sporting goods, ICT & Gaming Industry	R&D, ICT & Gaming Industry	Exhibition, Presentation	International
8	Laval Virtual 2014	March 2014	Laval (F)	VR/AR/MR shows & exhibition	Industry, Researchers, General Public	Meeting	International
9	VRIC 2014	March 2014	Laval (F)	VR/AR/MR Scientific Conference	Researchers	Scientific Conference	International
10	International Conference on Image Processing	2014		Research, Scientific	Researchers		International
11	IEEE MMTC Image, Video and Mesh coding Interest Group	2014		Research, Scientific, IT industry	Researchers, industry	Interest group	International
12	IEEE International Conference on Multimedia	2014		Research, Scientific, IT industry	Researchers,		International

	& Expo				industry		
13	IEEE Transactions on MultiMedia	2014		Research, Scientific	Researchers	Journal	International
14	IEEE International Conference on Communications	2014		Research, Scientific	Researchers		International
15	EICS 2014: Engineering Interactive Computing Systems	17th June 2014	Rome Italy	Research, Scientific	Researchers		International
16	ICE Conference	June 2014		Research, IT Industry	Industry, Researchers, other projects	Scientific Conference	International
17	*3D LIVE Project Review*	*Sep 2014*	*Brussels (BE)*	*Project Report*	*EC*	*Report*	*International*
18	*European Signal Processing Conference (EUSIPCO 2014)*	*1st September 2014*	*Lisbon Portugal*	*Research, IT Industry*	*Industry, Researchers*	*Joint Paper*	*International*
19	*SALENTO AVR 2014*	*17th September 2014*	*Lecce Italy*	*Research, IT Industry*	*Industry, Researchers*	*Paper*	*International*
20	*ICT 2014*	*1st October 2014*		*Research, IT Industry*	*Industry, Researchers*	*Paper and posters*	*International*
21	*ESoCE-Net Industrial Forum*	*December 2014*	*Rome Italy*	*Research, IT Industry*	*Industry, Researchers*	*Paper and presentation*	*International*
22	*WT Conference*	*3rd February 2015*	*Munich Germany*	*Research, IT Industry*	*Industry, Researchers*	*Full demonstration of results*	*International*
1	*3D LIVE Project Review*	*April 2015*	*Paris France*	*Final Report*	*EC*	*Report*	*International*

Table 1: dissemination master plan

6. Activity reporting; Participated 3D LIVE specific events

Dissemination reports of specific events during reporting period are described event by event. The Table 6.1 below is a summary of the participated 3D LIVE events (M13 – M30).

In total 14 events was presented by the 3D LIVE consortium members, out of these events 9 were different kinds of conferences as original project target for the conferences was 6. Workshop types of the participated events were:

- Paper publications and presentations
- Conferences
- Exhibitions

3D LIVE Event	Workshop	Impact and achievements
MMSP 2013 30th Sep 2013	*Scientific Conference*	Showcased the first live demo version of 3D LIVE.
Wearable Technologies Show at ISPO 2014, March 2014	*Symposium Sharing Live User Experience*	Exploitation and Dissemination of the sporting goods market. Feedback from Exhibitors and Visitors.
WT Conference, Munich, February 2014	*Exhibition*	Talking to important players of the Wearable ecosystem.
Mobile World Congress, Barcelona, February 2014	*Exhibition*	Getting in contact with mobile providers and smartphone manufacturers.
FIA Athens in 2014 18th-20th of March	*Scientific Conference*	To present 3D LIVE project consolidated results to the FIA Community
Laval Virtual, March 2014, 9th of March	*Exhibition, Paper presentation*	To present paper "Investigating the Main Characteristics of 3D Real Time Tele-Immersive Environments through the Example of a Computer Augmented Golf Platform"
IEEE ICASSP 2014 04th May 2014, Florence, Italy	*Exhibition, paper presentation*	To promote and disseminate the project to researchers and end-users interested in the field of 3D Tele-immersive environments
Wearable Technologies Conference, San Francisco 7th of July 2014	*Exhibition and presentations*	To present demos to Wearable Technologies, Sports, ICT & Gaming Industry
SALENTO AVR 18th of Sep 2014, Lecce, Italy	*Paper presentation "A design and evaluation framework for a tele-immersive mixed reality platform"*	Aim is to present the paper about 3D-LIVE experiential model and design process and report on the first set of experimental work (LIVE 1) and early results.

3D LIVE Event	Workshop	Impact and achievements
Afterwork FLUPA, 17-Sep-2014	*Presentations*	Aim is to present to an audience specialist of ergonomics and User Experience the application of the 3DLive UX methodology in a Virtual Reality distributed environment. The methodology and its outcomes in the 3D-LIVE context are presented
European Signal Processing Conference EUSIPCO 2014, 2nd of Sep, Lisbon, Portugal	*Scientific Conference - Paper publication*	Joint 3D LIVE consortium paper entitled "3D-LIVE a multimodal platform allowing Tele-Immersive sports activities" presented in the event. Also started collaboration between ARTS and the Dublin City University about Golf Activity Recognition.
ESoCE-Net Industrial Forum, 1-Dec-2014, Roma	*Presentation*	Dissemination of the 3D live platform to the audience to find new potential use cases, lots of interest of the benefits of deriving adaptation of the UX methodology.
The IEEE Visual Communications and Image Processing (IEEE VCIP), 7th of Dec 2014	*Two paper presentations*	CERTH/ITI promoted and disseminated the project to researchers and end-users interested in the fields of 3D tele-immersion, real-time 3D reconstruction from multiple RGB-Depth sensors, multimedia (3D mesh and multi-view textures) compression. Networking during the event was active and project aspects and outcomes were promoted.
Wearable Technologies Conference, 2nd and 3rd of Feb 2015, Munich	*3D Live platform demonstration, presentations*	World's 1st mixed reality skiing competition successfully demonstrated and completed, 3D Live platform widely made known for the Conference audience.
Laval Virtual 2015, from the 8th to the 12th of April, 2015	*Award ceremony, 3D Live presentations*	3D-LIVE will receive an award at the LV awards ceremony. 3D-LIVE will be part of the introduction of a VRIC session. B. Poussard will be referring person in a sports workshop sessions with researchers and potential customers.

Table 2: Participated 3D LIVE related main events

6.1. IEEE MMSP 2013

IEEE MMSP 2013: 15th International Workshop on Multimedia Signal Processing. Organized by the Multimedia Signal Processing Technical Committee of the IEEE Signal Processing Society. **30Sep-02Oct, 2013, Pula (Sardinia), Italy**
Scope and Objectives
The theme of the workshop is on Multimedia Signal Processing, while some of the topics of interest are: • Multimedia for communication and collaboration: Ad-hoc broadband sensor array, microphone and camera array, loudspeaker and display array, sensor calibration and synchronization, source separation, localization, de-noising, enhancement and spatialisation. • Virtual reality signal processing: Virtual reality and 3D imaging, 2D and 3D graphics/geometry animation, distributed virtual reality communication, 3D audio and video processing, haptics.
Programme
The workshop organizes a demo session, and as stated in the MMSP site: "The Demo Track solicits contribution from both the Academia and the Industry, with particular emphasis to contributions representing the outcomes of EU-funded projects."
3D LIVE Contribution (dissemination and impact)
The demo that 3DLIVE envisages to present in MMSP, was the first prototype of the 3DLIVE jogging use-case, that aligns with the aforementioned topics of interest of the workshop. This demo was the first attempt of 3DLIVE to showcase its technologies, gain visibility, attract attention to the project and potential "followers", and receive valuable feedback from the workshop participants (both academia and industry).
Participation objectives, Outcomes and Results
Apart from showcasing and disseminating the project, the 3DLIVE participant to the workshop had the opportunity to screen the current work and activities of other research groups in the field of interest, that could benefit the 3D LIVE project.

IEEE MMSP 2013 Report

3D-Live had the opportunity to show a demo of a draft of the first prototype of the Jogging demo. More in particular, the scenario involved remote runners, both outdoors and indoors, that simultaneously enjoyed the common jogging experience. The outdoor runner was jogging in Oulu, already reconstructed in 3D and carried with her/him a GPS-enabled mobile phone. The indoor user was running on a treadmill, in front of a 3D display, surrounded by capturing sensors (Kinects). The indoor case was hosted in

Thessaloniki. The demo viewers (MMSP participants) were able to watch on a display the reconstructed city, and could watch live the avatars of the two runners sharing their experience.

During the demo session of the conference, a lot of MMSP participants showed great amounts of interest and suggested different application domains. Specific sessions were organized for live demos of the 3D Live application, involving an indoor user in Thessaloniki and an outdoor user in Oulu, while, in the meantime, videos were shown to the MMSP participants. Participants' comments and interest were focused on the following:

1. Network synchronization issues
2. Necessary feedback for enhancing UX
3. Portability to different devices

In this sense, researchers and companies were informed regarding 3D –Live applications but, also, the 3D-Live consortium received feedback which addressed various aspects on this early draft. MMSP, in this way, acted for the 3D-Live developing team, as a first, informal co-creation activity and auto-evaluation in terms of user acceptance.

6.2. Wearable Technologies Show at IPSO

Wearable Technologies Show at IPSO, 18-20/3/2014
Scope and Objectives
The booth of the Wearable Technologies Group is one hotspot of the whole ISPO tradeshow. All major stakeholders of the fitness monitoring and tracking business are pathing by during the 4 days show. The booth was used for the distribution of leaflets and first information about the 3Dlive project. Sporting goods manufacturer, distributors and retailers are frequent visitors. Additional major sport teams or physicians e.g. of the ski or tennis teams are visiting the booth.
Programme
Daily match makings and interviews were organized at the booth. The ISPO is the world largest tradeshow for sporting goods and related services. A business to business event with many stakeholder from the complete sports eco-system. In total, more than 80.000 visitors and more than 2000 exhibitors attend. The show is divided into different segments. The location of the booth inside the skiing halls was perfect to promote the project.
3D LIVE Contribution (dissemination and impact)
Exploitation and Dissemination of the sporting goods market. Feedback from Exhibitors and Visitors. Direct conversation to fitness equipment manufacturer and sporting goods companies to explain the opportunities of a new mixed reality sports environment. Leaflets were distributed to the visitors of the Wearable Technologies booth at the ISPO.
Participation Objectives
Objective to participation to the event is describe how New Mixed Reality Technologies and Networks Support Real-Time Interactions.
Outcomes and Results
First interest in the sporting goods industry was realized. Especially the fitness equipment manufacturers are interested of the project. They are already working on first demos with the integration of google glass with their treadmills.

Report of Wearable Technologies Show at IPSO

Several leads were realized by visiting the show. The once with follow ups are listed below:

Technogym: World leading manufacturer of Fitness machines. At the ISPO, they introduced their first Google glass application working directly with one of their treadmills. Based on this development the Project management of Technogym was quite open to learn more about 3D LIVE. The realization with Glass was done in a simple way, by just showcasing the actual heart rat of the runner on the fitness equipment.

3D LIVE could bring advancement by connecting sensors to the runner and getting the real-time avatar in the Glass picture.

Fischer Ski: One of the leading ski manufacturers with an interest in new technologies. The interest was to learn more about the competitive element integrated in the 3D LIVE project.

Fischer is already partnering with game publishers for the so called "in game advertisement".

Kettler Sports: German leading manufacturer for home fitness equipment. Kettler already realized some competition application based on smartphone and working with treadmills.

The Kettler cycling competition is working in a quite similar way to the 3D LIVE project. Different stand-alone cyclists could compete against each other in an online platform. Even real cycling data (gps tracks) could be uploaded to race on the own old tracks together with friends. The only element missing was the real-time integration of a real cyclist on the street.

Runtastic: With more than 60 Mio. apps downloaded they are the third largest fitness app worldwide. Recently bought by Springer they have a strong capital stock with growth potential. Runtastic is looking for new applications in their app business and is also looking for new devices, which could be added to their growing product portfolio. 3D LIVE was of interest for them, though they and we are not quite sure how an implementation or connection between Runtastic and 3D LIVE could be realized.

6.3. FIA Athens 2014

11th Future Internet Assembly (FIA), 18-20/3/2014

Scope and Objectives

The FIA event is organized under the auspices of the Greek Presidency of the EU, co-organized and supported by the European Commission. It is a meeting point of projects investing in Future Internet and, thus, maintaining a high level of competitiveness of Europe in the market. Specifically,

- FIA is a meeting point of about 150 research projects (part of Challenge 1 of the ICT programme of FP7).
- FIA supports open interactions across multiple technical fields, encouraging the engagement of researchers working on Future Internet research (European or not) to the goals of the event.

Main focus of attention of the 11th FIA in Athens was **reshaping the Future Internet infrastructure for innovation.**

The aspects that were discussed and presented were related to:

- The new Internet technological landscape based on network/cloud integration through Software Defined Networking (SDN), Network Functions Virtualization (NFV), and innovative software and services that enable application innovation;
- The contribution of the EU National Research and Education Networks (NRENs) developments in the SDN/NFV domain;
- The role of SDN/NFV in i) building Internet applications of major impact (e.g., social networks, open data, big data analysis, etc.) with virtual services capabilities; ii) enabling the reduction in resources used (energy efficiency, reduction of raw-materials, etc....); iii) fostering the emergence of open platforms to create downstream markets for third party developers;
- The EU Public-Private-Partnerships (PPPs) and how they are positioned relative to these developments and relevant requirements towards demonstration and test-beds in Europe/globally.

Programme

FIA Athens took place from the 18th till the 20th of March, 2014, in Athens, Greece. It features a series of parallel events and sessions, such as project demonstrations, FIF, FI-PPP, project contests, working sessions, etc.

3DLive showcased its demo in the exhibition sessions, which was held during the whole period of the event.

3D LIVE Contribution (dissemination and impact)
3DLive participated in the FIA event by presenting a live demo of one of the three use-cases of the project. More in particular, in the FIA-2014 demo, visitors were able to see a virtual ski slope on a display, try a ski simulator and see their avatar being animated, by replicating their own movements, on the virtual scene. On top of that, they had the option to ski down the slope together with another remote user, who was also skiing on a ski simulator, from a distant location, though. They were able to share the ski experience through voice communication and watch live avatars on the slope, while their activity was evaluated, at the same time. The remote indoor skier was actually in the city of Thessaloniki, Greece, or Laval, France.
Participation Objectives
3D-Live participated through FIA exhibition of innovative ICT projects and technologies. The aim is to provide Future Internet stakeholders and other participants with up-to-date information and a hands-on experience on the latest Future Internet applications, systems and services, prototypes and innovative solutions. Moreover, the exhibition addressed key questions for delegates and it provided a networking environment. 3D-Live expected to play a key-role in this event, by promoting the innovative techniques developed within the project and relating technological challenges with user experience. FIA lays in the core of the technologies on which 3D-Live has been built and the three-day participation aims at increasing the osmosis between the project and possible stakeholders.
Outcomes and Results
3D-Live presenters expected to bring large visibility to the project, especially to researchers and end-users interested in the field of 3D tele-immersive environments, multimedia transmission-compression and human activity detection. Networking activities during the event are expected to highlight aspects of the project that can be further enhanced and/or promoted, while the potential of 3D-Live applications to penetrate the market will also be explored.

FIA Athens report

3D-LIVE participated in the FIA Athens 2014 event and presented a live demo of the ski use-case. Visitors were able to see the reconstructed ski slope of Schladming, get on a ski simulator (Wii board) and see their avatar being animated, by replicating their own movements. Further, a 3D-LIVE colleague was also skiing on a ski simulator, from a distant location though, either Thessaloniki (Greece) or Laval (France). Thus, FIA visitors who tried the demo were able to ski down the slope together with our colleague, and shared the ski experience through voice communication, watching their live avatars on the slope. A video-skype connection was also showing on the top of the screen, in order for the visitor to realize and see that there was indeed another remote user. That really helped the visitor to

feel the "liveness" of the demo.

Between the live demos (~one per hour) a video showing the experiments performed in LIVE-2 ski was presented to the visitors.

Overall, a lot of visitors stopped by the booth, watched the video and asked questions about our project, while some also tried the live demo and were quite enthusiastic about it. VIP tours took also place, guided from the FIA organisers, offering to the 3D-LIVE representatives' nice comments about the work being carried out in 3D-LIVE. The pictures below show the visit of the Director Mário Campolargo. The 3D-LIVE representatives further explained the vision of 3DLIVE, i.e. to include instead of avatar representations the actual 3D reconstruction of the indoor skiers in real-time to enhance the immersiveness of the system, and to carry out evaluation of the system by actual users in order to assess the quality of experience the 3DLIVE system offers to them. During the last day of the event the 3D-LIVE team was also capable to showcase the live demo that includes the 3D reconstruction of the indoor user in Thessaloniki.

Concluding, the 3D-LIVE representatives felt that large visibility was brought to the project, especially to researchers and stakeholders interested in the field of 3D tele-immersive environments and Future Internet applications.

Fig 1: Experiencing the live demo taking place

Fig 2: Director Mário Campolargo visiting 3D LIVE booth

6.4. IEEE ICASSP 2014

IEEE ICASSP 2014, Special Session SS7 Dynamic Geometry Compression **04 – 09 May 2014, Florence, Italy**
Scope and Objectives
With the advent of consumer grade depth cameras, there has been a surge of interest and availability of depth information. While in the past geometric information originated mostly from computer graphics, it is now more and more common to have geometry information originated from sensing the environment, e.g., from Kinect, stereo cameras, lidar, etc. While currently there is much work on compression of depth maps within the signal processing community, there could be significant advantages to compress the geometry directly. There has been some work in the computer graphics community targeted at mesh compression, but we believe that many of the techniques typically used in signal processing have the potential to greatly increase the compression efficiency. To encourage the research community to lend its expertise to this important problem, the Multimedia Technical Committee, with the support of the Signal Processing Society, chose one specific topic within this area (namely, compression of dynamic consistent meshes) and established a Dynamic Geometry Compression Competition, potentially the first in an annual series. This competition is loosely associated with the proposed special session, in the sense that it is within the scope of the special session, but the special session targets a more general problem, including direct compression of other types of dynamic geometry. We believe the special session was an important event to increase the attention of the SPS community to this new research area, which we believe will become fundamentally more important in the next several years. Together with the Competition, as well as another special session planned for ICIP, we believe this provided a foundation for significant further research in this topic, which we expect to flourish in the next several years.
Programme
Six-day event with novel work presentations and demos, in the area of Dynamic Mesh Compression. CERTH/ITI has submitted a paper in this special session and gave a short talk on the research field concerning the novel ideas presented in the respective paper.
3D LIVE Contribution (dissemination and impact)
CERTH/ITI, within the frames of 3D-Live, is conducting research on real time compression of Human Time Varying Meshes while exploiting activity-related characteristics. Reconstructed Human Models are compressed in real-time and transmitted over the network. The area of Time Varying Mesh Compression is new and little touched till now. The main difficulties to tackle are varying mesh geometry as well as varying connectivity across frames. Within this view, CERTH/ITI has developed a novel algorithm for Human Time Varying Mesh Compression that utilizes recent advances in motion capturing that provide human skeleton estimations in real-time.

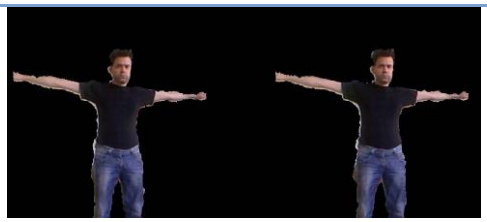


Fig 3: On the left: compressed frame. On the right: uncompressed frame.

In the presented work, entitled "On human time-varying mesh compression exploiting activity-related characteristics", we focus on exploiting activity-related characteristics, such as periodicity and other skeleton-based features to further enhance the efficiency of mesh compression.

Participation Objectives

CERTH/ITI expected that the work done in 3DLive was disseminated to a targeted audience and, at the same time, new methodologies and technologies were discussed and, probably, utilized for increasing 3D-Live performance.

Outcomes and Results

CERTH/ITI promoted and disseminated the project to researchers and end-users interested in the field of 3D tele-immersive environments, multimedia compression and human activity detection. With an abundance of cutting-edge technologies, CERTH/ITI (and, consequently, the 3D-Live consortium) expects to gain knowledge to invest in the project.

IEEE ICASSP 2014 Report

A lot of participants attended the Dynamic Geometry Compression Special Session of the conference, which was, to a large extent, dedicated to 3D mesh compression of motion captured data. The CERTH/ITI 20 minute presentation attracted the interest of people from Microsoft Research and various researchers and companies in the field.

ITI's presentation was very informative, packed with information that used up all the presentation time, leaving no further time for questions during the lecture. However, the interest of the attendees was expressed after the end of the session, in conversations taken privately especially with Ivan V. Bajic (Simon Fraser University, Canada) and Philip A. Chou (Microsoft Research, USA).

Overall, the presented work showed that ITI has developed experience and expertise in 3D Mesh Compression, gaining respect from other researchers. 3D Live was disseminated during the presentation which was built on 3DLive power point template, bearing the 3DLive and Fire logos.

6.5. Virtual Laval 2014

LAVAL VIRTUAL, Laval (FRANCE) – 9th to 13th April 2014
Video on Arts et Métiers ParisTech's booth
Participation to VRIC: Virtual Reality International Conference

Scope and Objectives

There are two objectives of participating to Laval Virtual 2014:

- To ensure the visibility of the 3D-LIVE project to the international Virtual Reality community, which is very involved in Laval Virtual.
- To promote the research work done in the context of the project.

Programme

The event:

- 9th to 11th: Professional days. International Exhibitors including hardware providers (Barco, AMD.), universities (KAIT, Arts et Métiers ParisTech…), VR applications/systems designers (CLARTE, Immersion…etc) and many others.
- 12th and 14th: Public days. Some professional booths are switched with more playful applications for a public audience.

Conferences:

From the 9th to 11th : VRIC (Virtual Reality International Conference). 5 symposiums dealing with Augmented Reality, Virtual Reality uses and Research issues. For more information about the full program visit: http://www.laval-virtual.org/en/scientific-conferences/vric-2014.html

Competitions:

ReVolution: ReVolution is an international competition which rewards the most innovating Virtual Reality projects. Selected by a jury of professionals and scientists, the best projects receive a booth in the Laval Virtual exhibition.These projects, ranging from the most playful to the most scientific, represent the early beginnings of future Virtual Reality technologies which could become a part of your future daily life.

Virtual Fantasy Demos: Students projects are selected to receive a booth at Laval Virtual, then a jury of specialists evaluate the most innovative project. The selected team receives an award.

Virtual Fantasy Limited Time: Students make teams (5 persons) to participate to a limited time competition : 30hours to build a VR application with the provided equipment.

3D LIVE Contribution (dissemination and impact)
During the five days, Arts et Métiers ParisTech held a booth showing their projects for companies or universities, and their master's degree for students. Taking into account the fact the experiments happen in the same period, planning a demo is out of question, but we do have some video materials that can be shown on the booth all the days. Members of the Arts et Métiers ParisTech team (Olivier Christmann or students) ensured the presentation of the project to a professional and a public audience. On the Friday 11th of April, a special session entitled "Augmented Experience within Real-Time Tele-Immersive Environments" takes place within the VRIC conferences. Benjamin Poussard presented the paper "*Investigating the Main Characteristics of 3D Real Time Tele-Immersive Environments through the Example of a Computer Augmented Golf Platform"* and Dimitrios Zarpalas, as the invited talk of the session, will present the work done by CERTH about 3D Full Human Reconstruction and its applications for Tele-Immersion. In conclusion 3D-LIVE was visible during the five days, (without any demonstration) and a special conference was dedicated to 3D-LIVE and the research it implies all the Friday morning.
Outcomes and Results
The project was not advanced enough to have a major impact on the Virtual Reality community. The companies and laboratories coming in Laval Virtual expect a high level experience and 3D-LIVE was not able yet to demonstrate it. But we had to try to reach a maximum of people interested by these technologies and keep them aware of the project. Laval Virtual 2015 could be a very adapted event to demonstrate the final prototypes of the 3D-LIVE platform. Sporting companies, VR companies, Gaming companies come to this event and all can be interested in the prototype we should demonstrate.

Virtual Laval 2014 Report

Some key figures of Laval Virtual 2013:

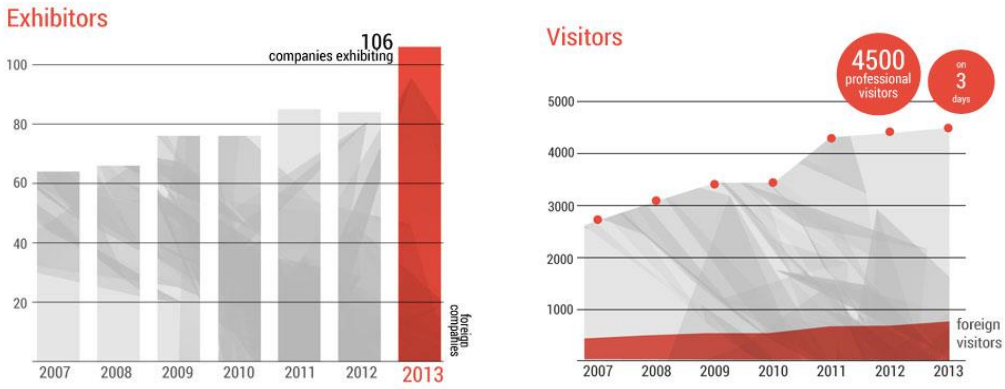


Fig 4: More than 4500 professional visitors on 3 days and 106 companies exhibiting

Fig 5: More than 275 participants at the conferences

Fig 6: More than 600 spectators at the Awards ceremony for the competitions

Our Dissemination:

The video on the Arts et Métiers ParisTech booth was quite visible but merged with other videos because of the booth's sharing constraints. Consequently the visibility and the impact of 3D-LIVE was not as important as expected.

Students got involved and presented during all the event the different activities of the laboratory in Laval, and so presented 3D-LIVE as well. 3D-LIVE members were not able to participate directly as LIVE 1 Golf experiments were taking place. We cannot assess the number of people reached about 3D-LIVE but the booth had some success thanks to the other prototypes exposed next to the 3D-LIVE presentation.

On the Friday 11th , the VRIC special session in which 3D-LIVE participated ("Augmented Experience within Real-Time Tele-Immersive Environments") gathered more than thirty people during the morning. They mainly came at the end of the session for the presentation of the full human reconstruction done by CERTH. Unfortunately it is a well-known issue with Laval Virtual: as there is an event (prizes + cocktail + party) on the Thursday evening, often the conferences of the Friday morning are empty.

6.6. Wearable Technologies Conference, San Francisco 7th/ 8th of July 2014

Wearable Technologies Conference, San Francisco 7th/8th of July 2014
Scope and Objectives
Already the participation at the Wearable Technologies Show at the Munich ISPO beginning of 2014 was for the project an important impact. The conference of the same scope which was held for the second time in the heart of the silicon valley in San Francisco. The conference was well attended by more than 400 professionals from all over the world. The wearable Technologies is an upcoming big trend and the project 3Dlive fits to this market trend. More than 30 million wearable devices were sold in 2013 and already in 2014 more than 50 million heart rate monitors, fitness trackers and smart watches will be sold. Semiconductor companies such as Intel, Qualcomm or ST are investing heavily to secure shares in the WT trend.
Programme
The Wearable Technologies Conference is the most important gathering of all players in the WT eco-system. More than 400 experts took part of this 2 day conference. http://www.wearable-technologies.com/events/wearable-technologies-conference-2014-usa Established and emerging companies, creative thinkers, artists, designers and media joined together to explore and invent the latest trends and developments. You could see product launches of the hottest new wearables, hear discussions about opportunities and challenges in this business, learn about the most innovative enabling technologies and meet influential new contacts. At the WT Innovation Show, attendees tested products and saw demos live at the venue.
3D LIVE Contribution (dissemination and impact)
Christian Stammel as the founder of this conference took the chance also to present the 3D LIVE project in a short introduction to the audience at his welcome keynote before he introduced the inventor of the google glass project Babak Parviz. The short introduction about 3Dlive fits very well in the later presentation of Babak from Google X. Suddenly he left 4 weeks after his speech the company google and till yet we were not able to get hold of a person with the same impact.
Participation Objectives
Talking to important players of the Wearable ecosystem. Introducing 3D LIVE to the audience and getting in contact with sensor and semiconductor companies to optimize the sensor development.
Outcomes and Results
The most interesting outcome was the interest of google, but there was no follow up

possible. Additional interest was generated by some of the chip manufacturer.

Report of Wearable Technologies Conference

The interest was created mainly by direct talks to the participants. The following once were the most interested companies with a clear follow up interest:

Intel: The world leading Chip Company is digging into the WT market with a tremendous power and speed. The interest of the company is mainly driven by their huge cloud business. All wearable's creating data and so they need processing power also in the cloud. As Intel is also looking into the next business for smartphones and the needs in smartphones, 3D LIVE is a perfect project to showcase the barriers of actual smartphones' processing and battery capacities. Therefore further talks to Intel make sense especially for using 3D LIVE as a perfect example of the calculating power of their newest smartphone or wearable chip sets.

STmicro: One of the leading MEMS companies. MEMS sensors are also used in SportsCurve's sensor devices for tracking the 3D LIVE athletes. Therefore STmicro has an interest to use the 3D LIVE project as a tradeshow example of their latest MEMS developments. Furthermore, such a tradeshow involvement, together with STmicro, could help the 3D LIVE project in additional promotion in the going to market approach.

Fig 7: Christian Stammel as the founder of this conference presenting the 3D LIVE project at WT conference

6.7. Mobile World Congress, Barcelona, February 2014

Mobile World Congress, Barcelona, February 2014
Scope and Objectives
The 3Dlive project could be a perfect showcase example of real-time data transmission for a mobile carrier. Such a carrier could use the project as an example to show its capabilities in real-time streaming and data transmission. Therefore the attendance as an visitor, to reach out for mobile carriers and their eco systems partners is crucial.
Programme
Mobile World Congress is the worldwide most important gathering of the global telco market. All important carriers, network providers and technology companies are taking part. The staff at the booths is high level and the chance to talk directly to the right person is very high at this high level conference.
3D LIVE Contribution (dissemination and impact)
The prices for booths are too high for a contribution. Therefore we attend just for getting in contact with the right people on carrier and operator level. Also some interest came via healthcare companies or organizations such as the continua health alliance. They have an interest in using such solution to bring behavior changes to their community.
Participation Objectives
Getting in contact with mobile providers and smartphone manufacturers. Learning how they are operating and which barriers the project has to overcome to become interesting for such partnerships.

Outcomes and Results

The interest in 3D LIVE was mainly driven by the topic mobile health. Getting healthier via 3D LIVE augmented or immersive training was a topic. At that time the first rumor about the potential deal of Facebook on Oculus Rift was discussed and that was a good entrance into many talks with different companies. The most interesting talks were listed below:

Ericsson: The leading network infrastructure company. The company is always looking for new advanced use-cases for cell networks. 3D LIVE could therefore be used as a nice high end example of what challenges will come up in future oriented applications for their customers – the leading network providers such as Telefonica or Deutsche Telekom

Vodafone: The contact was via the so called M2M unit of the Vodafone. M2M stands for Machine to Machine communication and could be used for the so called Internet of things applications. Vodafone has an interest in enlarging this business with data transfer as they are struggling with their RPU (Revenue per User) like every carrier.

3D LIVE is of interest regarding the streaming of huge datasets through their network.

Swisscom: A smaller but very innovative telecom company – one of the leading M2M players actually. They have the same interest as Vodafone has in the project. But as they are smaller, the chance for getting them on board is much bigger than with Vodafone.

6.8. SALENTO AVR 2014, 1st Int. Conf. on Augmented and Virtual Reality

SALENTO AVR 2014: 1st International Conference on Augmented and Virtual Reality

Scope and Objectives

The Salento AVR 2014 conference is described by the organisers as:

"The 1st International Conference on Augmented and Virtual Reality (SALENTO AVR 2014) took place in Lecce (Italy) on September 17-20, 2014 with the aim of bringing a community of researchers from academia and industry, computer scientists, engineers, physicians together in order to share points of views, knowledge, experiences and scientific and technical results, related to state-of-the-art solutions and technologies on virtual and augmented reality applications for medicine, cultural heritage, education, industrial sectors, as well as the demonstration of advanced products and technologies.

Presentations and discussions included topics from virtual environments and augmented reality to 3D user interfaces and the technology needed to enable these environments to a wide range of applications (medical, entertainment, military, design, manufacture, maintenance, arts and cultural heritage)."

Programme

Thursday 18th September, afternoon programme:

15,00 – 16,15 **Session 4 – Augmented & Mixed Reality**
Chair: Crzysztof Walczak – Poznan University, Poland

Michael Boniface, Simon Crowle, Benjamin Poussard, Stylianos Asteriadis	A design and evaluation framework for a tele-immersive mixed reality platform
Muhammad Asad, Greg Slabaugh	Hand Orientation Regression using Random Forest for Augment Reality
Paulo Roberto Jansen dos Reis, Daniel Lima Gomes Junior, Antônio Sérgio de Araújo, Geraldo Braz Junior, Aristófanes Correa Silva, Anselmo Cardoso de Paiva	Visualization of Power Systems Based on Panoramic Augmented Environments
Federico Manuri	A Workflow Analysis for Implementing AR-Based Maintenance Procedures

For a full conference programme, please visit: http://www.salentoavr.it/programme-2014/

3D LIVE Contribution (dissemination and impact)
The 3D-LIVE project was described as a well-fitting example of mixed reality research where we reported on: • The main features and use of the 3D-LIVE system • The design and experimental methodology used by 3D-LIVE • First set of experimental results for 3D-LIVE The paper presented at the conference: "A Design and Evaluation Framework for a Tele-Immersive Mixed Reality Platform" is to be published in the Springer Lecture Note series "Augmented and Virtual Reality. 1st Int. Conf. AVR 2014. Vol 8853" in early 2015.
Outcomes and Results
Conference members actively engaged in a short discussion after the presentation to consider the QoE feedback from our users and also performance related aspects of the 3D-LIVE system.

6.9. Afterwork FLUPA "UX et Réalité Virtuelle"

Afterwork FLUPA "UX et Réalité Virtuelle", Rennes, France
Scope and Objectives
The attendance of the 3DLive team at the Afterwork FLUPA "UX et Réalité Virtuelle" aims to present to an audience specialist of ergonomics and User Experience the application of the 3DLive UX methodology in a Virtual Reality distributed environment. Benjamin Poussard and Guillaume Loup presented the methodology and its outcomes in the 3D-LIVE context.
Programme
Date: 17 Sept 2014 **Venue: Campus Villejean de l'Université de Rennes 2** **17h30 – Welcome audience and demos** **17h45 – Intro Speech** *Virginie Dodeler – Responsable de l'antenne FLUPA à Rennes* **17h50 – Comment évaluer l'expérience subjective procurée par les dispositifs de Réalité Virtuelle ?** *Emilie Loup-Escande – Chercheur en ergonomie cognitive au CRPCC de Rennes* *Olivier Christmann – Maître de conférences aux Arts et Métiers ParisTech d'Angers* **18h30 – 3D-LIVE, une plateforme télé-immersive de Réalité Mixte et sports augmentés** *Benjamin Poussard – Ingénieur de Recherche aux Arts et Métiers ParisTech* *Guillaume Loup – Ingénieur de Recherche aux Arts et Métiers ParisTech*

19h10 – Projets RV et outils *Eric Jamet – Professeur de Psychologie Cognitive et Ergonomique, et Directeur du LOUSTIC* **19h30 – Buffet, Closure and demos**
3D LIVE Contribution (dissemination and impact)
The 3D-Live team presents its methodology to an audience concerned by the assessment of User Experience in Virtual Reality Environments. The impact in terms of dissemination is a reuse of some concepts of the methodology by French VR designers as well as getting some feedbacks by experts present in the audience, to compare methods, and identify good and bad aspects of each method.
Outcomes and Results
The presentation went very well and the audience was very interesting by the conceptual aspects of the methodology. ARTS got three new contacts in ergonomics and User Experience interested by the project and the methodology. A questionnaire of assessment of the presentations was provided to the audience. The 3DLive presentation received the best evaluation and positive comments.

Event report

32 people attended to the event, and were mainly belonging to the UX and ergonomics fields in informatics. We presented 40 slides including the presentation of the 3D-LIVE project, the scope and the context of application of the 3D-LIVE methodology. We then exposed our outcomes and limitations we faced during the project.

The program of the event was respected and lots of interesting questions were asked. We provided to the audience satisfactory answers. 17 people completed a satisfactory poll which is attached to this report. The most interesting contact seems to be an ergonomics designer working in Rennes but the discussions with the organizers could ease dissemination in future events.

Fig 8: Benjamin Poussard introducing the UX in 3D-Live

6.10. European Signal Processing Conference EUSIPCO 2014, 2nd of Sep

European Signal Processing Conference EUSIPCO 2014, 2nd of Sep, Lisbon, Portugal

3D-Live: A Multi-Modal Sensing Platform Allowing Tele-Immersive Augmented Sports Applications

Scope and Objectives

The EUSIPCO (European Signal Processing Conference) focuses on signal processing, algorithms and applications.

EUSIPCO 2014 featured a number of high quality special sessions addressing topics in emerging signal processing areas that complement the regular program. Special sessions were intermixed with regular sessions during the conference. Each special session was one hour and forty minutes long, typically consisting of 5 oral presentations. Special sessions were selected based on their quality and timeliness, their ability to introduce the area to the larger signal processing community and bring together key researchers in the area, as well as their role in establishing a larger research community on an emerging area. Special session proposals covering multi-disciplinary areas were particularly encouraged."

3D-LIVE aimed to participate into the special session entitled "**3D-Live: A Multi-Modal Sensing Platform Allowing Tele-Immersive Augmented Sports Applications"** organized by Noel O'Connor and Petros Daras.

Programme

Tuesday, 2nd of September at the EUSIPCO 2014 in Lisbon. Special Session:

TU-L10: Multi-Modal Sensing and Analysis of Human Motion for Sporting and Leisure Applications (Special Session)

Room: Room 1.15

Chair: Noel E O'Connor (Dublin City University, Ireland)

16:00 Interactive Games for Preservation and Promotion of Sporting Movements

Noel E O'Connor (Dublin City University, Ireland), Yvain Tisserand (MIRALab, University of Geneva, Switzerland), Argyris Chatzitofis (Centre for Research and Technology Hellas, Information Technologies Institute, Greece), Francois Destelle (Dublin City University, Ireland), Jon Goenetxea (Vicomtech-IK4, Spain), Luis Unzueta (Vicomtech-IK4, Spain), Dimitrios Zarpalas (Informatics and Telematics Institute, Greece), Petros Daras (Centre for Research and Technology Hellas, Greece), Mariate Linaza (Vicomtech-IK4, Spain), Kieran Moran (Dublin City University, Ireland) and Nadia Magnenat-Thalmann (Miralab, Switzerland)

16:20 3DLIVE: A Multi-Modal Sensing Platform Allowing Tele-Immersive Sports Applications

Benjamin Poussard (Arts et Métiers Paristech, France), Simon Richir (Arts et Métiers Paristech, LAMPA, France), Dimitrios Zarpalas (Informatics and Telematics Institute, Greece), Stylianos Asteriadis (Information Technologies Institute, Greece) and Petros Daras (Centre for Research and Technology Hellas, Greece)

16:40 Viewpoint-dependent 3D Human Body Posing for Sports Legacy Recovery From Images and Video

Luis Unzueta (Vicomtech-IK4, Spain), Jon Goenetxea (Vicomtech-IK4, Spain), Mikel Rodriguez (Vicomtech-IK4, Spain) and Mariate Linaza (Vicomtech-IK4, Spain)

17:00 Articulated Human Motion Tracking with Foreground Learning

Aichun Zhu (University of Technology of Troyes, France), Hichem Snoussi (University of Technology of Troyes, France) and Abel Cherouat (University of Technology of Troyes, France)

17:20 Low-cost Accurate Skeleton Tracking Based on Fusion of Kinect and Wearable Inertial Sensors

Francois Destelle (Dublin City University, Ireland), Argyris Chatzitofis (Centre for Research and Technology Hellas, Information Technologies Institute, Greece), Amin Ahmadi (Dublin City University & Insight Centre for Data Analytics, Ireland), Dimitrios Zarpalas (Informatics and Telematics Institute, Greece), Petros Daras (Centre for Research and Technology Hellas, Greece), Noel E O'Connor (Dublin City University, Ireland) and Kieran Moran (Dublin City University, Ireland)

3D LIVE Contribution (dissemination and impact)

The 3D-Live team presented its main concepts to an audience of researchers working on the analysis of Human Motion sensing for sporting applications. The goal of the session was to meet the scientific community working on similar topics and share our work, progress and ideas over the methodologies and technologies that could enhance the analysis of the sporting activity. More than just the tracking of the activity 3D-LIVE intended to present the overall frame of our platform in order to share with this community the opportunities of application of such solutions to track human activity.

Outcomes and Results

The different presentations lead by Noel O'Connor and the different talks were really meaningful for the 3D-LIVE consortium.

The 3D-LIVE presentation was less technical and detailed than the other presentations as it covered several parts of the platform. However it was really well received and the session gathered around 30 people. We started discussions with Francois Destelle from the Dublin City University about the use of inertial sensors on golf activity recognition, as they were concurrently working on that topic.

Event report

About 30 people attended to the event, coming from laboratories working on Signal processing for human activity tracking. We presented to them the paper entitled "3D-LIVE a multimodal platform allowing Tele-Immersive sports activities" in which we detailed the different sensing modalities allowing 3D-LIVE users to feel immersed regardless they are indoors or outdoors.

The different presentations reflected current research about the human activity tracking. Several technologies and methodologies were presented to track the activity of sportsmen in real time but also, to try retrieving the skeleton of sportsmen's activity based on a video input.

The common goal of those presentations was to try to understand the gestures of our today's champions of today's sports, but also past champions of more rare sports.

Collaboration started between ARTS and the Dublin City University about Golf Activity Recognition which is a common topic between the two entities.

Fig 9: Benjamin Poussard presenting the 3D-LIVE paper

6.11. ESoCE-Net Industrial Forum, 1st of Dec 2014, Roma

ESoCE-Net Industrial Forum, Rome, 1st December 2014

People driven social innovation for Sports/Wellbeing, Energy and cultural heritage

Scope and Objectives

The participation of the 3D LIVE team in the ESoCE-Net Industrial Forum 2014 aims to:

- Disseminate project's findings and results to an audience composed by Living Labs and members of FIRE Community, which are among the intended stakeholders of the 3D LIVE Project;
- Evaluate the applicability of the UX methodology developed within 3D LIVE in other contexts, namely Living Labs and other FIRE-related environment and establish contacts for potentialjoint exploitation;
- Evaluate the applicability of the 3D LIVE platformto the deployment of the People Olympics activities.

Programme

09:00 People Driven Social Innovation,

- People Olympics for Social Innovation, Roberto Santoro - ESoCE Net President

09:30 Smarter Cities and Communities addressing Wellbeing and Energy Societal Challenges

- People Olympics: wellbeing, health and economic benefits, Alain Belli - Physiology Lab Saint Etienne
- People Olympics: the Social dimension, Francesc Aragall – Design for ALL
- Energy Positive Neighbourhoods, The Odysseus Project - Michel Böhms – TNO
- Energy Management – Rome XI district Pilot Claudio Vecchi, Cristina Fantini – Roma Capitale
- New 3D Technologies enabling new form of socialization in sports, The 3D LIVE project – Marco Conte – Collaborative Engineering

11:00 Coffee Break

11:30 Experiencing People Olympics and its Technological infrastructure

Panel of Living Labbers, innovation designers and technology innovators

- People Olympics, Design Innovation and Beauty, Mikael Mangyoku - Cité du Design
- Taipei and People Olympics, Belinda Chen – Taipei LLAB

- Istanbul and People Olympics, ERSİN PAMUKSÜZER - BASAKŞEHİR LLAB
- Bilbao for People Olympics, Jokin Garatea– Sportis LLAB
- Belfast and People Olympics, Brendan Galbraith - University of Ulster

13:00 Lunch

14:30-16:00 User Engagement and Motivation for Collective Experience: People Olympics Healthy Index and 3D UX experience design, Roberto Santoro – ESoCE Net.

- Demonstration of 3D LIVE technologies for Running, Skiing and Golfing, Benjamin Poussard - ARTS and Esa Posio, CYBER
- Healthy Index, metrics for People Olympics, Roberto Santoro
- Assessing user experience in 3D-LIVE environments, Simon Crowle – IT Innovation and Marco Conte – Collaborative Engineering

Participants engage in a co-creation session for the evaluation of the applicability of the concepts introduced and on the added value in terms of exploitability of developed applications and social involvement at large. Key points are:

- Engaging and keeping involved for a long time a very large community.
- Assessing user experience
- Identifying Research Challenges and additional Opportunities, including pilots.

16:00-17:30 Design Innovation and the Emerging Cultural Heritage, Federico Mussano – ESoCE

Panel of Living Labbers, innovation designers and Cultural Heritage innovators

- Vision for Innovation in Cultural Heritage: the eCultValue project, Margaretha Mazura – European Multimedia Forum
- Hurdles for Innovating in the Cultural Heritage domain, Goranka Horjan – European Museum Forum
- Concept validation in Living Labs for adoption of new technological solutions in adaptive storytelling and augmented reality for Cultural Heritage:
  - Augmented Reality Experimentation at **Cité des Sciences et de l'Industrie** - Paris, Silvia de los Rios Perez – TAG CLOUD & Charles Tijus – IUL-LUTIN
  - Adaptive Storytelling Experimentation at **Stedelijk Museum** - Amsterdam, CHESS & Niels de Jong – ASC
  - Object Mediated Augmented Reality Experimentation at **National Museum of History** - Sofia, meSch & Stavri Nikolov – DSLL

17.30 ***Closure*** summarizing findings and discussing opportunities for launching joint initiatives.

3D LIVE Contribution (dissemination and impact)

The 3D LIVE project chaired one of the sessions of the event in order to provide its solution for engaging and keeping involved for a long time large communities of users for assessing user experience (how to use it to retrofit the design of platforms and/or innovative FI applications).

An overall presentation of the project outlook was given in the morning plenary session, while the afternoon session focused more on the UX methodology developed as well as the outcomes from the experimentation.

Outcomes and Results

The audience consisted of about 50 people, most of them involved in open innovation issues and related domain. A number of Living Labbers were attending, in view of analyzing the described methodology to be adapted to the needs of their specific constituencies and in the different business domains / contexts.

Benefits deriving from the adoption of the UX methodology were reported and discussed with the audience in a structured way, in order to obtain feedback on it and investigate on the potential applicability of the 3D LIVE methodology to different contexts.

In detail, building upon an overall presentation about 3D LIVE delivered in the morning session, the 3D LIVE workshop was structured as follows:

- A brief introduction, to explain the objectives and the way to proceed;
- Detailed presentation of 3D LIVE platform, through multimedia material from the experimentations;
- Presentation of new collective metrics to measure collective behaviour (from the People Olympics approach), suitable for motivating users to practice sports and therefore for achieving healthier life styles. The thread with 3D LIVE is that there could be commonalities in terms of users engagement, motivation and experience capturing.
- Report from the experimentation, with a special focus on the methodology adopted and feedback from the users.

During the final question time, the following topics were discussed:

- Effectiveness of 3D LIVE of Users' engagement:
- Added Value of 3D LIVE Users' engagement:
- Applicability in other FI and Living Labs contexts.

The audience was engaged in elaborating jointly the proposed tracks and some of them agreed to provide their feedback on the method. The audience appreciated the lively discussion, particularly the fact that 3D LIVE methodology provides a method to design and re-create a-priori the expected users experience on a concrete basis. The 3D LIVE UX approach is perceived as cost and time effective and was perceived as a good way to interest and engage users and to bring them in the loop, also with respect to other contexts.

6.12. The IEEE Visual Communications and Image Processing (IEEE VCIP) Conference, 7th of Dec 2014

IEEE VCIP 2014: Visual Communications and Image Processing. Valetta, Malta, 7-10 December, 2014
Scope and Objectives
The IEEE Visual Communications and Image Processing (IEEE VCIP) Conference, sponsored by the IEEE Circuits and Systems Society, IEEE Malta Section and by the University of Malta, was held in Valletta, the capital city of the Historical Malta, during 7-10 December 2014. Since 1986, VCIP has served as a premier forum in SPIE for the exchange of fundamental research results and technological advances in the field of visual communications and image processing. The 2014 edition was the fourth time that VCIP was held under the auspices of the IEEE. IEEE VCIP 2014 inherited the tradition of previous conferences in providing fertile ground for leading engineers and scientists from around the world to escalate collaboratively the research frontiers within these and related areas.
Programme
A four-day conference with oral and poster presentations of original works, in various fields, including among others advanced techniques for 3D processing and next generation (3D) Video Coding. CERTH/ITI presented two accepted papers, giving a 20+20 minute talk (or 20 minutes talk + poster presentation), on their work in 3D reconstruction and tele-immersion systems.
3D LIVE Contribution (dissemination and impact)
CERTH/ITI, within the frames of 3D-Live, is conducting research on i) real-time and robust 3D reconstruction of moving humans from multiple visual sensors and ii) fast 3D data compression and transmission, as well as on iii) how these components can be efficiently combined and integrated towards future tele-immersion systems. Outcomes of this research are summarized in two papers accepted to be presented in the VCIP2014 conference. More specifically, in the 1st paper, a fast and robust reconstruction method is proposed, which receives input from multiple consumer RGB-Depth cameras (kinects). A fast and efficient method to calibrate the sensors in initially described. More importantly, an efficient method to smoothly fuse the captured raw point sets is presented, followed by a volumetric method to produce watertight and manifold meshes (see Fig. 1). The proposed method can operate at high frame rates. The experimental results, with respect to reconstruction quality and rates, verify the effectiveness of the proposed methodology.

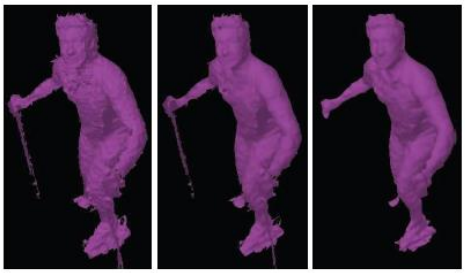


Fig 10: Skiing reconstruction results: Raw, smoothed/"stitched" and final reconstruction.

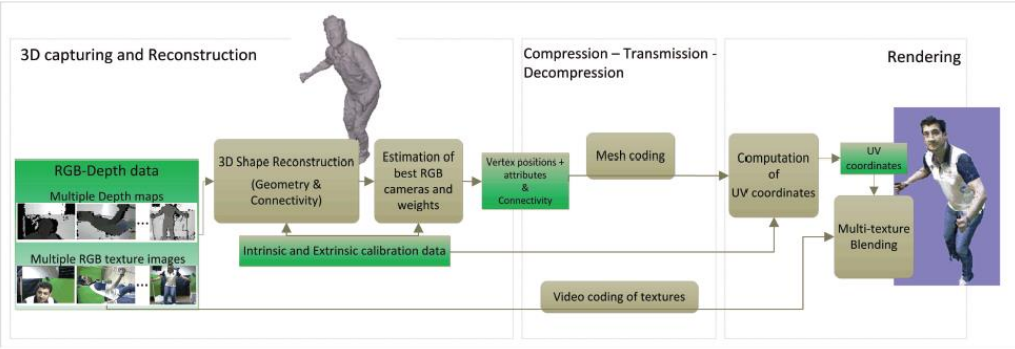


Fig 11: A studied tele-immersion chain from capturing to rendering.

The primary objective of the second paper is to present and analyze all key aspects related to next-generation tele-immersion applications, studying the end-to-end chain from 3D capturing of remote users to rendering (see Fig. 2). The key modules for 3D reconstruction of moving humans and their mesh compression are presented and discussed. The chain performance is in-detail evaluated in terms of frame-rates, delay, and visual quality.

Participation Objectives

VCIP conference is a meeting point for researchers and companies working in the field of computer vision, with an eye on latest advances in technologies and possible applications that can stem from them. CERTH/ITI expects that the work done in 3D-Live will be disseminated to a targeted audience and, at the same time, new methodologies and technologies will be discussed and, probably, utilized in the methodology proposed by 3D-Live. The topics covered in the conference are the following:

- Emerging Techniques for Next Generation Video/Image Coding
- Advanced Techniques for 3D Videos
- Visual Communications
- Systems and Techniques for Human Interaction
- Embedded Systems and Architecture Implementations

- Cloud Multimedia Systems, Applications and Services

Outcomes and Results

CERTH/ITI promoted and disseminated the project to researchers and end-users interested in the fields of 3D tele-immersion, real-time 3D reconstruction from multiple RGB-Depth sensors, multimedia (3D mesh and multi-view textures) compression. Networking during the event was active and project aspects and outcomes were promoted.

Event report

CERTH/ITI participated in the IEEE Visual Communications and Image Processing (IEEE VCIP) Conference, held in Malta during 7-10 December 2014. More specifically, CERTH/ITI presented two accepted papers, giving a 20 minute talk and a poster presentation, respectively.

The first paper, summarizing the 3DLive research in fast and robust reconstruction method from multiple consumer RGB-Depth cameras, was presented in the 2nd day of the conference (Multiview and FreeView oral session), in the Auditorium of the conference venue, which was almost full (more than 50 attendees). During the presentation, various short videos that demonstrate the application of 3D reconstruction in the 3DLive tele-immersion applications, were shown and received a good feedback from the audience after presentation. More importantly, the specific paper was selected as one of the conference's best papers of the whole conference (more than 140 papers accepted), as it received excellent comments in the review process by 4 reviewers (double-blind review).

The second paper, presenting a complete study on tele-immersion systems, from capturing to rendering, was presented as a poster in the 3rd day of the conference (Poster Session at Auditorium Foyer). It received the attention of a lot of people, while some of them admitted that paper's outcomes constitute a good reference point for people working in the field. During the poster presentation, several constructive ideas on i) architectures for distant multi-view and free-point, ii) mesh compression and others were discussed with experts in the field.

6.13. Wearable Technologies Conference, Feb 2015

Wearable Technologies Conference 2015
Munich, Germany. February 2-3rd, 2015
Participation: On stage presentation

Scope and Objectives

The world's most profound event for wearables gathers all important players of the wearable tech ecosystem at the 14th Wearable Technologies Conference in Munich on February 2 and 3. The objectives of this dissemination are to:

- Present the 3D-LIVE project and its components to a relevant audience
- Share, demo and discuss the end result of the project as a promotion measurement as well as important lead creation of partners and customers

Programme

The 14th Wearable Technologies Conference is held on February 2-3rd in Munich in relation to the global sport tradeshow ISPO. The event includes two full days of seminars focusing on the latest in the field of wearable tech. Detailed agenda: https://www.wearable-technologies.com/events/14th-wearable-technologies-conference-2015-i-europe/

For 3D LIVE there is stand reserved for both days. There's also reservation for the speaker slot for second day (Feb 3rd) on the "The Latest in Enabling Tech" presentation.

LIVE 3 Skiing experience demonstration was situated in the demo stand. There were predefined timeslots when live demo are executed on the stand, this is mandatory to ensure working demo. Between these timeslots there were demo videos running, which presented Skiing experience for the viewers.

3D LIVE Contribution (dissemination and impact)

This is a highly relevant event for 3D LIVE to present the results to a dedicated audience as a means of promotion of the project as well as basis for further discussions with potential future business partners.

Outcomes and Results

Attendance to conference was success in many different aspects. LIVE 3 Skiing experience titled to "World's 1st tele-immersive ski competition", was successfully held during the event and all demonstrations worked flawlessly every time. All 4 races of the competition were streamed to the internet as well. 3D LIVE project acquired a lot attention during conference with global publicity; proof of this is dozens of network articles.

3D LIVE project content was explained in detail to the interested conference visitors and to other potential co-operation companies which were at conference as exhibitors.

During the second day of the conference 3D LIVE project was presented also in the conference stage.

Event report

3D LIVE project had own stand at the conference and participated to both conference days. 4 project related banners were created with one flyer. New video clip about demonstration of Ski experience was also in use at conference, the video was played in loop in the monitor between live demonstrations.

Demonstration and presentation of the 3D LIVE platform was done by using LIVE 3 Skiing experience. Experience at the conference was titled to *"World's 1st tele-immersive ski competition"* and it was advertised before conference. Competition divided to 4 separate races where 3 participants were racing. Race setup was; 1 competitor skiing at Schladming ski resort slope, 2 competitors racing virtually in the same slope; 1 physically at WT conference stand and 1 at Thessaloniki CAVE environment. Views of the all racers were gathered to one single monitor, which was located at the WT conference and enabled visitors to follow race on real time. Competition was successfully held and it received wide global interest; 52 Online articles published by end of February (Appendix 11). 327 persons were following races real time via provided live stream. By looking 3D LIVE web site traffic logs conference affected positively to interest of the project, web page hit record was achieved on the February 2015.

Fig 12: Pictures from the World's 1st Tele-immersive Ski competition

Fig 13: Michael Boniface presenting 3D live at WT Conference stage

On the second conference day 3D LIVE project was presented in the conference stage by Michael Boniface. Tele-immersive ski competition award ceremony was part of presentation and it utilized 3D LIVE platform, which in that way nicely demonstrated again working platform prototype.

During conference platform was introduced in details to multiple different companies and some leads was acquired which could utilize 3D LIVE platform with their own product. In example Heddoko's smart compression garment could be used for person movement tracking and realistic avatar movement in the virtual world. Multiple different companies also were demonstrating their smartwatches with capability to track movement and heart rate, e.g. Polar. Data from this kind of devices could be transferred to the 3D LIVE platform for further application development.

6.14. Laval Virtual 2015, 8th-12th of April, 2015

Laval Virtual 2015, from the 8th to the 12th of April, 2015 **Presentation of 3D-LIVE on the Arts et Métiers ParisTech booth**
Scope and Objectives
Laval Virtual is the 1st event in Europe regarding Virtual Reality, Augmented Reality technologies. It is the place to be in order to demonstrate innovative technologies or experiences in various fields of application, to meet worldwide researchers and customers. Many French and abroad companies interested in this kind of technologies, or just wondering why it could benefit their activities come to this event. The 3D-LIVE project is finished but the 3D-LIVE story is not. Due to the recent success at the end of the project, we decided to compete in the Laval Virtual Awards. We won an award in the category "Sports". We will then be rewarded on stage on the 9th of April. Concurrently the 3D-LIVE core technologies will be presented on the Arts et Métiers ParisTech booth the full week: 3 days for the pros, 2 days for a public audience. During the VRIC sessions, B. Poussard will introduce the sessions entitled "Designing Augmented Experiences & Natural User Collaboration (NUC)" and will take the 3D-LIVE design approach as an example for designing augmented experiences. Objectives: • 3D-LIVE will receive an award at the LV awards ceremony • 3D-LIVE will be part of the introduction of a VRIC session • B. Poussard will be referring person in a sports workshop sessions with researchers and potential customers.

Programme

Date: 8-12 April 2015

Venue: Salle polyvalente, Laval, France

8th of April : Opening. 3D-LIVE booth presentation

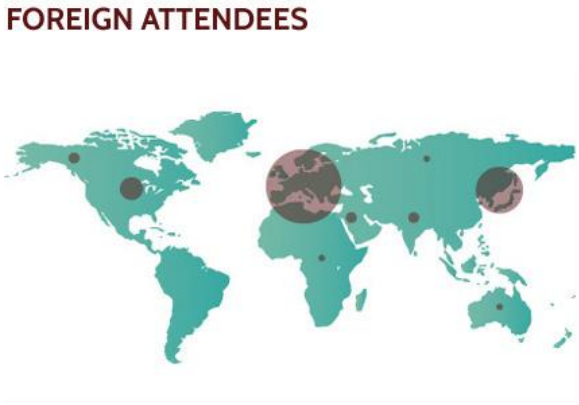
9th of April – 11h : Awards ceremony. 3D-LIVE receives the award in the "Sports" category

10th of April – 9h B. Poussard opening the VRIC session. 10h: B. Poussard referring person in the Workshop "sports"

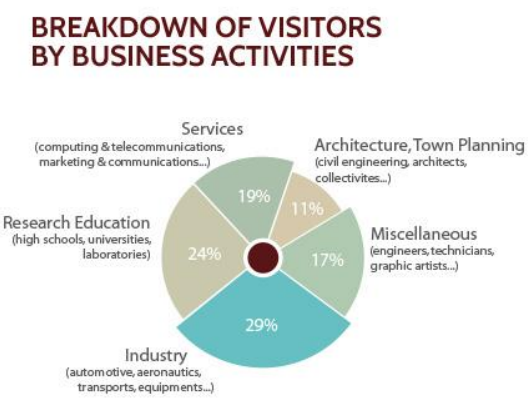
3D LIVE Contribution (dissemination and impact)

The Laval Virtual Event is a key event where 3D-LIVE needs to demonstrate his knowledge. The impact will be huge as you can see on the key figures below, summary of the LV2014 results:

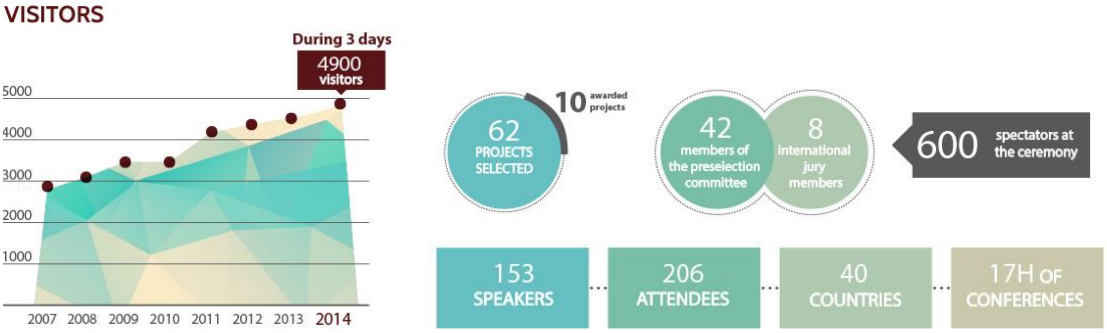
Exhibitors and attendees of Laval Virtual 2014:



Visitors of Laval Virtual 2014, classified by trades and business activities:



Number of visitors, VRIC and Awards key numbers:



Dissemination Impact of the event:

Outcomes and Results

Event report

Event report will be added after event.

7. 3D LIVE Dissemination Material and tools

Dissemination in the context of 3D LIVE was designed as a forerunner activity to Marketing, regarded as a two-way dynamic and interactive process, which was continuous and progressive.

Dissemination was performed at both the consortium level and at partners' level and was performed through the following activities:

- Production of papers, relevant to the project outcomes;
- Production of dissemination material;
- Development and management of the 3D LIVE website;
- Development and management of the 3D LIVE community on LinkedIn
- Development and management of the 3D LIVE community on YouTube
- Participating to various conferences to demonstrate and present 3D Live platform

7.1. Production of papers, relevant to the project outcomes

Publications and papers were submitted in conferences and journals, relevant to both the IoT research domain as well as the Open Innovation (Living Labs) domain. Particular attention was given to conferences and events on Future Internet and policy making. The papers were clearly linked to the project development, and their issue was monitored utilising the 3D LIVE papers Master Schedule.

The process used to derive the "3D LIVE papers Master Schedule" was based on the following logical steps:

- Proposals for paper issue from the interested 3D LIVE partners
- Discussion of the tentative schedule obtained by integrating the individual proposals. In particular, the scientific dissemination of all the intended results were checked and mapped against the intended schedule
- Consolidation of the "3D LIVE papers Master Schedule"
- Monitoring of the execution

Following table (Table 7.1) contains information of the Papers published during last half of the 3D LIVE project. Information about the paper contents and subject as well as the event / conference / journal in which paper was presented is provided, as an indication of the potential impact of the scientific dissemination.

When possible, papers (or at least their abstract, in case of on-going copyright agreements with publishers) were made available by the 3D LIVE Consortium through the project website.

#	Author(s) and Organisation	Title of paper Topic of presentation	Journal, Conference etc. Event	Planned Date	Status	Number of Attendees
1	A. Doumanoglou, D. Alexiadis, D. Zarpalas, P. Daras CERTH/ITI	Towards Real-Time and Efficient Compression of Human Time-Varying-Meshes	IEEE Transactions on Circuits and Systems for Video Technology	April, 2014	Published	-
2	P. Daras, D. Zarpalas, S. Asteriadis, E. Posio, J. Vatjus-Anttila	Sharing the jogging experience between remote runners	The 15th IEEE International Workshop on Multimedia Signal Processing, (MMSP)	October 2, 2013	Presented	20-30
3	Benjamin Poussard Olivier Christmann; Simon Richir,	Investigating the Main Characteristics of 3D Real Time Tele-Immersive Environments through the Example of a Computer Augmented Golf Platform	Laval Virtual, VRIC 2014	Apr 2014	Presented and published	35
4	A. Doumanoglou, D. Alexiadis, S. Asteriadis, D. Zarpalas, P. Daras	On human time-varying mesh compression exploiting activity-related characteristics	IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP), FLORENCE, ITALY	May 4-9, 2014	Presented and published	40-50
5	3D LIVE project consortium	Joint Paper, "3D LIVE = A multi-modal sensing platform allowing Tele-Immersive Sports Applications"	European Signal Processing Conference (EUSIPCO 2014)	22nd of Sep 2014	Approved	-
6	Simon Crowle, Michael Boniface, Benjamin Poussard, Stylianos Asteriadis	"A design and evaluation framework for a tele-immersive mixed reality platform	SALENTO AVR 2014	17th of Sep 2014	Approved	30
7	D. Alexiadis, A. Doumanoglou, D. Zarpalas, P. Daras	A case study for tele-immersion communication applications: from 3D capturing to rendering	IEEE International Conference on Visual Communications and Image Processing, VCIP, Valletta, Malta	2014, Dec 7-10	Presented and published	50
8	D. Alexiadis, D. Zarpalas, P. Daras	Fast and smooth 3D reconstruction using multiple RGB-Depth sensors	IEEE International Conference on Visual Communications and Image Processing, VCIP, Valletta, Malta	2014, Dec 7-10	Presented and published	50

Table 7.1 Papers published during 2nd half of project

7.2. Production of dissemination material

During the project 3D LIVE consortium produced following types of dissemination materials:

- Project brochures
- One pagers, banners and posters
- Multiple 3D LIVE project specific newsletters
- Project related videos

The 3D LIVE project has produced a project brochures to introduce the project and inform about project targets and/or use cases to a target audience. Brochures are distributed by website (as a printable PDF), distributed personally or placed in brochure racks on the exhibitions and seminars. Dissemination materials are attached to Annex-chapter.

One pagers and posters were produced original for the public events to be used on the exhibition stands. Same material was also re-used in some publications. Posters and banners were co-created in collaboration with 3D LIVE consortium members; input was gathered from each consortium members and graphical illustration of the visual material was fine-tuned during consortiums internal review process.

Additionally for spreading information about the project using the website and project brochures, 3D LIVE project issues multiple newsletters. The 3rd newsletter was published early June 2013 and the 4th newsletter was published on December 2014. All project documentation and the dissemination material produced (leaflets, flyers, newsletters, standard presentations etc.) are based on 3D LIVE project document templates. Official 3D LIVE logo and FIRE logo together with the EU emblem and the mention of the programme name is incorporated into all material.

3D LIVE produced also videos about the project. Videos contained showcases of the project's sport experiences

7.3. 3D LIVE project in news

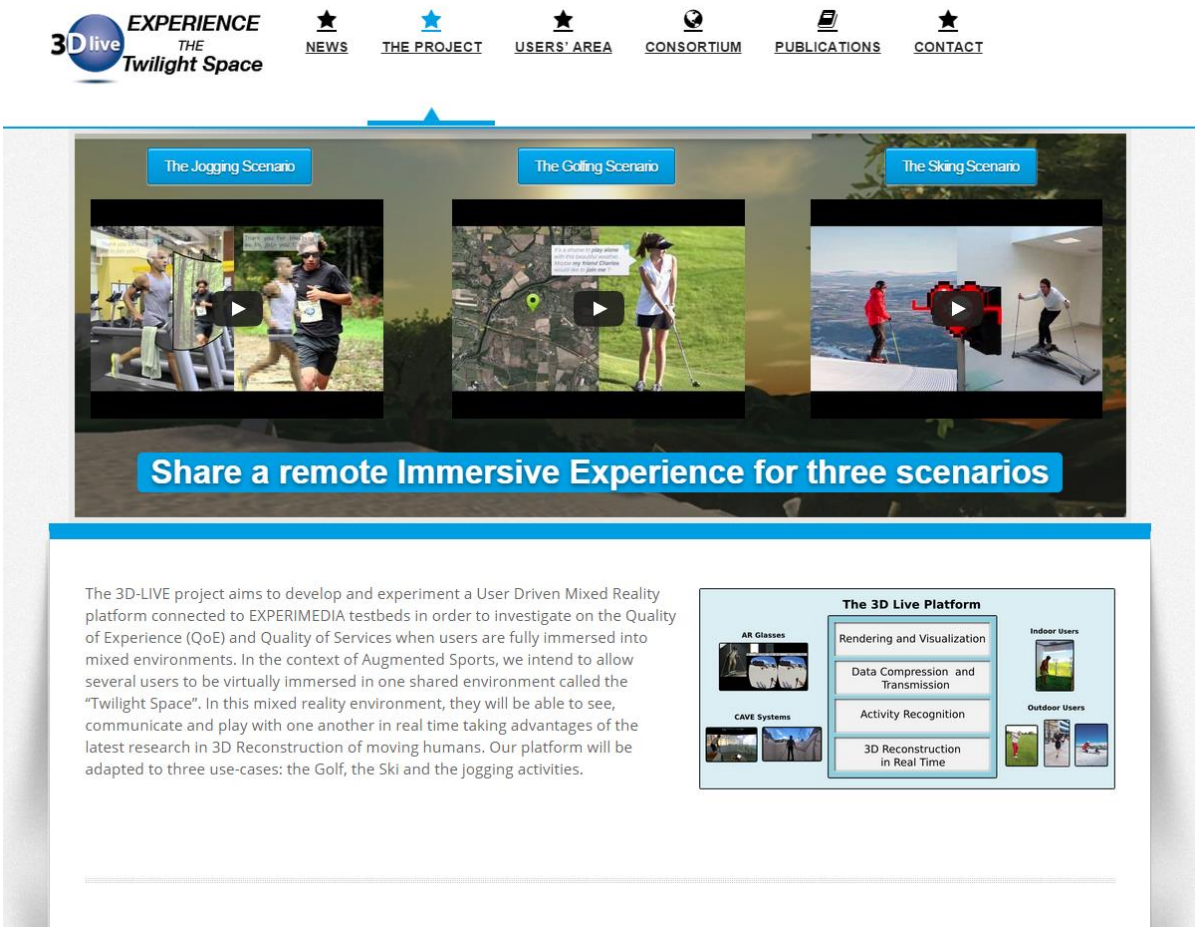
3D LIVE project has gained remarkable publicity during project lifetime, dissemination activities have been beneficial and project publicity has increased towards end of the project. There are paper articles publish about 3D LIVE project, these are in the Annex-section.

3D LIVE project has also gained wide global publicity, in the Annex 11 there is list of 52 web news articles about 3D LIVE, project content and TIE demonstration.

7.4. Development and management of the 3D LIVE website

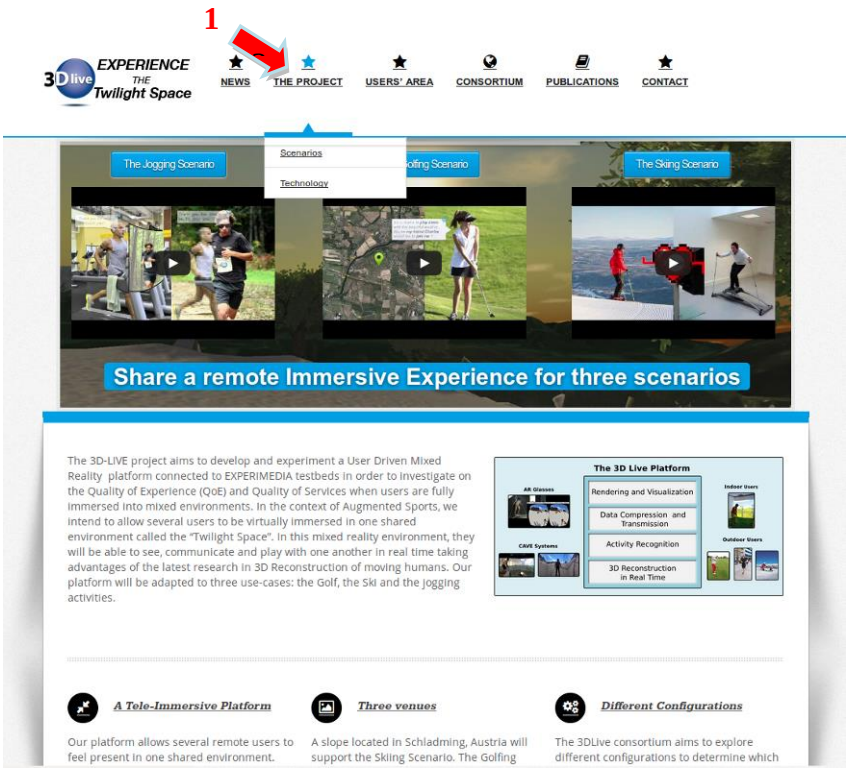
3D LIVE project has established a website supported by the project partners, to provide a unified view of the 3D LIVE project. www.3dliveproject.eu

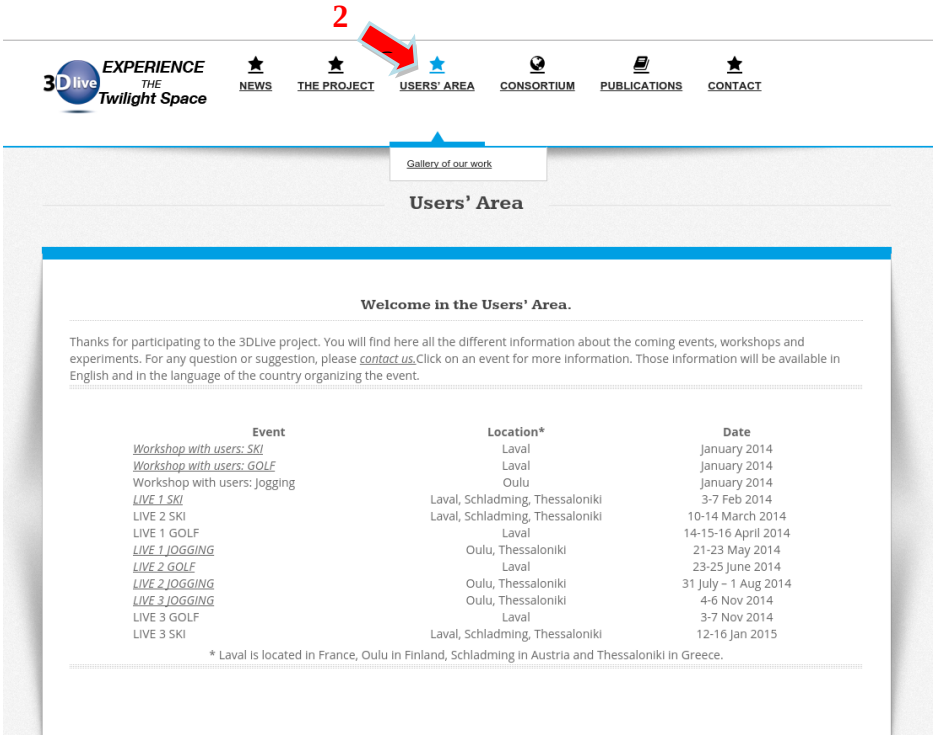
The whole website has recreated based on reviewers comments from 1st Project Review. The website look and feel is now similar to the one of the other FIRE projects.

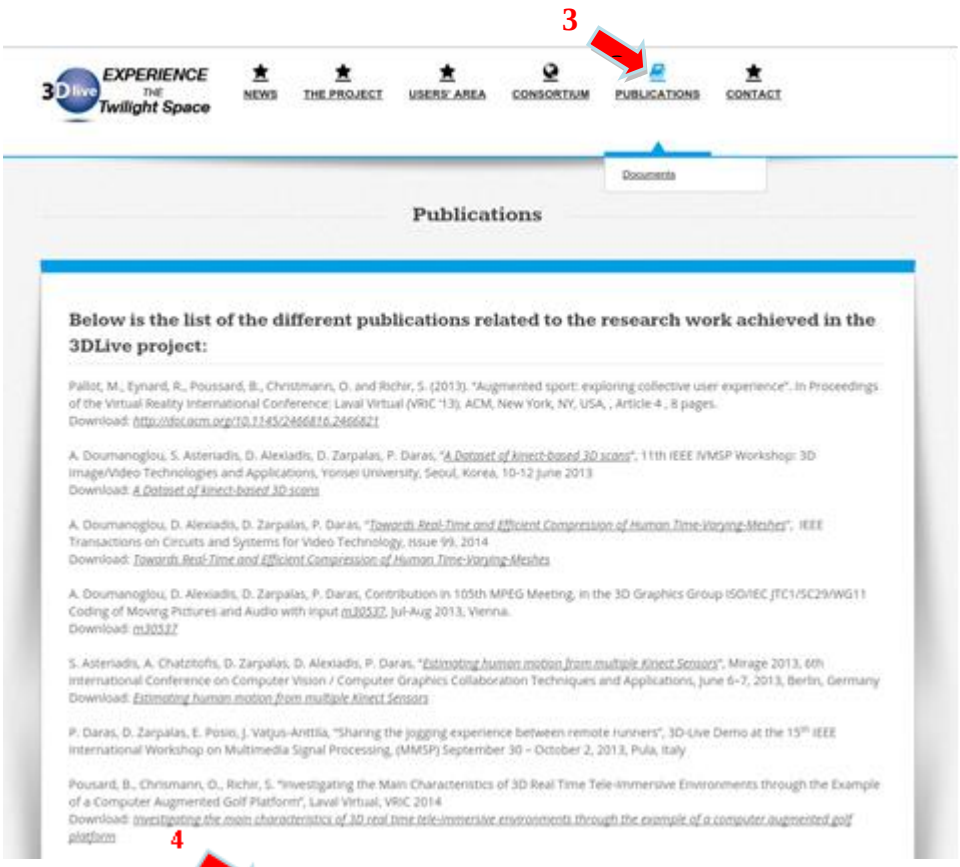


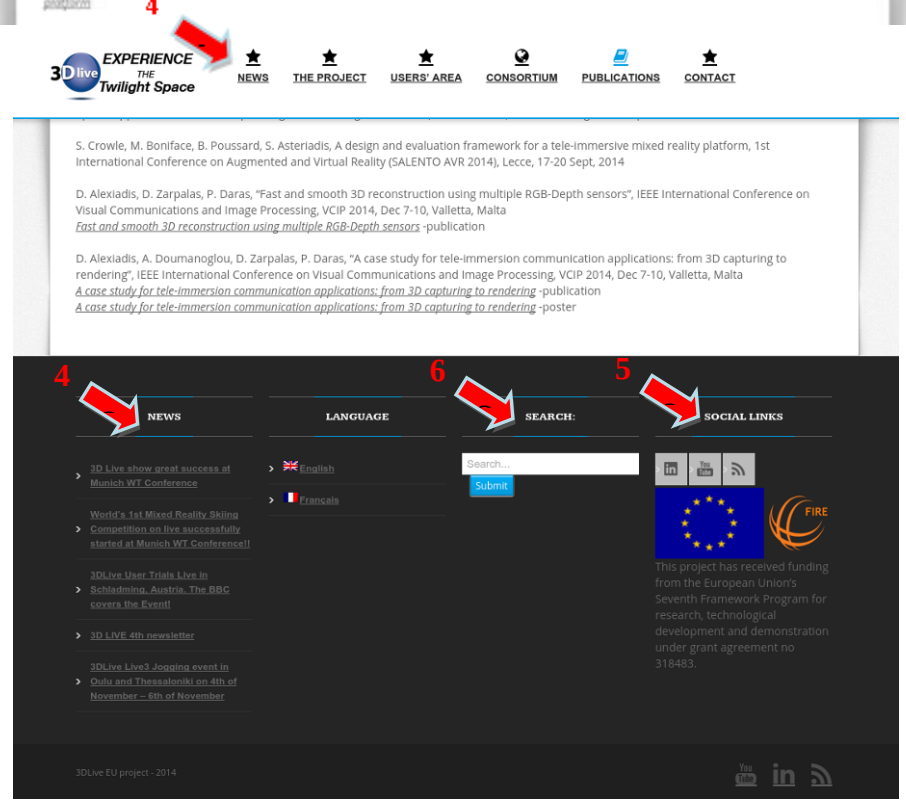
www.3dliveproject.eu

The website includes a general presentation of the project objectives and consortium as well as all information related to the project activities. Main dissemination materials and other project information can be found from the sub-pages on the header (#1, See picture below), experimentation results (2) and published papers (3). News link (4) is both in the top header and footer area, footer area shows titles of the latest news. Footer area contains also social media links (5) and web page search functionality (6).


1
EXPERIENCE THE Twilight Space
NEWS
THE PROJECT
USERS' AREA
CONSORTIUM
PUBLICATIONS
CONTACT
Scenarios
Technology
The Jogging Scenario
The Skiing Scenario
Share a remote Immersive Experience for three scenarios
The 3D-LIVE project aims to develop and experiment a User Driven Mixed Reality platform connected to EXPERIMEDIA testbeds in order to investigate on the Quality of Experience (QoE) and Quality of Services when users are fully immersed into mixed environments. In the context of Augmented Sports, we intend to allow several users to be virtually immersed in one shared environment called the "Twilight Space". In this mixed reality environment, they will be able to see, communicate and play with one another in real time taking advantages of the latest research in 3D Reconstruction of moving humans. Our platform will be adapted to three use-cases: the Golf, the Ski and the Jogging activities.
The 3D Live Platform
Rendering and Visualization
Data Compression and Transmission
Activity Recognition
3D Reconstruction in Real Time
A Tele-Immersive Platform
Our platform allows several remote users to feel present in one shared environment.
Three venues
A slope located in Schladming, Austria will support the Skiing Scenario. The Golfing
Different Configurations
The 3DLive consortium aims to explore different configurations to determine which


2
EXPERIENCE THE Twilight Space
NEWS
THE PROJECT
USERS' AREA
CONSORTIUM
PUBLICATIONS
CONTACT
Gallery of our work
Users' Area
Welcome in the Users' Area.
Thanks for participating to the 3DLive project. You will find here all the different information about the coming events, workshops and experiments. For any question or suggestion, please contact us.Click on an event for more information. Those information will be available in English and in the language of the country organizing the event.
Event
Location*
Date
Workshop with users: SKI
Laval
January 2014
Workshop with users: GOLF
Laval
January 2014
Workshop with users: Jogging
Oulu
January 2014
LIVE 1 SKI
Laval, Schladming, Thessaloniki
3-7 Feb 2014
LIVE 2 SKI
Laval, Schladming, Thessaloniki
10-14 March 2014
LIVE 1 GOLF
Laval
14-15-16 April 2014
LIVE 1 JOGGING
Oulu, Thessaloniki
21-23 May 2014
LIVE 2 GOLF
Laval
23-25 June 2014
LIVE 2 JOGGING
Oulu, Thessaloniki
31 July – 1 Aug 2014
LIVE 3 JOGGING
Oulu, Thessaloniki
4-6 Nov 2014
LIVE 3 GOLF
Laval
3-7 Nov 2014
LIVE 3 SKI
Laval, Schladming, Thessaloniki
12-16 Jan 2015
* Laval is located in France, Oulu in Finland, Schladming in Austria and Thessaloniki in Greece.


3
EXPERIENCE THE Twilight Space
NEWS
THE PROJECT
USERS' AREA
CONSORTIUM
PUBLICATIONS
CONTACT
Documents
Publications
Below is the list of the different publications related to the research work achieved in the 3DLive project:
Pallot, M., Eynard, R., Poussard, B., Christmann, O. and Richir, S. (2013). "Augmented sport: exploring collective user experience". In Proceedings of the Virtual Reality International Conference: Laval Virtual (VRIC '13). ACM, New York, NY, USA, , Article 4 , 8 pages.
Download: http://doi.acm.org/10.1145/2466816.2466821
A. Doumanoglou, S. Asteriadis, D. Alexiadis, D. Zarpalas, P. Daras, "A Dataset of kinect-based 3D scans", 11th IEEE IVMSP Workshop: 3D Image/Video Technologies and Applications, Yonsei University, Seoul, Korea, 10-12 June 2013
Download: A Dataset of kinect-based 3D scans
A. Doumanoglou, D. Alexiadis, D. Zarpalas, P. Daras, "Towards Real-Time and Efficient Compression of Human Time-Varying Meshes", IEEE Transactions on Circuits and Systems for Video Technology, Issue 99, 2014
Download: Towards Real-Time and Efficient Compression of Human Time-Varying Meshes
A. Doumanoglou, D. Alexiadis, D. Zarpalas, P. Daras, Contribution in 105th MPEG Meeting, in the 3D Graphics Group ISO/IEC JTC1/SC29/WG11 Coding of Moving Pictures and Audio with input m30537, Jul-Aug 2013, Vienna.
Download: m30537
S. Asteriadis, A. Chatzitofis, D. Zarpalas, D. Alexiadis, P. Daras, "Estimating human motion from multiple Kinect Sensors", Mirage 2013, 6th International Conference on Computer Vision / Computer Graphics Collaboration Techniques and Applications, June 6-7, 2013, Berlin, Germany
Download: Estimating human motion from multiple Kinect Sensors
P. Daras, D. Zarpalas, E. Posio, J. Vatjus-Anttila, "Sharing the jogging experience between remote runners", 3D-Live Demo at the 15th IEEE International Workshop on Multimedia Signal Processing, (MMSP) September 30 – October 2, 2013, Pula, Italy
Pousard, B., Chrismann, O., Richir, S. "Investigating the Main Characteristics of 3D Real Time Tele-immersive Environments through the Example of a Computer Augmented Golf Platform", Laval Virtual, VRIC 2014
Download: Investigating the main characteristics of 3D real time tele-immersive environments through the example of a computer augmented golf platform


4
EXPERIENCE THE Twilight Space
NEWS
THE PROJECT
USERS' AREA
CONSORTIUM
PUBLICATIONS
CONTACT
S. Crowle, M. Boniface, B. Poussard, S. Asteriadis, A design and evaluation framework for a tele-immersive mixed reality platform, 1st International Conference on Augmented and Virtual Reality (SALENTO AVR 2014), Lecce, 17-20 Sept, 2014
D. Alexiadis, D. Zarpalas, P. Daras, "Fast and smooth 3D reconstruction using multiple RGB-Depth sensors", IEEE International Conference on Visual Communications and Image Processing, VCIP 2014, Dec 7-10, Valletta, Malta
Fast and smooth 3D reconstruction using multiple RGB-Depth sensors -publication
D. Alexiadis, A. Doumanoglou, D. Zarpalas, P. Daras, "A case study for tele-immersion communication applications: from 3D capturing to rendering", IEEE International Conference on Visual Communications and Image Processing, VCIP 2014, Dec 7-10, Valletta, Malta
A case study for tele-immersion communication applications: from 3D capturing to rendering -publication
A case study for tele-immersion communication applications: from 3D capturing to rendering -poster
4
NEWS
6
LANGUAGE
5
SEARCH:
SOCIAL LINKS
3D Live show great success at Munich WT Conference
World's 1st Mixed Reality Skiing Competition on live successfully started at Munich WT Conference!!
3DLive User Trials Live in Schladming, Austria. The BBC covers the Event!
3D LIVE 4th newsletter
3DLive Live3 Jogging event in Oulu and Thessaloniki on 4th of November – 6th of November
English
Francais
Search...
Submit
FIRE
This project has received funding from the European Union's Seventh Framework Program for research, technological development and demonstration under grant agreement no 318483.
3DLive EU project - 2014

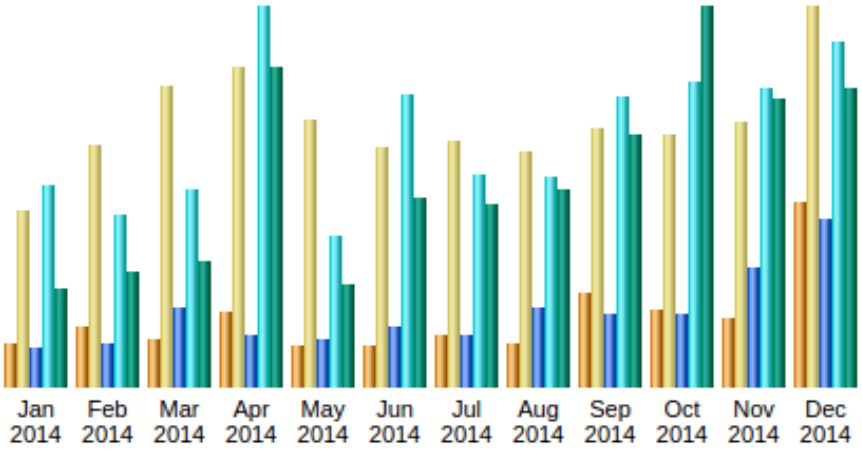
The 3D LIVE website is complemented by a social media communication that ensured a broad diffusion of the project results and represent and integrate the project with online discussion communities.

Additionally, a presence with relevant social networks on the web has been established. YouTube and LinkedIn has been utilized.

Visits to the 3D LIVE Web Site

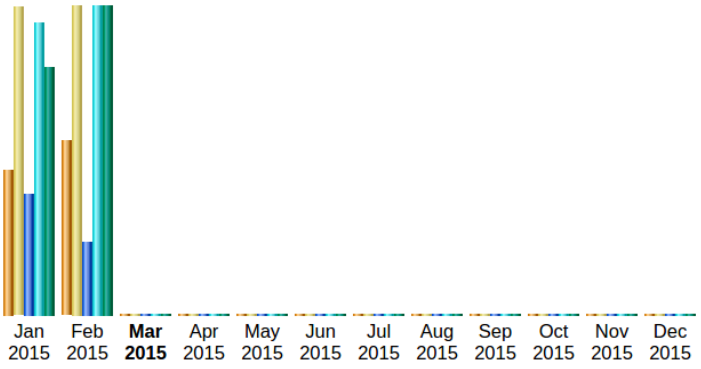
From the launch of the project, since September 2012, we have been collecting statistics on the hits to the 3D LIVE web site. The graph and table below shows the visits to the 3D LIVE web site, from the beginning of year 2014.

Monthly history



Month	Unique visitors	Number of visits	Pages	Hits	Bandwidth
Jan 2014	315	1,315	3,565	18,845	289.70 MB
Feb 2014	451	1,795	4,108	16,107	338.07 MB
Mar 2014	354	2,232	7,433	18,441	374.33 MB
Apr 2014	561	2,367	4,816	35,615	947.98 MB
May 2014	299	1,978	4,442	14,136	303.63 MB
Jun 2014	302	1,774	5,617	27,426	559.29 MB
Jul 2014	376	1,825	4,779	19,844	539.38 MB
Aug 2014	328	1,747	7,332	19,693	582.52 MB
Sep 2014	698	1,913	6,887	27,174	748.19 MB
Oct 2014	578	1,869	6,777	28,626	1.10 GB
Nov 2014	504	1,963	11,119	27,942	856.78 MB
Dec 2014	1,366	2,820	15,760	32,281	885.03 MB
Total	6,132	23,598	82,635	286,130	7.37 GB

Monthly history



Month	Unique visitors	Number of visits	Pages	Hits	Bandwidth
Jan 2015	1,217	2,570	16,865	40,798	1.23 GB
Feb 2015	1,455	2,579	10,251	43,049	1.54 GB
Mar 2015	6	7	14	35	3.23 MB
Apr 2015	0	0	0	0	0
May 2015	0	0	0	0	0
Jun 2015	0	0	0	0	0
Jul 2015	0	0	0	0	0
Aug 2015	0	0	0	0	0
Sep 2015	0	0	0	0	0
Oct 2015	0	0	0	0	0
Nov 2015	0	0	0	0	0
Dec 2015	0	0	0	0	0
Total	2,678	5,156	27,130	83,882	2.77 GB

Countries (Top 25) - Full list

Countries		Pages	Hits	Bandwidth
Germany	de	2,382	6,034	136.94 MB
Finland	fi	1,964	6,057	150.41 MB
United States	us	1,666	4,480	165.94 MB
Russian Federation	ru	930	2,017	36.35 MB
Italy	it	797	1,805	41.44 MB
Luxembourg	lu	457	630	6.70 MB
France	fr	392	4,981	150.00 MB
Great Britain	gb	183	2,698	174.17 MB
South Korea	kr	149	1,646	98.66 MB
China	cn	120	417	14.44 MB
Ukraine	ua	102	182	13.06 MB
Denmark	dk	101	296	13.50 MB
Greece	gr	89	1,199	31.81 MB
Austria	at	85	1,566	33.15 MB
Netherlands	nl	75	770	20.47 MB
Argentina	ar	74	145	2.69 MB
Brazil	br	48	691	23.68 MB
Japan	jp	47	300	16.56 MB
Turkey	tr	46	243	8.42 MB
Romania	ro	40	193	6.17 MB
Vietnam	vn	37	37	186.65 KB
India	in	34	676	27.71 MB
Belgium	be	33	642	17.95 MB
Spain	es	31	660	29.87 MB
Canada	ca	29	159	12.55 MB
Others		340	4525	340.47 MB

The data above shows a regular interest to the web site during year 2014. 6132 individual users visited on the web site with 23 598 visits to the 82 635 pages. During January to February 2015 there was 2678 individual users with 5156 visits to 27130 pages. The web site hits has been steadily growing and achieved increased speed towards end of the project.

By the end of February 2015 project website reached 26 EU-countries, globally 85 countries were reached with the website (Annex 12).

7.5. Development and management of the 3D LIVE community on social media

The website of the 3D LIVE project has been linked to the social media like LinkedIn and to publish the latest updates on website in social media and vice versa.

7.5.1. LinkedIn

By the end of February 2015 there was 125 members in the LinkedIn group, discussion topics in the LinkedIn covered project related news and events, publications made during project as well bringing visibility to other internet pages which promoted 3D LIVE achievements.

7.5.2. YouTube

The 3D LIVE project created videos of different sport experiences to introduce the project and inform about project achievements in the conducted use case pilots. Main channel to distribute videos was YouTube. Videos expanded dissemination possibilities by giving much richer description of the use cases displayed on normal or stereographic displays.

Video recording about worlds 1st Tele-Immersive Ski competition in example achieved huge success both in social media and achieved almost 5000 watchers in YouTube by the end of February 2015. Competition was also streamed live to the internet when event was on, 4 different races did achieve big number of followers as well.

8. 3D LIVE Exploitation strategy

The 3D-LIVE exploitation is based on the combined provision of the product and services, obtained by the 3D LIVE Consortium during the execution of the project.

The 3D LIVE exploitation effort builds upon successful demonstrations which were held in different events to showcase 3D LIVE project results, specifically on the skiing scenario. As a consequence of these, lots of interest was raised by entities outside the project, including industry. Among them, BBC wanted to shoot 3D LIVE trials in Schladming and broadcast a feature as part of the BBC Click programme (global audience of 300 million), which was an achievement which made the overall project proud of. While "live" demonstrations(i.e. without any safety net) of the 3D LIVE platform were successfully held in the FIA events in Athens and in the Wearable Technologies Conference (2nd and 3rd February 2015) where the project organised the world's 1st mixed reality ski competition broadcast to a global Internet audience. In addition to having achieved successful public demonstrations, the 3D LIVE consortium has forged initial commercial links with stakeholders and getting first hand feedback from potential partners / customers.

The feedback and experience gained during such events were used as inputs to consolidate and finalise the overall 3D LIVE exploitation and use plan, which are now mature and detailed.

In this chapter, the 3D LIVE consortium presents a baseline marketing and joint exploitation plan, with a specific view to the provision of 3D LIVE services and sporting applications. We would like to emphasise the word "baseline" as we also learned from the acquired contacts that different offers and approaches may be required, depending upon the typology of the potential customer/partner.

3D LIVE exploitation occurs at two distinct, although interacting, levels:

- Joint exploitation level, in which more partners collaborate to provide the required outputs with a common opportunity;
- Individual exploitation, in which individual partners take up project results to increase their individual business capacity or, simply, to expand and develop their knowledge base.

Joint Exploitation plans are described in terms of:

- 3D LIVE Overall Exploitation Objectives and Intentions
- Description of 3D LIVE Sporting applications and relevant maturity level;
- Identification of the potential Market And Unique Selling Proposition
- Market Context Overview
- Definition of the joint exploitation approach
- Description of the joint exploitation vehicle;
- Status of the joint exploitation plan.

Individual exploitation plans are described in terms of:

- Specific results to be exploited;
- Implementation and use plan ;
- Potential/expected benefits.

Detailed description of all the achieved results can be found within the project deliverables (namely WP1, WP2, WP3 and WP4 deliverables) and are also summarised in Appendix 1, in which the detailed list of the assets developed and relevant IPR is reported.

In particular, the IPR Asset table is the basis of a specific exploitation agreement which is under discussion between the partners, as it highlights who contributes with what in the joint effort of pursuing some business after 3D LIVE project end date.

8.1. Exploitation activities performed

The 3D LIVE Consortium performed the following activities, in the frame of the building a sound and robust exploitation plan:

1. Identification of potential business partners and development of a business dialogue with them;
2. Conduction of face-to-face meetings with potential partners at the WT Conference/ISPO show to demo the system and verify common interest level;
3. Finalization of 3D LIVE Solution Prototype to be used in demonstration based on performed live tests with users and their feedback;
4. Promotion of the 3D LIVE experiential and open innovation approach with the FIRE community, to evaluate the possibility of extending the methodology for user driven design of new FI services;
5. Development of marketing and communication material in print and online format;
6. Finalization of the IPR analysis;
7. Finalization of 3D LIVE exploitation mechanism approach and the relevant legal issues. Due to the complexity of the several involved stakeholders in the 3D LIVE project, the current suggestion is to continue the business based on a Collaboration Agreement, where a revenue sharing model and the responsibilities of each partner are clearly defined. The revenue should be split among the partners based upon the contribution during the complete project and the efforts spent in the sales and consulting/implementation phase.

The outcomes of the above mentioned activities are described in the following sections and can be summarised as follows.

8.2. 3D LIVE Exploitation Objectives and Intentions

The 3D LIVE Consortium exploitation objectives and intentions are summarized in the following table, in which project results are aggregated and mapped against potential exploitation stream.

The table below reports four main exploitation objectives, which summarizes both joint and individual exploitation intentions, on which the Consortium is currently focusing.

3D-LIVE Results (What)	Use/Implementation (How)	Targets	Who
1. 3D LIVE TI platform	Utilisation of the existing TI platform architecture and integration concepts to develop to a new wave of sporting (and non-sporting) applications	– Leisure and gaming industry; – Industry highlighting emerging needs for multimedia applications (i.e. fashion)	ARTS, CERTH/ITI, IT-Innovation
2. Sport applications in the skiing, golfing and jogging domains	Exploitation of developed applications (and possible extensions of the validated domains to additional sport sectors, including embedded consulting services) through: – Engineering of available prototypes with partners from Sporting/Gaming industry or Wearable Technology Industry. – Engineering solutions to offer 3D Live platform within broadcaster workflows for new audience participation models at large scale sports events (www.dtg.org.uk/news/news.php?id=5359)	– Events; – Sporting/Gaming industry.	CENG, ARTS, CERTH/ITI, CYBER, Sportscurve, IT-Innovation
3. 3D LIVE experiential model and methodology	Identification of opportunities for the implementation of the experiential model and methodology for FIRE facilities. Relevant services include: – Instantiation of the experiential model in other contexts and/or within Experiment-as-a-Service tools (e.g. EXPERImonitor); – Identification of user experience metrics and processes; – Training.	– European FIRE facilities; – Living Labs; – Smart Cities and FI environment..	ARTS, CENG, IT-Innovation.
4. Improved FIRE facilities after the user experiment	Identification of new service opportunities for the two facilities Enhanced motivation for offering facilities for experimentation based on the huge marketing success and visibility achieved through live trials at Schladming	– EXPERIMEDIA – Oulu Living Lab	IT-Innovation CYBER (to be confirmed.

Table 3: 3D-LIVE results exploitation scheme

The above described exploitation plans are also expanded through individual exploitation plans, by which each partner describes the plan and the individual strategy for leveraging 3D LIVE results for their own organization, in a view to both develop more business and / or to strengthen their academic leadership in 3D LIVE related domains.

Detailed individual exploitation plans are reported in the following chapter.

8.3. Exploitation of 3D LIVE Sporting applications

With respect to the overall exploitation plans reported in the previous paragraph, we would like to focus on the exploitation of 3D LIVE Sporting applications.

3D LIVE provides a complete platform of hardware and software efficiently combined in order for geographically separated users to interactively share an activity experience such as skiing, golfing or running – whether indoor or outdoor. It allows several users to be virtually immersed in one shared environment, called "The Twilight Space". In this mixed reality environment, they will be able to see, communicate and play with one another in real time, taking advantages of the latest research in 3D reconstruction of moving humans and immersive display technologies. The system also offers the possibility for a user to record a previous activity experience and compete against his own performance e.g. in a specific ski slope or running route, a so called Ghost-function or "Ghosting" mode. Furthermore, the system could be expanded into offering the possibility to compete against other 3D LIVE users or selected celebrities.

The basic exploitable product offer consists of a starter package including the 3D LIVE platform and add-on features available depending on desired experience level. The proposed 3D LIVE basic starter package includes for the three scenarios:

- 3D LIVE communication platform and web user interface allowing for real-time:
- Location sharing of GPS position and route
- Simulation of an indoor user via Kinect technology
- Interaction via voice and written messages
- Enhanced visual sharing experience via a 3D rendered environment
- Compatibility and easy implementation/connection of body sensors as well as add-on features/devices
- Two 3-dimensional body sensors to accurately and more realistically simulate the user movements for the avatar

Possible add-on features/devices to the starter package includes (these may be scenario dependent):

- Recon Instruments glasses;
- Ski slide simulator;
- Additional body sensors;
- Heart rate monitors;
- Other compatible devices.

Furthermore, thanks to the acquired competence and solutions from the project, 3D LIVE could also act as a service provider and provide activity and movement data from specific users to support for example the gaming and sport equipment industries, see next paragraph.

The 3D LIVE applications also offer the possibility for alone users to use the so called "Ghosting" mode, allowing for competition against themselves or a recorded other user.

In our testing and analysis of the system, it is clear that the two gaming options are more or less relevant for the different sport activities.

8.4. Identification of the potential Market And Unique Selling Proposition

The potential end users of 3D LIVE sporting applications are primarily found within the personal sport & fitness, gaming and broadcast sectors. Main benefits of the technology for these users of the platform are an enhanced real and virtual experience as well as an increased motivation by making social interaction available in ways and in places previously not possible.

With these users, and such applications in mind, 3D LIVE will enable sport, gaming companies, broadcasters or ICT industry players to realize new ways and experiences of immersive or augmented gaming (gamification) or 3D real-time augmented industry information systems.

3D LIVE is addressing these industries, the Sport, Gaming, Broadcast and the ICT Industry, see Table 4. Both industries are merging in the field of consumer electronic devices. Especially the big ICT companies, such as chip manufacturers or component providers, are making strong efforts in the fitness and sports market with electronic devices.

Target industry	Company examples	3D LIVE Selling Proposition
1. Sport & Gaming industry	Technogym, Adidas, Fischer Ski, Recon Instruments	Customizable solution for social augmented sports resulting in a higher user motivation and excitement
2. Broadcast Industry	VizRT, Quantel	3D Live platform incorporated into broadcast production workflows for producer to create new experiences associated with sports events
3. ICT industry	STMicro, Intel, Texas Instruments, Ericsson	Real-time augmented data for industry applications as well as for demos of specific products and competences

Table 4: Overview of selling proposition for the two target industries (Source: 3D LIVE)

8.5. Market Context Overview and Emerging Trends

3D LIVE is ideally positioned for accessing the profitable sports market. The strategic position between the high-tech, quality-based sport equipment market and the quantity-based OEM markets allows for a two sided marketing approach. 3D LIVE is also highly

relevant for the fast growing gaming market. Lots of development among virtual reality games targeting an older (20+ years) user audience is currently happening, see Figure 14. In general, since Facebook bought Oculus Rift for more than 2 Billion dollars, the whole immersive and augmented Gaming market has significantly sped up.

3D LIVE is directly involved in this business segment and has the potential to partner with some of those sophisticated companies for the going to market strategy.

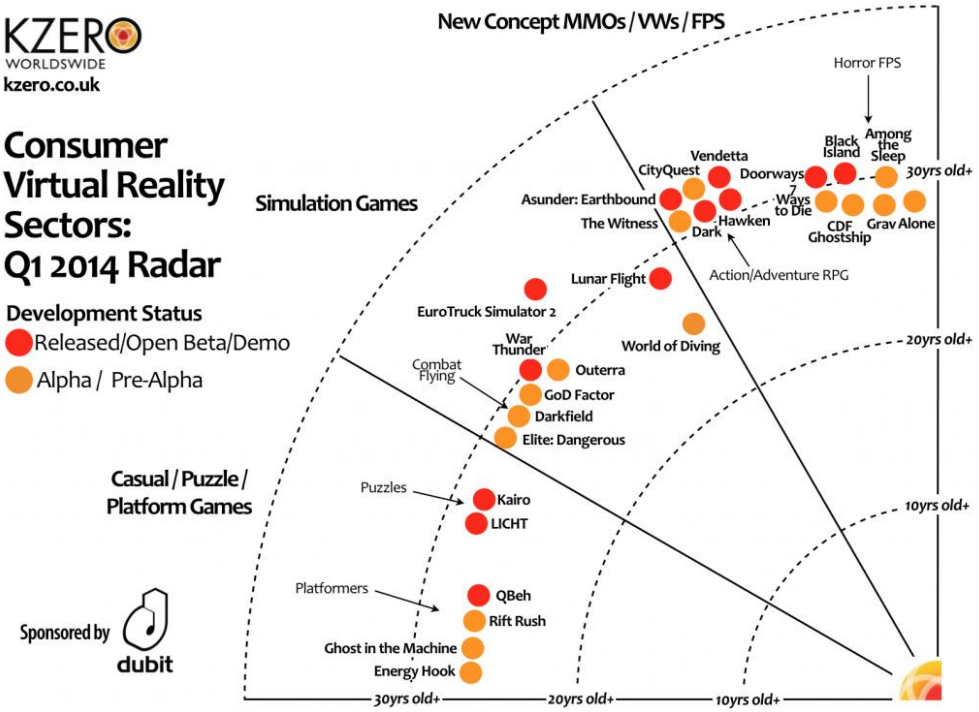


Fig 14: Consumer virtual reality sectors (Source: KZER Worldwide)

The current demand for personal tracking devices and services is growing rapidly. There are numerous of so called "Wearable Technologies" manufacturers and quantified-self web portals which have been until now operating separately and therefore unable to reach the mass market and establish them as a market standard. 3D LIVE can bring it together in a totally new dimension. A platform to meet your friends in a three-dimensional environment and doing sports and fitness exercises together. The one running on his treadmill - the friend running in real-time in his normal environment, but could be surpassed by the friend on its treadmill through the 3D LIVE platform. Therefore an augmentation system such as Google Glass or a Recon goggle could show the real runner his "virtual" competitor.

Overall the global Wearable Technology market is growing rapidly which is displayed in Figure 15.

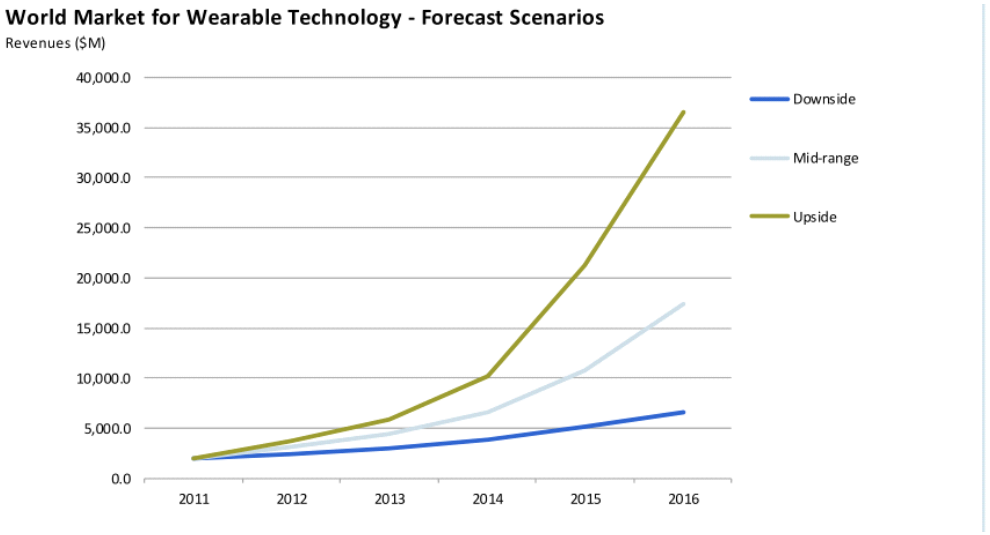


Fig 15: World Market for Wearable Technologies – Forecast Scenarios (Source: IMS research

Below are some additional examples of current supporting market trends, which favor the success of 3D LIVE.

Furthermore, trend scout agency "Trendone", predicts that the future entertainment will be e.g. in the direction of more augmented reality in sports as well as less of an intersection between the virtual and real world, see fig. 16.

- The use of smartphone devices, in particular during sports and fitness exercise, is growing exponentially. People are becoming more familiar with sporting apps and are willing to integrate these into their daily life.
- Recreational and amateur athletes are not only becoming increasingly aggressive in the pursuit of their activities (striving to better themselves), but they are becoming more technology savvy.
- The fast growing number of professional and amateur competitions such as marathons taking place throughout the world cannot always afford full coverage for their audiences / athletes – some are sold out after some minutes of registration. 3D LIVE is able to enlarge the number of potential participants at those crowded events – by staying at home and running on a treadmill.
- Online community portal usage is experiencing strong growth.

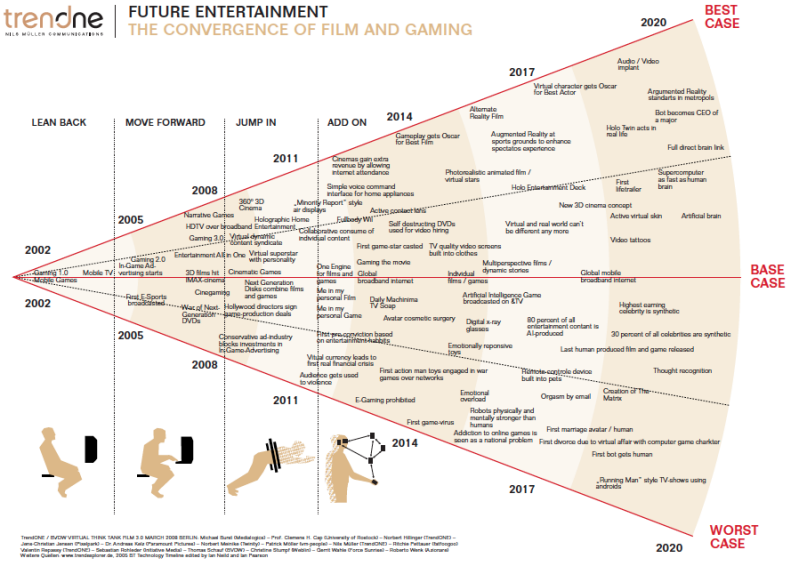


Fig 16: Future Entertainment – Forecast Scenarios (Source: Trendone)

8.6. SWOT Analysis

The 3D LIVE consortium have analyzed the positioning of their offer with respect the analyzed and perceived market context, resulting in a classical SWOT analysis, which is summarized in the following table.

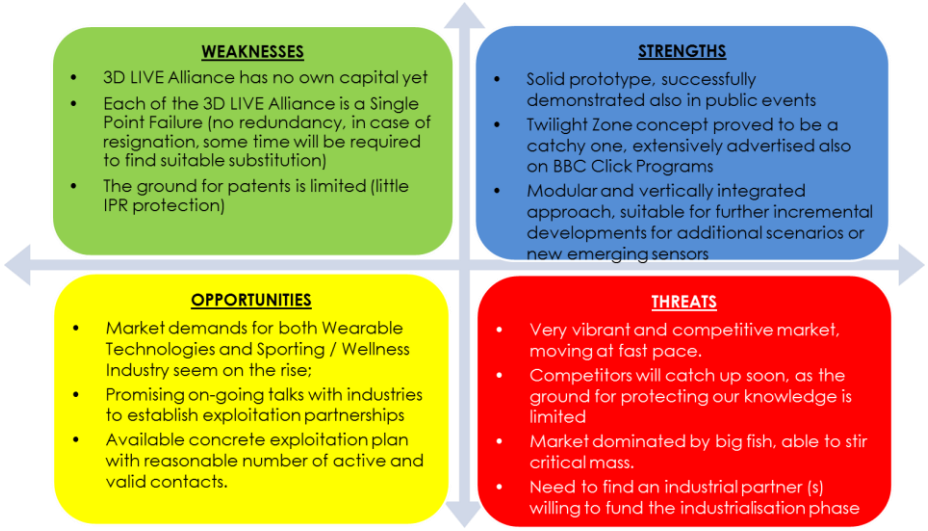


Fig 17: SWOT analysis for the 3D LIVE Sporting Applications

Discussion on the Strengths, Weaknesses, Opportunities and Threats is reported hereafter.

8.6.1. Strengths

Solid prototype, successfully demonstrated also in public events. Although it is fair to admit that the 3D LIVE solution is still at a prototypal stage, as we need to realistically face the fact that more work is needed to go to the market and to industrialize the solution, the 3D LIVE prototype is a very good starting point as it has been demonstrated in a number of events with a very good reception from the audience. This proves that the concept and the development work behind it are both solid and ground.

Twilight Zone concept proved to be a catchy one, extensively advertised also on BBC Click Programs. In addition to the point above, the 3D LIVE solution is not only of interest for IT researchers and experts, but also for a wider public, as judged by the BBC crew who came all the way to Schladming to shoot our trials. As also demonstrated by our contact with industry, this means that there is a concrete possibility that the 3D LIVE concept can really hit the market and that the exploitation potential is there.

Modular and vertically integrated approach, suitable for further incremental developments for additional scenarios or new emerging sensors. The 3D LIVE consortium have a competitive advantage with respect to all other competitors in the arena as the consortium brings together a good variety of competencies which can support quite different needs which may arise in the industrialization phase. The point here is to keep the momentum going.

8.6.2. Weaknesses

3D LIVE Alliance has no own capital yet. As explained in this document, the 3D LIVE consortium operations will continue supported by an exploitation agreement, which we liked to call the "3D LIVE Alliance". While this is only the initial form for continuing the collaboration and does not preclude any successive evolution in more stable forms, it is obvious that this is unlikely to support significant self-funded investments, thus potentially extending the time to market, with the risk of being overtaken by other more agile or wealthy competitors.

Each of the 3D LIVE Alliance is a Single Point Failure (no redundancy, in case of resignation, some time will be required to find suitable substitution). Although the 3D LIVE consortium is nicely balanced, a potential withdraw from the 3D LIVE Alliance could hamper the capability of the remaining members to find a substitution and therefore to hit the market. The approach of finding an industrial partner can be however consider a possible mitigation factor for this weakness.

The ground for patents is limited (little IPR protection). An IPR asset table was compiled to provide the basis for the Joint Exploitation Agreement. Although a significant amount of foreground was produced, this mainly entails new developments and integration of existing technologies, thus hardly patentable (apart CERTH's identified potential patent). The UX methodology and model cannot be patented, it could be "trademarked". This does not give us any recognizable competitive edge on the competition. Our competitive edge on the competition will be in our capacity to further build on our foreground in an efficient and competitive way.

8.6.3. Opportunities

Market demands for both Wearable Technologies and Sporting / Wellness Industry seem on the rise. As discussed in the previous paragraph, 3D LIVE is ideally positioned in really vibrant and rising market contexts, pushed both by the availability of better and accessible technology and by an increasing awareness about fitness and, above all, wellness.

Promising on-going talks with industries to establish exploitation partnerships. Following the recommendations of the EC reviewing team, we focused on the identification of potential customers/partners for the exploitation. Initial talks with them were promising and a plan for identifying how to move forward is being identified.

Availability of a concrete exploitation plan with reasonable number of active and valid contacts. The 3D LIVE Alliance decided to work on a realistic but feasible and concrete exploitation plan. Contacts were obtained in different ways, from making available individual partners contacts to getting contacts from the events 3D LIVE was attending. The result is a concrete plan of actions, which will be monitored by the 3D LIVE Alliance Committee.

8.6.4. Threats

The threats reported hereafter are indeed different side of the same coin.

Very vibrant and competitive market, moving at fast pace, dominated by big fish capable to stir critical mass. The threat here is that if somebody having investment capacity decides to offer 3D LIVE style solutions, they could overcome us by virtue of their access to wider communities and therefore to potentially higher revenues even in the presence of less sophisticated solutions.

Competitors will catch up soon, as the ground for protecting our knowledge is limited. As said before, our competitive edge is mainly based on our ability to leverage effectively the background produced

Need to find an industrial partner (s) willing to fund the industrialization phase. The need of relying on an Industrial partner can be ideal, but it will require strong negotiation skills and effort to ensure fair allocation of stakes for all involved.

8.7. Definition of the joint exploitation approach

On the basis of the considerations developed in the previous paragraph, the 3D LIVE Consortium considered carefully which exploitation approach to take, in order to devise a strategy to go to the Market.

By exploitation approach we mean the actual configuration that the 3D LIVE will adopt to respond to the inquiries from the market.

The exploitation approach is clearly depending upon:

- The specific 3D LIVE offer and relevant level of maturity;
- The feedback we got from preliminary contacts with potential customers and/or partners.

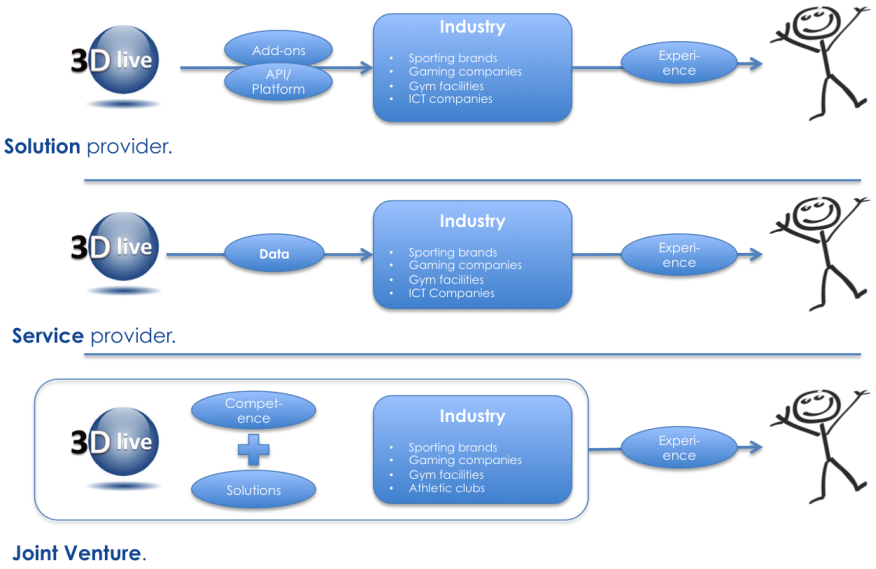


Fig 18: Options considered for joint exploitation approach

At the beginning, we identified primarily three approaches for exploiting the 3D LIVE applications (see Figure 18):

- As Solution provider (i.e. the 3D LIVE Consortium providing the solution to a potential customer). As a **Solution Provider**, 3D LIVE would sell the platform and additional features to the companies in need of a real-time augmented solution, as described in previous paragraphs. The specific solution/package also needs to be customizable depending on what the company wants to offer and the sport activity involved;
- As Service provider. By being a **Service provider**, 3D LIVE could assist several industries by providing important data about how users perform different activities. This is for example interesting for the gaming industry in enabling more realistic avatars as well as for sports brand in their development in a more optimized and user-friendly product. This option could also include providing consulting and engineering support to parties interested in developing their own customized solution based on the 3D LIVE platform. Both the Solution and Service option require the creation of a corporate entity as well as a relevant setup of the internal organization.
- Via a Joint Venture with additional entities (external to the Consortium). In the option of a **Joint Venture**, there are numerous alternatives of companies in the targeted industries, which could be interested in joining forces or potentially in acquiring the complete 3D LIVE business or to use 3D LIVE applications as a demonstrator for their own sensors and wearable technologies or in collaborating to bring further the level of maturity of current 3D LIVE solutions. Potential partners can be interested in the platform concept or in any of the developed sporting applications or even in applying the 3D LIVE concepts to additional sporting scenarios.

The contacts we had with potential interested partners suggested that the third option to market is the most viable one, as it would allow a more flexible approach as the 3D LIVE products / services are likely to require more development and as we may need to collaborate with potential customers/partners. A joint venture approach (a sort of Virtual Enterprise approach) will allow for ensuring commitment in view of potential business opportunities while at the same time foreseeing the management process to adapt the work to be done to the specific needs of the business opportunities. More details on the roles and the mechanisms are provided in the following paragraph.

In the option of a Joint Venture with e.g. Technogym, it is possible that the 3D LIVE system could be integrated in some of their workout machines (treadmills, spinning bikes etc.). This type of partnership would be both deeper and long term than a regular Solution collaboration. A possible business model could contemplate:

- a collaborative project to engineer the identified solution, to make it ready for the market. The collaboration scheme here is that the foreground information made available by 3D LIVE will be further developed together with the partner. The additional IPR generated could be given to the identified industrial partner, to allow it to commercially exploit it.
- A production and sales phase, carried out by the industrial partner, in which the co-developed application and product are sold. The generated revenues will be redistributed between the industrial partner and the 3D LIVE partners, participating in the project.

There may be the possibility for IT Innovation to originate a spin-off company, devoted to the support 3D LIVE exploitation and commercialization (and further development of the platform/application). IT Innovation, as research centre, has the mission of stimulating and supporting innovative start-ups and recently spin off a software-based startup working closely the University of Southampton Research and Innovation Services (RIS). The viability of this approach is still under evaluation within consortium partners and discussions with RIS.

8.8. Description of the joint exploitation vehicle: 3D LIVE Alliance

On the basis of the outcomes of the contacts, which we are pursuing with potential customers and / or partners, the 3D LIVE consortium is adopting the scheme of joint venture (or Virtual Enterprise approach) as suitable initial exploitation mechanism by entering the 3D LIVE Alliance.

As previously explained, the adoption of this model would allow to cover the following phases further to 3D LIVE EC project completion:

- Business opportunity analysis and evaluation / approval of the activity to be undertaken collaboratively and/or jointly with a business partners;
- Conduction and management of the identified collaborative activities, necessary to bring the 3D LIVE from the current prototypal level to a commercial level.
- Support to the production and sales activities (which are most likely to be undertaken by the industrial partner)

One of the advantages of this approach is that it is very agile at the beginning of the operations, not requiring the establishment of a specific newco at a time in which the specific scope of it is not clarified. 3D LIVE Alliance is regulated by an Exploitation Agreement, signed by all interested partners, which addresses among the others, the following items:

- Scope of the Exploitation agreement;
- Mutual roles and responsibilities among the different partners including which company to assume the role of sales agent and signer for the new 3D LIVE entity;
- Governance, i.e. the management processes which will be used in order to support the operations;
- Revenue sharing mechanism, to support the allocation of the revenues from all sales including collaboration with an external entity;
- Access rights to the generated foreground, in order to allow the continuation of the collaboration between the partners and IPR rules, in general.

In our case, the scope of the Exploitation Agreement is clearly to bring to the market the 3D LIVE results, by finding an appropriate Customer (or Customers) willing to take-up 3D LIVE foreground to produce products and or services.

8.8.1. 3D LIVE Alliance Governing Body: the Steering Committee

Through the exploitation agreement, the exploitation activities are coordinated and managed by a Steering Committee, chaired by Collaborative Engineering and participated by the other partners of 3D LIVE, whose main tasks are:

1. To analyze the different business opportunities brought to the Committee by any of the Committee member, who can act as sale agents (leveraging both individual or joint contacts) for the Virtual Enterprise with the support of the Steering Committee Chair and SportsCurve/Cyberlighting;

2. To take go / no-go decisions on the basis of the considered elements for a business opportunity;
3. To agree the work plan for possible collaboration with external partners and potential revenue sharing, based both on the role which will be performed within that specific collaboration. The role played by each partner shall reflect the amount of the 3D LIVE IPR involved and will be negotiated on a case by case basis;
4. To manage on-going business opportunities, including the evaluation of the intermediate outcomes and of the Estimation at Complete, to make sure that the activities are aligned and consistent with the scope agreed with the go / no-go decision;
5. To agree on the 3D LIVE specific exploitation plan, including who to approach and by whom within the consortium, how and by when;
6. To maintain and update current dissemination and marketing material.
7. To establish ad hoc newcos to help exploit on-going business opportunities (according to the evolution of the business, the Exploitation Agreement could evolve in a start-up companies, participated by the current 3D LIVE partners and potentially external entities).

Decisions on items 1, 2, 3, 5 and 7 will be taken unanimously, while decisions on items 4 and 6 will be taken upon majority vote (in case of no majority is found, the vote of the Steering Committee Chair is counted twice.

The Steering Committee meets once every second month, called by the Steering Committee Chair who will provide an agenda at least 5 working days in advance to the meeting. Minutes from the Meeting will be duly circulated by the Steering Committee chair.

8.8.2. Roles within the 3D LIVE Alliance

The roles within the 3D LIVE Alliance adhere to the roles undertaken by the partners within the 3D LIVE project.

- Collaborative Engineering will serve as Steering Committee Chair, coordinating and supporting the execution of the activities launched by the 3D LIVE VE. If required, CE can design the UX for the identification and finalization of new additional scenarios and relevant evaluation;
- CERTH-ITI will work on further developments of the 3D LIVE platform and in the implementation of full 3D reconstruction for existing and/or new scenarios;
- IT Innovation will work on the platform for scenario vision, analysis, evaluation and data collection, and integration of wearable sensors and smart displays required by skiing and new applications. IT Innovation will also be responsible for overall system performance analysis considering the teleimmersion pipeline and infrastructure resource in terms of cloud process and network capacity.
- ARTS will take care of the integration of the platform and of the update of new sporting applications, with specific respect to golfing and skiing scenarios, and potentially, if required, the implementation of new application;

- CYBER will support the integration of the platform and the update of jogging applications. CYBER will also support in the identification of business pipeline;
- SportsCurve will support the update of the platform by providing new and better performing sensors, thanks to their contact in the world of wearable technologies. SportsCurve will also support in the identification of business pipeline.

8.8.3. Exploitation activities performed

The promotion of the project outcome – already initiated at an early stage – has facilitated early potential customer feedback in a timeframe, where still a quite flexible going to market approach is possible. Therefore we started beginning of 2014 with a presentation at the world leading sporting goods show ISPO, see paragraph 6.2. This show is held once a year in Munich and attracts more than 80.000 professional visitors. The whole worldwide sporting goods and wearable technologies ecosystem are attending.

The second larger presentation was held at the world leading WT Conference in San Francisco, see paragraph 6.6. The conference brings together all major players from semiconductor giants through consumer brands and retailers. It was held in the first week of July 2014 directly at the waterfront of the Bay Area.

As mentioned, we have already started initial partnership discussions with Recon Instruments from Vancouver, which has created a totally new sunglass goggle with an integrated Head up Display (HUD). Integration of the 3D LIVE system with Recon's products would enable the benefits discussed at the end of paragraph 8.3 of partnering with an established industry player. The other opportunity we investigate is to work closely with one of the leading chip vendors to demonstrate, by means of 3D LIVE, the performance of one of their latest chip technologies at tradeshows or at sales events.

The Wearable Technologies Conference 2015, on February 2-3 2015 played a key role in the exploitation and future commercialization of 3D LIVE. As the conference is in relation to the global sport show ISPO, most of the relevant companies in this industry were attending, and some valuable contacts were collected. The conference was excellent in timing at the end of the project when the 3D LIVE product and service concepts are finalized. This facilitated the discussions with potential partners both for a solution and a joint venture way forward.

Each of the 3D LIVE partners acted proactively to promote 3D LIVE among their constituency and business contacts. It was therefore possible to access additional potential partners. A list of the most advanced contacts is reported here below, together with a summary description of the status and possible evolutions.

8.8.4. Status of on-going contacts

Name	Scope	Contact	Trend	Remarks
Technogym	Adoption of the jogging scenario	Mr Giudici (COO) Mr Viarani (CTO)		First contact established. Dissemination Marketing material provided. Initial confcall held. Go – No Go decision in progress.
Recon	Adoption of 3D LIVE platform to support sales of their goggles	Mario Palombo		First contact established. Reluctant to sign a MoU (not in line with their policies).
COBI	Adaptation of 3D LIVE to eBikes / spinning bikes	Mr Tom Acland (Head of Business Development)		First contact established. Meeting held. MoU under discussion
CaddieON	Evolution of the golfing platform and scenario	CEO, Tuomo Lalli		First contact established. Meeting held. MoU signed
Notch	Adoption of 3D LIVE platform to connect and promote their sensors	Mrs Eszether Horvath (CTO)		First contact established. However, Notch is a start-up with very tight roll out schedule
Montreal International Consulting	Joint search for investor capitals for development of the golfing platform and scenario	Jean-Paul Oudin, Director		First contact established. Before proceeding, 3D LIVE needs to establish a LoI or, even better a MoU.
Vodafone Germany	German based innovation group is looking for sophisticated solutions. E.g. to install this in the own innovation center	Stephan Schneider		Contact was interesting and as soon as the application / solution is selfrunning, they have interest for an installed base
Red Bull	World leading extreme sports brand is looking for solution to enrich its content by gamification	Kai Müller		Combination of Skiing Race and Gaming application is of great interest. Are willing to go next steps in autumn 2015
People Olympics	To provide 3D LIVE technology to support competitions between local communities	Roberto Santoro, ESoCE-Net President		Initial request for 3D LIVE technology availability done. MoU to be discussed soon

Table 5: 3D LIVE Alliance: Exploitation Plan

The table above is the 3D LIVE exploitation plan, which is going to be updated periodically by the 3D LIVE Alliance Committee. It is a dynamic table, which summarizes the scope of a potential collaboration, the contact person (s), and the status of the discussion. The objective is to have in the next 6 months 3 collaborations in place (ideally one for each of the sporting applications).

8.8.5. Example of a potential Business Case: Technogym – My Wellness

Contacts with Technogym – My Wellness started in the frame of the activities for the organization of the 3D LIVE participation to the Wearable Technologies 2015, as they were announced in the audience. Similarly to what we did with other companies, we tried to set up a bilateral meeting but we were at last unsuccessful as they did not show in Munich. Within 3D LIVE, we decided to appoint Marco Conte to follow up with Technogym – My Wellness. The first contact was the CTO who was proved to be not the right contact. Contacts now are at COO level (Mr Giudici). Dissemination/marketing material were sent beforehand, and a dedicated and very promising phone call was held on 26th March.

The following snapshot taken from Technogym – My Wellness website summarizes the domain and the topics under discussion with them.

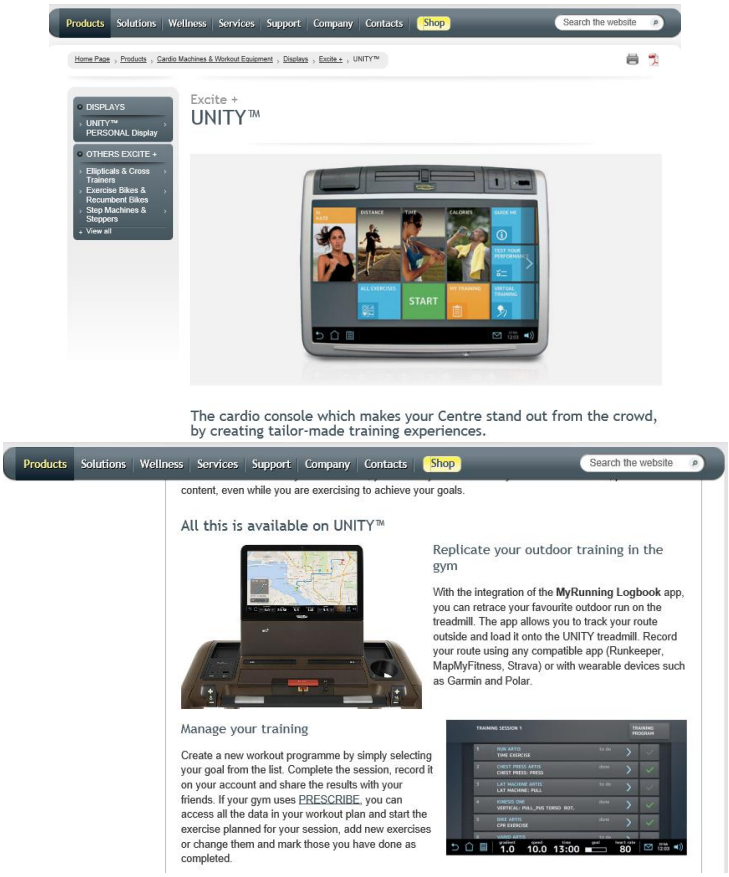


Fig 19: Technogym – My Wellness offer: Console for Treadmills

The idea here is to utilize 3D LIVE results to power the contents and the experience of people running indoor as per our video scenario.

The status of this opportunity is that Technogym – My Wellness started an internal process to analyze our offer in more details and to arrive in a reasonable time to a Go – No go decision. 3D LIVE consortium will support this process by providing additional information

and / or organizing some demonstration for their benefits. Supporting activities are covered by an NDA, to protect 3D LIVE background and foreground.

Below, an initial business plan for the cooperation between a fitness equipment manufacturer / product owner and the 3D LIVE consortium is reported as an example. As reported earlier in this document, discussions are being currently held with Technogym and other potential partners and there is no assurance that this initial business plan that we report here can materialise in the same extent we are hypothesising here below. The most manufacturer in the category of fitness equipment are providing plenty of different home or gym designed sport styles, such as running (treadmill), cycling (spinning), rowing, or even skiing. Some manufacturer are working already in the field of connected fitness equipment for gym or home use. In the home category the market leader "kettler" has already invented a cycling platform were different gym or home athlete could compete against each other on their spinning machines. Compared to 3Dlive the realtime coverage of real cyclist is completely missing. This is a basis of the below created business case. The integration barriers are not too high and 3D LIVE is able to enhance the existing connected solution by adding real outdoor athletes

Around the world, the rise of obesity and such diseases as diabetes and heart disease drives concern about fitness and health. Worldwide sales of fitness equipment are expected to reach nearly $15 billion by 2018, according to Global Industry Analysts. Markets such as the Asia/Pacific region, Latin America, and the Middle East drive growth.

For example with revenues of more than €400m ($544m), 90% of which are generated abroad, Technogym is the world's number two — and one of Italy's most striking economic success stories in recent years. The production is over 100.000 pieces annually. The average price is around 4.000 Euro for top of the range equipment. Based on this price segment it should be not difficult to add to the product and additional 3D LIVE service for connecting the gym equipment with real outdoor athletes. Our estimation is that the price for this additional feature could be 10% of the current price.

We made following estimation based on the above mentioned figures.

Revenue: Complete revenue stream for just the 3D LIVE solution during 2016-2018 would, based upon the above assumptions, be 10 000 units x 400 EUR = approximately 4.0 million EUR and that at least 4.500 units could be retrofitted with 3D LIVE functionalities.

The assumption is that Technogym and 3D LIVE alliance would share equally this extra-revenue, resulting in 2,65 million EUR going to the 3D LIVE Alliance.

	2016	**2017**	**2018**	**Total**
Sales (units) with 3D live functionality	1.500	2.500	6.000	10.000
Sales of 3D LIVE system to old customers	250	1.000	2.000	4.500
Price (EUR), 3D LIVE system	400	400	400	400
Revenue (EUR), 3D LIVE system	700 000	1.400 000	3 200 000	5 300 000
Revenue share 3D LIVE (50%)	**350 000**	**700 000**	**1 600 000**	**2 650 000**

Table 6: Example of a possible business plan originated by the collaboration with Technogym – My Wellness. The initial investment made by the partners could be therefore quite easily justified economically.

8.9. Additional and alternative exploitation activities

In addition to the above and to the dissemination of the results within the FIRE community, the 3D LIVE Consortium is in contact with other initiatives which are on-going at the moment in Europe in the domain of Healthy Living, such as People Olympics. People Olympics (http://www.peopleolympics.org/) aims at facilitating the adoption of healthier and more active life style by promoting sporting events in which different communities compete with each other. The more a community as a whole is able to involve their members the more points they score and, ultimately, the highest chances have to outscoring other communities. In other words, competition between communities is the trigger according People Olympics to motivate individuals to practice more sport.

To this end, for instance, the jogging application is seen as a tool to incentivize individual to do more sports, by connecting indoor and outdoor users in community activities.

People Olympics has already organized trial events in 2014 in pilot cities: Rome, Bilbao, Saint Etienne, Istanbul, Montreal, Taipei, Sofia, Barcelona, Belfast. As reported in table X.8, 3D LIVE has been pre-alerted about the possibility of supporting People Olympics pilot activities, by providing the 3D LIVE technology as an enabling factor for stimulating collective sporting activities and for contribution therefore to the change of behavior at overall social level.

3D Live has been developed using the EXPERIMEDIA principle of deep instrumentation for observability using the EXPERImonitor framework. As such the 3D Live TI platform and technologies are ideally developed for further experimentation of TI solutions in new domains within and beyond EXPERIMEDIA. 3D Live consortium partners are exploring TI experiences in sports training, healthcare and rehabilitation where further research and experimentation is needed to create scientific evidence for suitability. 3D Live was developed for the entertainment market which requires far less fidelity than sports and clinical sciences. Usage in such sectors has to be robustly validated before adoption.

9. Individual Exploitation Plans

In addition to the overall joint exploitation approach described in the previous paragraph, the results which 3D LIVE is generating can be exploited by the partners at individual level. The on-going individual exploitation intentions are summarized in the following sections, in which every partner discusses what they intend to do, with relevance to the main exploitation plans highlighted in table 3.

9.1. Collaborative Engineering

The initial motivation for Collaborative Engineering to be part of the 3D LIVE project was to develop and refine cutting edge service framework for the development of FI services. The Space Engineering Group was acquired by AIRBUS Defense and Space and that meant a re-focusing of Collaborative Engineering activities.

Current focus is to support the business capture in domains supported by new scenarios characterized by technology convergence (communication satellites, 4/5G, Internet of Things) and to help the transition of Space Engineering from being a technology provider to a service provider. Collaborative Engineering is committed to support the joint exploitation plan according to the roles identified in the previous chapter.

9.1.1. Specific results to be exploited

In addition to the joint exploitation activities, Collaborative Engineering aims at leveraging Open Innovation methods as well as User eXperience design methodology to better define use scenarios and, consequently, to better valorize the technological offer of Space Engineering. Technological applications that can be ideally complemented by Open Innovation and UX design methodology would include:

- Satellite enabled telemedicine services;
- Infomobility and transport applications.

9.1.2. Implementation plan and potential benefits

The idea is to identify business opportunities made available by local governmental bodies, such as Regions or Capital Cities, which have committed to offer better services in the security, health and Infomobility and transport. Based on the heritage from 3D LIVE, Collaborative Engineering will be active in deriving, analyzing and assessing users' needs and to promptly retrofitting them to the system designers. Thanks to the work in 3D LIVE, it is expected to shorten the service development effort and to be able therefore to provide better services, at a lower costs.

It is also expected that a better positioning in the bids originated in the frame of Smart Cities and in the frame of Public Pre-Commercial Procurement is achieved (increasing the success ratio) as well as a better dimensioning of the offer (also to mitigate the risk involved). It is expected to win one of these bids by the end of this year and two more in 2016. Size of the intended bids should be such that a ROI is achieved at the end of 2016.

9.2. Centre for Research and Technology Hellas/Informatics & Telematics Institute

CERTH/ITI has participated and coordinated several EU funded projects relevant to 3D-LIVE including the NoE 3DLife, REVERIE, RePlay, EXPERIMEDIA, I-SEARCH, ASSETS, CUBRIK, the FET CEEDs. In 3D-LIVE, due to its experience in computer vision and 3D/image/video analysis, CERTH/ITI led WP3 and was a contributor to all other WPs.

CERTH/ITI main interest and motivation in being part of 3D LIVE was to extend its expertise in 3D tele-immersive technologies.

9.2.1. Specific results to be exploited

Within 3D-LIVE, CERTH/ITI developed novel tele-immersive algorithms and solutions, more specifically for the tasks of:

- Kinect based skeleton capturing and filtering from multiple Kinects,
- Skeleton based avatar animation component for Unity3D (Windows, Android) and realXtend,
- 3D Human Reconstruction creation,
- 3D-reconstruction rendering module for RealXtend and Unity 3D,
- Compression, decompression and transmission of 3D reconstructed humans,
- 3D tele-immersion pipeline and performance Models.

9.2.2. Implementation and use plan

Given that tele-immersion seems to be a very promising technology with plenty future internet applications of commercial nature, CERTH/ITI goal is to continue to investigate and gain even more expertise in the relevant technologies and get established as one of the world-wide experts/research centers in the field.

In parallel, it will monitor commercial/business opportunities and will try to take advantage of CERTH/ITI's spin off company, called VR-SENSE, in order to exploit and materialise its expertise.

9.3. University of Southampton - IT Innovation Centre

IT Innovation is a major player in the FIRE initiative including roles as project coordinator (EXPERIMEDIA), construction (BonFIRE, EXPERIMEDIA, FED4FIRE, FIESTA), experimentation (BonFIRE, OFELIA, 3D Live) and sustainability (BonFIRE, FED4FIRE, EXPERIMEDIA, AmpliFIRE, FIESTA) along with significant experience in sensor data fusion and analysis (SANY, ENVIROFI, TRIDEC, SENSE4US, REVEAL, ProsocialLearn).

IT Innovation's main interest and motivation in being part of 3D LIVE was to investigate new forms of mixed and virtual reality experiences, to build capability in wearable sensor/display technologies and data analysis, and to further extend techniques for QoS and QoE evaluation frameworks. The results have led to new and complex research questions that are being pursued through new research projects.

9.3.1. Specific results to be exploited

3D Live has developed a deep expertise in mixed reality environments, their application to sports and system characteristics contributing to enhanced user experience.

- IT Innovation set the vision for the use of Recon Smart Ski Goggles within the skiing scenario. IT Innovation developed the interaction design and storyboard for the mixed reality skiing experience covering phases of meeting, lift, racing and reviewing results. IT Innovation developed the Recon application and the novel technique of providing a synchronized virtual view of the ski slope with augmented content alongside the real view of the slope. This novel approach broke the accepted Reality–virtuality continuum to offer a totally new form of experience.
- IT Innovation developed a sensor framework for acquiring and fusing environment information from different sources that was used to create feature effects in virtual environments.
- IT Innovation instantiated 3D Live's experiential model within the EXPERImonitor framework creating a mechanism to monitor and assess QoS and QoE in real-time teleimmersive applications.

IT Innovation developed an adaptive streaming approach for real-time 3D teleimmersion by bringing together active network monitoring with content adaptation rules.

9.3.2. Implementation and use plan

IT Innovation is exploiting and using 3D Live results in commercial opportunities within the broadcast industry and through further applied research in application domains such as healthcare, sports science and smart city services.

- IT Innovation is exploring the novel approach to mixed reality in a range of entertainment and industrial applications. IT Innovation has established links to both broadcasters (BBC, RAI), broadcast tools providers (VizRT) and IT systems integrators (Atos) who have shown a high interest in 3D Live results following successful demonstration activities.
- The experience and technology pluggable sensor frameworks for integrating real-time data from sensor sources is being exploited in IoT applications addressing

smart city challenges. IT Innovation is seeking new opportunities in IoT systems including tools to support efficient development of mixed reality systems that require synchronization and consistency between real, virtual and augmented objects. IT Innovation is discussing directly with Smart City operators (Bristol, Barcelona, Antwerp) and seeking approaches to provide tools for key mobile and games developer communities

- With many new teleimmersion application emerging, and the challenge in understanding the benefits of such experiences, EXPERImonitor's instantiation of the 3D Live experimental model is a valuable tool for both designers and software engineers working on advanced solutions. IT Innovation is seeking to exploit these enhancements to EXPERImonitor in application sectors where teleimmersive quality and performance are key to success such as sports (CAR St Cugat) and clinical sciences.
- Considering the high resource requirements of the 3D Live platform the optimal configuration and scalability of infrastructure will be essential for success. The expertise in how to manage network resource for 3D teleimmersion is being exploited in all use cases to minimize cost of deployments. IT Innovation is seeking to explore how such adaptive streaming approaches can be standardized
- Spin off companies are an important exploitation route for IT IN and we are exploring through the University of Southampton Research and Innovation Services the potential for a start up support the 3D Live commercialization activities.

9.3.3. Potential benefits

3D Live contributes directly to IT Innovation research strategy in the area of systems engineering and interactive media. Through the enhancements to EXPERImonitor, we have established a model for the evaluation of real-time 3D teleimmersion systems. This initial model has been used as the basis for runtime adaptation of content based on network performance. From an experiential point of view, 3D Live created common experience for users interacting in very different HCI configurations. We expect further research will be required to understand who such differences affect experience for different users. In fact, displaying a synchronized virtual reality in a heads up display was not assessed in the project and the value of this approach beyond the initial subjective responses has yet to be investigated.

3D Live contributes directly to IT Innovation's research of resource management for real-time interactive applications following on resourcing strategies from previous research in post-production systems, collaborative content workflows and massive multi-player online games. The adaptive streaming approach developed within 3D Live provided a proof of concept resource management strategy for 3D teleimmersion which needs to be further extended to consider the end-2-end pipeline including all aspects of sensing, processing, transmission and rendering. In addition, new networking paradigms such as NFV and SDN in 5G networks offer opportunities to consider more complex interplay between content and network performance. 3D Live was built on production networks and therefore could not consider such aspects.

Finally, 3D Live provided insights into the tools needed to developed mixed reality applications where consistency and synchronization between real, virtual and augmented objects are required. Standardised engineering approaches are need to build such applications more effectively and efficiently, and applications related to IoT offer great opportunities to explore such approaches with mobile and games developers.

9.4. Arts & Metiers ParisTech

ARTS is a research and technology organization created in 1973 (called SERAM up to 2008). It is a non-profit organisation (French Association Loi du 1 juillet 1901). The activities of ARTS are carried out in close collaboration with the research laboratories of the engineering school "Arts et Métiers ParisTech" (also called ENSAM) and some other public research entities in France.

ARTS's research topics include methodologies and applications for the design of experiences and products using Virtual Reality and Augmented Reality solutions through collaborative applications. In the 3D-LIVE project, our goal was to push forward this collaboration by implementing a collaborative platform using concepts of tele-immersion. ARTS wanted to contribute in developing, experimenting and refining a methodology to design Tele-Immersive environments as well as strengthen his knowledge in Virtual Reality technologies, wearables and how to interconnect them to provide valuable experiences in various fields.

9.4.1. Specific results to be exploited

The 3D-LIVE project has lead ARTS' team to capitalize design good practices, re-usable developments for building a tele-immersive environment as well as heuristics to help developers building a strong User Experience.

- Design methodology: the iterative design process with end-users involved at the early stage of the project, has been validated through 3D-LIVE. This methodology can be extended to other tele-immersive/VR applications and be the core design process in future projects. Co-creation in 3D-LIVE provided very valuable feedbacks which, once converted into requirements and implemented, improved notably the perceived Quality of Experience of end users.
- User Experience Model: understanding and modeling User Experience in Virtual Reality systems are an important part of our laboratory activities, and 3D-LIVE included dimensions that significantly impacted the perceived Quality of Experience of users, immersed with one another from remote locations. Based on that model, rules and heuristics have been defined to drive designers taking the proper decisions when creating this kind of UX, for any field of tele-immersive platform.
- Developments and good practices: the implementation of the 3D-LIVE platform has proven that unique modules can be capitalized and deployed for several scenarios and several platforms (CAVE, HMDs, Smartphones, smart goggles…etc). Several components of 3D-LIVE result in aggregating several sources of sensors' data to create fused ways of interaction, applicable for collaborative experiences (in

sports or other fields). These components are fully usable in other projects ARTS will be involved in. The 3D-LIVE project also provided to ARTS good practices in terms of network communications and synchronization between remote users immersed in VR environments.

ARTS has also a particular interest in the skiing and golfing scenarios that offer potential future projects proposals or products offers.

About the skiing scenario, the fascinating (and unforeseen) outcome of this project for ARTS, is the use of head's up displays which are not delivering augmented reality but a contextualized information, while intervening on location. The final results on the project showed that this solution was preferred rather than Augmented Reality and that it provided a very good QoE. ARTS is thinking about further collaborative applications where to propose this kind of technologies.

About the golfing scenario, the outcomes of the UX analysis combined with the informal feedbacks of professional golfers and golf coaches, lead us to draw an exploitable product out of the 3D-LIVE concepts. The hard trick to consider with this solution is that most of the solutions exist, and they need an overall common integration to run a very valuable service during international Golf Competitions.

9.4.2. Implementation and use plan

ARTS is involved in research and developments at several levels:

- Locally: ARTS is a leading partner of the LVRC (Laval Virtual Reality Cluster) living lab, promoting the development of new products and services through the innovative and collaborative techniques of Virtual Reality, Augmented Reality and 3D. ARTS will include the 3D-LIVE findings in his dissemination strategy and will create, propose and lead future projects based on the 3D-LIVE core technologies and collaborative interactions. ARTS mission includes valorization of research and technologies to companies. It is anticipated that some components of the 3D-LIVE platform can be used for studies with local companies. To this target audience, ARTS will specifically study the value that each 3D-LIVE technology could bring to local companies, and propose studies and specifications of systems which could accompany them towards the digital transition.
- Nationally/Internationally: ARTS is the partner in charge of the development of collaborative research for the Arts et Métiers ParisTech engineer school. Given this role, future projects with the French ANR (Agence Nationale de la Recherche) and European Commission (in H2020 submissions) will be submitted taking into account the work achieved in 3D-LIVE. It is anticipated that the 3D-LIVE methodology and concepts will be extended to the learning and training fields (e.g. Serious Gaming, training of human resources, collaborative learning, virtual MOOCs…etc.) to help human beings to interact and to take decisions while immersed in remote virtual worlds.

To exploit the HUD results, ARTS intends to perform studies for companies comparing the potential easiness of use, the relevance, and the performance of smart goggles and augmented reality goggles in the Industry.

We will also continuously study the potential means of interacting in virtual environments from outdoor sites. For instance using IMUs sensors suits to track the whole skeleton of one user, as it has been recently released by the Heddoko company.

9.4.3. Potential benefits

Our laboratory is expert in designing and experimenting VR applications. For a few years, three phenomena initiated a shift in our expertise needs:

- the most recent improvements in network infrastructure offered by telecom companies allow people to be connected 24/7 anywhere on earth;
- this is aligned with the rise of wearable sensors to track the activities of users, providing a powerful dataset for interactivity in VR systems;
- the democratization of Virtual Reality since Facebook bought Oculus. Today common people know what Virtual Reality is, whereas we work since 15 years on its uses.

3D-LIVE project has started at the best moment for ARTS, to provide inertia to this shift and lead our research activities following this direction: provide a valuable Collaborative User Experience in Immersive Environments (remote or not), through various possibilities of interactions using latest available VR hardware combined with wearables, transmitted real time via existing networks.

9.5. SportsCurve

SportsCurve is a leading provider of real-time tracking for athletes and sporting event organizers, designed to meet the demands of professional athletes. SportsCurve technology represents the latest developments in GPS and telecommunications; extremely small, lightweight, and easy to use. The combination of state of the art satellite positioning solutions and detailed mapping data is a perfect basis for monitoring individual tracks, runs, rides and all other sporting experiences.

SportsCurve's main interest and motivation in being part of 3D LIVE was to leverage and analyse the different sensor capabilities for tracking outdoor sports athletes in real-time applications. Connection several types of Wearable Technologies to an athlete and transmitting this data in real-time, is one of the core business fields for SportsCurve's future business approach. Especially the so called area of "Gamifaction" has a huge potential for SportsCurve and therefore the experience and the results of the 3D LIVE project could help to address this topic at existing and new customers from the sports, gaming, media and lifestyle industry.

9.5.1. Specific results to be exploited

The 3D LIVE project has developed a breakthrough expertise in the so called "Twilight zone" using inertial indoor and outdoor sensors to track real-time body movements and translating such data into movements of avatars.

- SportsCurve enabled the projects with its deep market expertise in the field of Wearable Technologies. The concept how to use which sensors and which devices such as the HUD from Recon was crucial for the project.
- SportsCurve developed with its partner a dedicated API for retrieving the sensor data for android smartphone apps or with windows platforms. Based on this development also further application developments based on sensors are possible
- SportsCurve also used its existing customers base (mainly companies from its main shareholder Wearable Technologies AG) to spread the word about 3Dlive and to motivate those potential customers for looking in a deeper way to the project results. Involved companies are the once which were already mentioned in the overall exploitation part, but additional companies such as HTC, Sony, Intel or also Gaming companies such as Marvell were already addressed.

Overall SportsCurve could strength its position against existing customers such as Red Bull to be the preferred partner for real-time sportsdata transmission beside its existing pure GPS data services. Already now customers such as Red Bull are showing interest in the 3Dlive project results.

9.5.2. Implementation and use plan

SportsCurve is exploiting and using 3D Live results in commercial opportunities within the sports- / fitness, Media and consumer electronics industry:

- The mixed reality approach has produced a lot of interest at media companies such as Red Bull or companies from the Gaming industry. After testing first hopefully paid demos, we could go ahead. Especially the interest from the energy drink company Red Bull with their plenty of own developed events and also some Skiing World Cup title-sponsorships such as Kitzbuehl could be of interest.
- SportsCurve´s close link to the whole Wearable Technologies industry, will enable a lot of more interest for 3Dlive´s applications. At least also the company Recon Instruments comes from the ecosystem of the Wearable Technologies group.
- The automotive industry is also looking into this field with many different potential application. Based on the fact, that SportsCurve is a Munich based company with already existing links to BMW, we will also work on a presentation for the responsible people.
- SportsCurve main shareholder Wearable Technologies AG has its own early stage investment fund – after successful demonstrations against customers, also the creation of an own company / spin off for the consortia

9.5.3. Potential benefits

SportsCurve is able to enlarge its service portfolio against existing and new customers based on the outcome / reference of the 3D LIVE project. We see already in the upcoming next 12 month first potential projects as an outcome of the exploration / dissemination work.

9.6. CyberLightning

CyberLightning's mission has been changed since we started in this 3D LIVE project. Currently Cyberlightning Ltd is a global leader in providing intelligent end2end Internet of Everything (IoE) Application Platforms for operational and business use in the Smart City context. Cyberlightning is developing a real world and virtual world integration service portfolio and also enabling IoT networks to be controllable via mobile devices. Company's future proof, open source and open standards based Internet technology solution (CyberVille® enables efficient big data manipulation in auto-generated 3D models with no vendor lock-in. At the beginning of 3D LIVE project Cyberlighting Ltd was working with the 3D Internet and did offer a wide range of exclusive services and products enabling digital existence. CyberLightning did enable the digital existence in the Internet by providing content, space and identity for the crowd to safely be and act together in the new 3D Internet. CyberLightning's main interest and motivation in being part of 3D LIVE was study and understand what it takes to get into the "Twilight Zone". With the other words, can we create so immersive situation in the virtual environment that people can share experiences and do decisions based on that experience. This was mainly our interest and to take that experience into the 3D shops and other services where avatar and people behavior in the immersive situations is crucial. Also, a real time 3D rendering in mobile devices was one interest and still is. Gathering data from different wearables and data visualization it for e-Health applications is one point of interest for Cyberlightning.

9.6.1. Specific results to be exploited

In addition to the joint exploitation activities, CyberLightning aims at leveraging results from experimentations of sports activities, to demonstrate capabilities of 3D LIVE platform to third parties, such sports application SW developers, Gyms and HW developers. Another aspect is utilizing the data from wearable sensors for better eHealth services and applications. CyberLightning has developed the eHealth data visualization on the mobile device. eHealth applications are not on the main focus of Cyberlightning today, but they can be in the near future, so the results of the 3D LIVE can be thus used to improve the technological offer of Cyberlightning Ltd.

9.6.2. Implementation and use plan

Cyberlightning Ltd will leverage 3D LIVE results for Oulu Urban Living Labs (OULLabs, www.oullabs.fi) and for Test User Community (www.patiolla.fi) to identify new service opportunities for them. Cyberlightning will also discuss with local companies like CaddieON (Golf SW and HW, www.caddieon.com) and Polar Electro (wearables, heart rate monitoring, www.polar.com) in a view to develop more business or service platforms. Cyberlighting will also research how the data from wearable sensors can be utilized for better eHealth services and applications.

9.6.3. Potential benefits

As a potential benefits for Gyms (treadmills) or Golf Clubs (simulators, mobile applications) we can see new services and ways of doing new business. On the other hand, 3D LIVE consortium can benefit out of co-operation with Sports and eHealth HW manufactures, like Polar or Technogym, by specifying the HW interfaces to support their products.

10.Conclusion and Impact Indicators

The project partners have been very active in promoting the work done within the scope of the project and we consider this 24 months has been successful in raising interest and disseminating the results of 3D LIVE. See, chapters 6 and 7.

We will keep promoting our research activities and experimentation results as much as possible by publishing more articles, attending FIRE oriented conferences during the last remaining year of the project and through organising workshops with aim to promote interest within the community for the 3D LIVE research topics and technologies.

The assessment of the impact on the various target communities has been discussed and reported in this document.

Achieved results are listed here with respect to the dissemination and impact indicators set to the project at the beginning. The table metrics for second half of the project represents the months M13 to M30 since project was expanded by 6 months.

Indicators	**M12 Target**	**M30 Target**
FIRE Engagement indicators		
Indicator A: Concertation and Community Building activities: FIRE related Conferences attended	2	4
Indicator B: Concertation and Community Building activities: participation in FIRE / EXPERIMEDIA working Groups	1	2
Indicator C: Organisation of Joint Workshops with synergic projects within the FIRE Community	1	2
Indicator D: Production and update of the 3D-LIVE Dissemination Package	1	2
Dissemination indicators		
EU Countries reached	15	27
3D LIVE Network	1000	2500
# of Organizations reached	100	500
# of 3D LIVE Days organised	1	2
# of 3D LIVE related conference attended (other than FIRE)	3	6
# of Papers and Articles	3	7
Exploitation indicators		
# of participants effectively engaged in the 3D LIVE community	20	50
# of ideas collected through the 3D LIVE Call for ideas	0	20
Collection of intents for supporting the dissemination and the adoption of the 3D LIVE project results	20	50

Table 7: Impact indicators

The 3D LIVE dissemination activities have been done according to the following facts and indicators for M30:

- The 3D LIVE Project organised and took part actively in **12 main events** at European level and in **1 worldwide event** in this reporting period.
- A **Web 2.0** presence for 3D LIVE (www.3dliveproject.eu), including **LinkedIn** and **YouTube** for videos
    - Over 4700 individual views in "World's first live mixed reality ski competition race 4 and overall results" YouTube video
- Huge press impact with "World's first live mixed reality ski competition race" at WT conference, 3 days after event there was **found 52 articles** about 3D Live platform and skiing experience (Annex 12)
- **Over 8000 individual users** in Web between 1.1.2014-15.2.2015, about **125** in **LinkedIn** group and daily growing number of messages shared
- **Over 370 000 hits** and **over 28 700 visits** to the web site from Jan 2014 to end of Feb 2015
- **10 papers** have been published and presented**.**
- The 3D LIVE dissemination activities **reached more than 85 countries** where **26** of them were **EU Countries (Annex 13, web page statistics between Jan 2015 to Feb 2015)**
- 3D LIVE dissemination reached through web page and YouTube channel **more than 10000 individuals and their organizations,** actual number is much larger when dissemination done in multiple conferences are estimated.

As far as the exploitation activities are concerned, the 3D LIVE project have devised Unique Selling Propositions for its results and have therefore devised a sound exploitation strategy, based on a joint venture approach aimed at collaborating with established players in both sporting/gaming industry and ICT industry. Contacts with Recon and CaddieON Inc are under way. Recon is interested to utilize Skiing experience with their ski goggles, CaddieON Inc to investigate possibility to integrate their golf product with Golf experience.

There's also initial discussions ongoing with Technogym and other potential partners. To mention some companies, e.g. from WT conference StretchSense and Heddoko were companies which would be valuable candidates to be promoted to incorporate their products with 3D Live Platform.

In conclusion, the dissemination were successfully performed and the expected impact and objectives were mostly met during this reporting period, while significant progress was also accomplished as far as the exploitation activities are concerned.

Annex

Annex 1. 3rd Newsletter

Annex 2. 3D LIVE one pager for FIRE Brochure

RESEARCH PROJECTS

3D-LIVE

3D-LIVE develops and experiments a User Driven Mixed Reality and Immersive (Twilight) platform connected to EXPERIMEDIA facilities in order to investigate the Future Internet (FI) broadband capacity to support real-time immersive situations, and to evaluate both the Quality of Experience (QoE) and Quality of Service. The combination of FIRE testbeds and Living Labs enables both researchers and users to explore 3D/Media technologies and IoT in real and virtual environments and in live situations. Combining both FI technology and Tele-Immersion market pull establishes new requirements for Internet technology and infrastructure, and advances the creation and adoption of innovative FI Immersive services.

HOW DOES IT WORK?

3D-LIVE experiments and evaluates the Twilight Platform and 3D Tele-Immersive Environments in skiing, running and golfing scenarios. The selected FIRE facility is EXPERIMEDIA Schladming. Of particular interest is the EXPERIMEDIA advancement in new methods and algorithms for content processing targeting the efficient delivery of augmented reality to mobile devices and 3D processing for on the fly reconstruction of live events in indoor geolocalised spaces.

KEY ACHIEVEMENTS/RESULTS

The Project has developed a model and a methodology suitable for involving users in the design loop of Future Internet applications at an earlier stage: the resulting applications are exactly what the users require. Prototypes for a Twilight Tele-Immersive Environment have been developed allowing users dispersed geographically to practice their favourite sport as if they were together.

PROJECT FACTS

COORDINATOR: Marco Conte, Collaborative Engineering
EXECUTION: From 2012-09-01 to 2015-02-28
PARTNERS: Collaborative Engineering (Italy) (Coordinator), ARTS (France), University of Southampton (UK), Cyberlightning (Finland), Sportscurve (Germany), CERTH (Greece).

MORE INFORMATION: http://3dliveproject.eu

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Movie 5.3 3D LIVE - Jogging Scenario.

Project facts

COORDINATOR: Marco Conte, Collaborative Engineering

EXECUTION: From 2012-09-01 to 2015-02-28

MORE INFORMATION: http://3dliveproject.eu

http://3dliveproject.eu/

PARTNERS: Collaborative Engineering (Italy) (Coordinator), ARTS (France), University of Southampton (UK), Cyberlightning (Finland), Sportscurve (Germany), CERTH (Greece).

3D-LIVE

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Movie 5.2 3D LIVE - Golfing Scenario.

How does it work?

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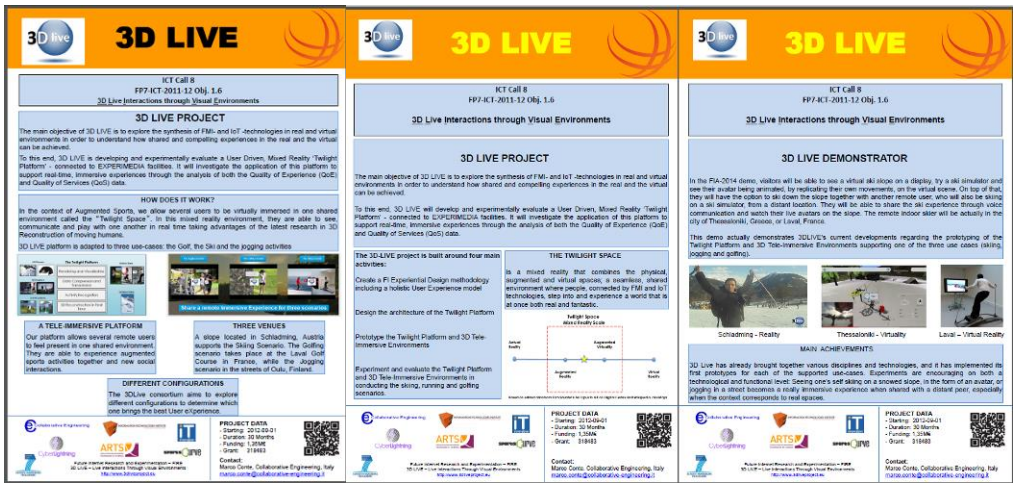
Key achievements/results

The Project has developed a model and a methodology suitable for involving users in the design loop of Future Internet applications at an earlier stage: the resulting applications are exactly what the users require. Prototypes for a Twilight Tele-Immersive Environment have been developed allowing users dispersed geographically to practice their favourite sport as if they were together.

Annex 3. 3D LIVE Posters and presentations for FIA Athens



Annex 4. 3D LIVE Poster for VIRC 2014 Laval

Annex 5. 4th newsletter

Annex 6. FIRE Brochure 2015 – 3D Live success story

SUCCESS STORY BY **3D-LIVE**

Experiments in a Twilight Space

PARTICIPANTS

Collaborative Engineering (Coordinator) (Italy)
ARTS (France)
University of Southampton (UK)
Cyberlightning (Finland)
Sportscurve (Germany)
CERTH (Greece)

CHALLENGE

In the modern world, the number of 3D capable devices are rapidly increasing bringing virtual reality closer to real the world. The 3D-LIVE project challenge was to study how to evaluate experiences in immersive environment where users are able to experience, feel and interact with real environments and real distant users in real time.

SOLUTION

The 3D-LIVE project developed a User Driven Mixed Reality platform connected to EXPERIMEDIA testbeds to investigate the Quality of Experience (QoE) and Quality of Services (QoS) when users are fully immersed into mixed environments. In the context of Augmented Sports, we allow several users to be virtually immersed in one shared environment called the "Twilight platform". In this mixed reality environment, they are able to see, communicate and play with one another in real time taking advantages of the latest research in 3D Reconstruction of moving humans. Our platform is adapted to three use-cases: the Golf, the Ski and the Jogging activities.

Twilight Platform which seamlessly connects indoor and outdoor users in Tele-immersive environment

The 3D-LIVE project main phases

- Creation of a Future Internet Experiential Design methodology including a holistic User Experience model to enable the continuous evaluation of the QoE and the QoS.
- Design and creation of open FI mediated Mixed Reality (Twilight) Platform supporting 3D Tele-Immersive Environments with social interaction in the context of live sport events. During the project new practices were created for:
  - Skeleton Capturing.
  - Pre-recorded animations usage.
  - Human 3D reconstruction.
- Experimentation and evaluation of the implemented Twilight Platform and 3D Tele-Immersive Environments with the skiing, running and golfing live scenarios.

3D Live experimentations

User experiences with Twilight platform in all 3D-LIVE scenarios were similar and encouraging: users enjoyed the experience and reported strong, positive attitudes towards future use. In some cases users wanted to schedule further events with each other after the experiment! Many of our joggers became competitive very quickly during these experiments! Others enjoyed interacting with each other in the shared environment via physical actions their avatars performed. Quality of Service and Quality of Experience data we captured were valuable and used to further improve the overall user experience.

FIRE CONTRIBUTION

The 3D-LIVE project has engaged with the FIRE community on a number of platforms including cross-project collaboration with EXPERIMEDIA (including the sharing of facilities; technologies and methods); the presentation of collaborations at workshops; and the dissemination of promotional material.

3D-LIVE

MORE INFORMATION:
3dliveproject.eu

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Annex 7. Ouest France newspaper – 6-Feb-2015

Laval
Saint-Berthevin - Changé
Bonchamp - Évron
Annonces emploi + TV Mag
1,15 € Vendredi 6 février 2015

ouest france

VISITEZ à BONCHAMP
la maison PASSIVE CONNECTÉE

«Ma mission, c'est l'unité»

- Renforcer la laïcité dès l'école
- Un service civique à partir du 1er juin
- Le retour de la « réserve citoyenne »
- Baisse du chômage : l'ultimatum de 2017

Page 2

Ukraine
Le plan de paix de Hollande et Merkel
Page 3

À Laval, une descente de ski virtuelle
C'est une première mondiale. Des ingénieurs lavallois ont participé à un projet inédit autour du ski virtuel. Il sera dévoilé aux jeux olympiques grâce à un casque de réalité augmentée. Cette innovation a été préparée à l'Ingénierium de Laval.
Page 8

Le gendarme radié continuait de sévir
Page 4

Mayenne
À Bruxelles avec Jean Arthuis, vétéran de la finance
Page 8
Reconstitution du double meurtre hier, à Courcité
Page 8

Laval

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Une descente de ski virtuelle imaginée à Laval

Participer à une compétition en mettant un simple casque relié à un ordinateur, c'est l'innovation que des ingénieurs lavallois ont mise au point. Le skieur virtuel a même remporté la course.

Un skieur professionnel a descendu la piste olympique de Schladming, en Autriche, lundi et mardi derniers. Il avait face à lui, deux compétiteurs un peu spéciaux, qui n'ont touché la neige qu'avec les yeux. Grâce à un simulateur virtuel, les deux concurrents, l'un à Munich, l'autre à Thessalonique, en Grèce, l'ont défié, grâce à la réalité augmentée.

Cette expérience a été rendue possible grâce à des Oculus rifts, des casques qui permettent de visualiser la piste, à distance. « **On a configuré les casques pour qu'ils reçoivent du contenu virtuel, jouable en temps réel. On entre dans la situation d'une descente à ski** », explique David Potier, ingénieur à Laval. Grâce à ce dispositif, mis en réseau via internet, il est possible de voir les concurrents et d'entendre le bruit des skis sur la neige.

Un projet collaboratif

C'est finalement le concurrent grec, équipé d'un casque en réalité virtuelle, donc, qui l'a emporté. Il a devancé le skieur professionnel qui, lui, a réellement effectué la descente en Autriche. Cette course a été retransmise en direct sur Internet, réunissant environ 350 spectateurs. « **Nous sommes très fiers que ce projet collaboratif soit parti de Laval** », se félicite Simon Richir, professeur à l'Ingénierium de Laval, qui a accompagné une douzaine d'ingénieurs dans cette aventure, en coordination avec cinq pays européens.

L'expérience du casque en réalité augmentée peut s'avérer perturbante. Son utilisation peut parfois provoquer des malaises. C'est pourquoi les ingénieurs de Laval ont intégré un retour sonore dans le casque, afin de créer une cohérence entre la vue et l'ouïe. « **On souhaite rendre l'approche intéressante pour les joueurs, créer la sensation de vitesse, mais on ne veut pas créer de décalage sensoriel** », précise David Potier, enthousiaste. Simon Richir confirme : « **Nos nouveaux usages sont centrés sur l'utilisateur, la technologie vient seulement en appui** ».

Cette innovation intéresse déjà des grands noms de la Net économie. Exemple : Marc Zuckerberg, patron de Facebook, a récemment racheté, pour deux milliards de dollars, l'entreprise qui produit l'Oculus rift, et qui collabore avec les ingénieurs de Laval. « **Le patron de Facebook vient de le découvrir, mais nous, cela fait longtemps qu'on travaille dessus** », se vante Simon Richir, qui travaillent sur d'autres projets sportifs, tels que le golf, en collaboration avec le club de golf de Laval.

Cette technologie pourra également être utilisée pour s'immerger dans un film. « **Nous aurons pu être aussi dans la finale du championnat du monde de handball, aux côtés de l'entraîneur ou des joueurs** », imagine Simon Richir.

Le casque sera présenté au prochain salon de Laval Virtual, du 9 au 13 avril. « **Vous pourrez le constater, ajoute-t-il, l'effet « Wiiouh ! » est bien là.** »

Clément BRAULT.

Le dispositif technique à l'Ingénierium de Laval.

Des journalistes de la rédaction et des lecteurs, chez M'Lire, offert le café et les viennoiseries.

Ouest-France était chez M'Lire

Les journalistes de Laval étaient invités à tenir leur conférence de rédaction dans les locaux de la librairie du centre-ville.

Une quinzaine de personnes étaient au rendez-vous, d'« Ouest-France paye le café », hier matin chez M'Lire, la librairie de la rue de la Paix. Depuis novembre, nous, journalistes de la rédaction, tenons quelques-unes de nos conférences de rédaction en public ou dans des entreprises.

Après le café Marie Tourrelle un jour de marché, nous avons été invités à l'hôpital de Laval, au siège du Crédit agricole ou encore au Forum des métiers. À chaque fois, l'idée est la même : montrer concrètement comment les journalistes travaillent et répondre aux questions.

Hier, on a beaucoup parlé du traitement de l'actualité des associations.

« On a le s… tage d'arti… sportives … confié un l… sociation d… atteintes d… Il n'y a pas … du les jour… essaie de … tivité des … par le port… le compte … nérale.

Pour invite… daction da… fil d'écrire … france.fr

À gauche, le compétiteur virtuel portant le casque Oculus rift. À droite, la vue de la piste de ski, à l'intérieur du casque de réalité virtuelle.

Ouest-France à votre service

Annoncer un événement (réunions, fêtes, loisirs) :
Passer une petite annonce par téléphone : 0 820 … réservé aux particuliers : 0,12 € TTC la minute).
Publicité : Précom, 6, rue de la Paix, tél. 02 43 59 …

Annex 8. Greece newspaper – Article of 3D Live project

Αγγελιοφόρος
Κυριακή 8 Φεβρουαρίου 2015

ΚΟΙΝΩΝΙΑ
ΡΕΠΟΡΤΑΖ

21

Γεύση από το τρισδιάστατο μέλλον

Πρωτοποριακή εφαρμογή παρουσιάστηκε στο 15ο συνέδριο «Φορετής Τεχνολογίας» στο Μόναχο

ΡΕΠΟΡΤΑΖ ΜΑΡΙΑ ΛΙΤΟΥ
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ΦΩΤΟΓΡΑΦΙΕΣ ΠΑΥΛΟΣ ΜΑΚΡΙΔΗΣ/ MEGAPRESS

Ο έμπειρος σκιέρ Βέγκαρντ Ενγκεν βρίσκεται στην παγκοσμίου φήμης πίστα του Schladming στις αυστριακές Άλπεις, ο Μπένζαμιν Πουσάρ στο συνεδριακό χώρο του Μονάχου και ο Αλέξανδρος στις εγκαταστάσεις του ΕΚΕΤΑ (Εθνικό Κέντρο Έρευνας και Τεχνολογιακής Ανάπτυξης) στη Θεσσαλονίκη.

Ο Αλέξανδρος Δουμάνογλου ενώ κάνει σκι σε κλειστό χώρο σαν να βρίσκεται στην πίστα του Schladming, στις αυστριακές Άλπεις, με τους συναδέλφους του

Ο δρ Δημήτριος Ζαρπαλάς δείχνει πώς συνυπάρχουν τρισδιάστατα οι τρεις σκιέρ και η επίδειξη μεταδίδεται ζωντανά σε συνέδριο στο Μόναχο

Η ομάδα «3D-Live» αποτελείται από τους Πέτρο Δάρα, Δημήτρη Ζαρπαλά, Δημήτρη Αλεξιάδη και Αλέξανδρο Δουμάνογλου

Στην οθόνη του υπολογιστή φαίνονται σε πραγματικό χρόνο και οι τρεις σκιέρ που συναγωνίζονται στον παγκόσμιο εικονικό αγώνα, αν και βρίσκονται σε διαφορετικά μέρη του κόσμου

Χιλιάδες χιλιόμετρα μακριά ο ένας από τον άλλον, κι όμως οι τρεις νέοι κατάφεραν να βρεθούν σε πραγματικό χρόνο για να μοιραστούν μια συναρπαστική εμπειρία. Εκείνον σκι, ταυτόχρονα, ο ένας διασχίζαν την πλαγιά πραγματικά και οι άλλοι δυο εικονικά. Ήταν η πρώτη φορά παγκοσμίως που άνθρωποι οι οποίοι βρίσκονταν σε απομακρυσμένα σημεία μοιράστηκαν, με ρεαλιστικές και τρισδιάστατες αναπαραστάσεις, να συναντιόνται σε εικονικό κόσμο και σε πραγματικό χρόνο, συμμετέχοντας σε μια κοινή δραστηριότητα.

Αυτός ο αγώνας σκι, ο 1ος Παγκόσμιος Διαδραστικός Αγώνας Σκι Μεικτής Πραγματικότητας (World's 1st Mixed Reality Ski Competition), ήταν διαφορετικός: οι δύο στους τρεις σκιέρ ήταν ερευνητές και η εφαρμογή της εικονικής πραγματικότητας που ανέπτυξαν αποτελεί παγκόσμια πρωτοπορία που ανοίγει το δρόμο για τη δημιουργία των πλέον εξελιγμένων παιχνιδιών του μέλλοντος.

Πρωταγωνιστές από τη Θεσσαλονίκη

Ανάμεσα στους πρωταγωνιστές, μέλη της ομάδας του Ινστιτούτου Τεχνολογιών και Πληροφορικής (ΙΤΠΗΛ) του ΕΚΕΤΑ και συγκεκριμένα του Εργαστηρίου Οπτικής Πληροφορικής, που έκλεψαν τα ενημέρωσεις και για έναν ακόμη λόγο: ο δρ Πέτρος Δάρας, επιστημονικός υπεύθυνος, ο συνεργάτης δρ Δημήτριος Ζαρπαλάς και οι ερευνητές δόκτορες Δημήτριος Αλεξιάδης και Αλέξανδρος Δουμάνογλου παρουσίασαν την καινοτόμα εφαρμογή σε αληθινό χρόνο στο 15ο Συνέδριο «Φορετής Τεχνολογίας» (Wearable Technologies Conference), το οποίο διεξαγόταν την περασμένη Τρίτη στο Μόναχο. Ερευνητές από κάθε γωνιά του κόσμου που παρακολουθούσαν τη ζωντανή επίδειξη έμειναν εντυπωσιασμένοι από την παγκοσμίως καινοτόμα τεχνολογία που ανέπτυξε η ομάδα των νέων επιστημόνων, στο πλαίσιο του 3D-Live (3D Living Interactions Through Visual Environments). Το πείραμα παιχνίδι μεταδόθηκε και από το BBC, μαγνητίζοντας τα βλέμματα της διεθνούς επιστημονικής κοινότητας.

Η ελληνική ερευνητική ομάδα συνεργάστηκε με ερευνητές από τη Μεγάλη Βρετανία, την Ιταλία, τη Γαλλία, τη Γερμανία και τη Φινλανδία.

Και άλλες εφαρμογές

Οι τεχνολογίες που ανέπτυξαν στο ΙΤΠΗΛ βρίσκουν εφαρμογές όχι μόνο στο σκι αλλά και σε άλλες αθλητικές δραστηριότητες, όπως τρέξιμο και γκολφ. Έτσι, ενώ κάποιος κάνει το απογευματινό του τζόκινγκ στη Φινλανδία, κάποιος από το σπίτι του στη Θεσσαλονίκη θα μπορεί να παρακολουθεί το avatar του Φινλανδού φίλου του να προβάλλεται στον εικονικό κόσμο της φινλανδικής πόλης, χάρη σε πληροφορίες που προέρχονται από το gps του κινητού του. Οι δύο φίλοι θα συναθλούνται, ακόμη και αν ο ένας βρίσκεται στο σπίτι του, αρκεί να διαθέτει ένα διάδρομο τρεξίματος, μια μεγάλη οθόνη που θα αναπαριστά την φινλανδική πόλη, το avatar του Φινλανδού φίλου του να τρέχει, καθώς και την τρισδιάστατη αναπαράσταση του ίδιου να τρέχει σε πραγματικό χρόνο.

«Οι τεχνολογίες αυτές μπορούν να εφαρμοστούν και σε νέου τύπου παιχνίδια, στο διαδικτυακό σινεμά και στο πεδίο των διοικητικών», εξηγεί ο κ. Δάρας, επισημαίνοντας τις ομάδες που έχει βραβευτεί για την επιτυχημένη έρευνα σε νέες τεχνολογίες από παγκόσμιους φορείς όπως το IEEE (Institute of Electrical and Electronics Engineers).

Το πρωτότυπο πείραμα

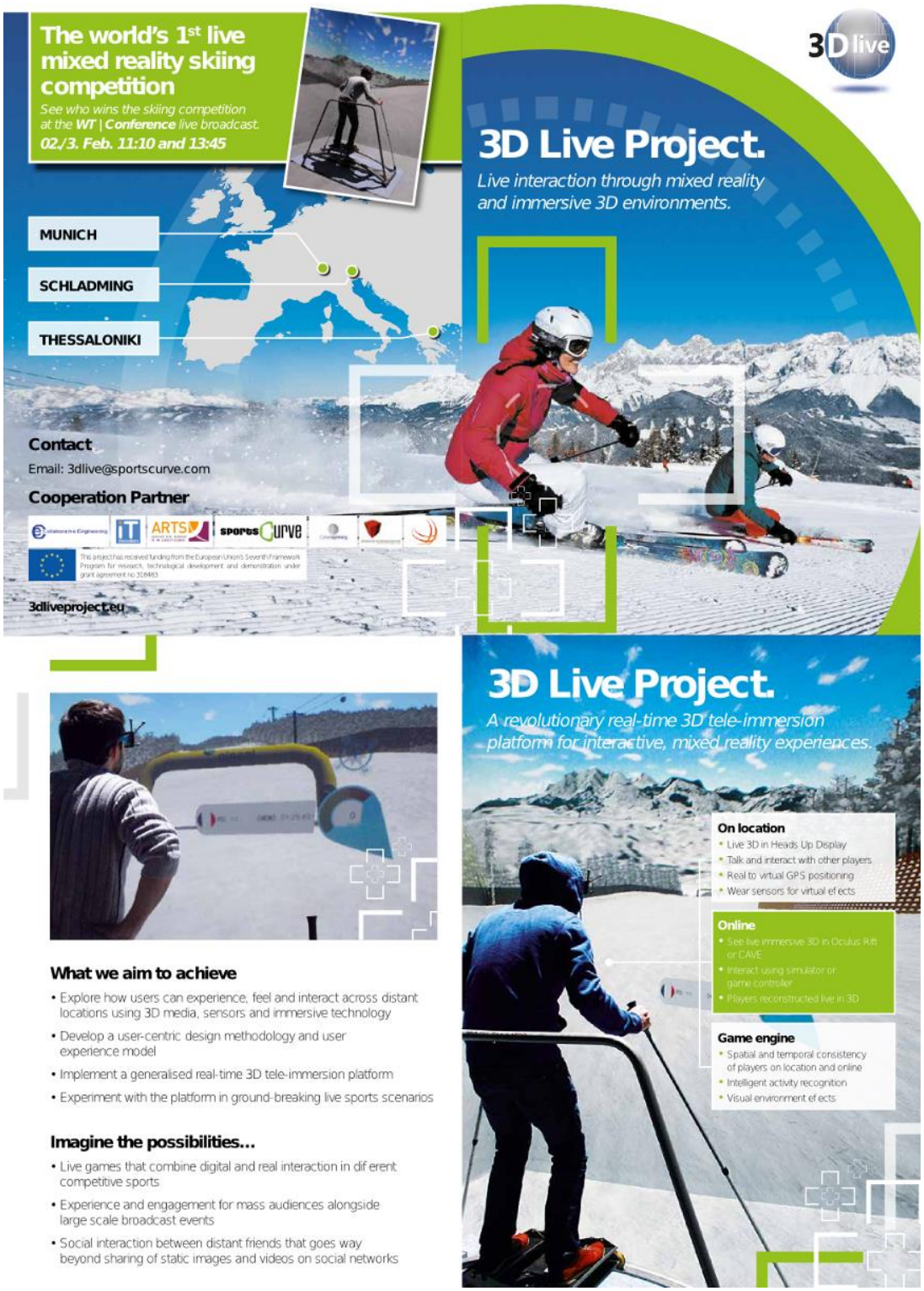
Για τις ανάγκες του προγράμματος, οι εγκαταστάσεις του ΙΤΠΗΛ στη Θέρμη μετατράπηκαν σε ένα απέραντο... πειραματικό εργαστήριο από το Σεπτέμβριο του 2012. Οι ερευνητές αφοσιώθηκαν στις τεχνολογίες αιχμής και προσπάθησαν να τις αξιοποιήσουν για να καταγράψουν και να αναπαραστήσουν ανθρώπους σε τρεις διαστάσεις και σε πραγματικό χρόνο. Τελικός στόχος, να δημιουργήσουν μία πλατφόρμα ώστε να μπορούν οι άνθρωποι αυτοί να «συναντηθούν» σε περιβάλλον εικονικής πραγματικότητας.

Χρησιμοποιώντας ως εξοπλισμό ηλεκτρονικούς υπολογιστές, τρισδιάστατους αισθητήρες, αισθητήρες εκτίμησης κίνησης και βάθους τύπου Microsoft Kinect, υλοποίησαν τρισδιάστατους κόσμους - αντίγραφα πραγματικών.

Όταν όλα ήταν έτοιμα και τα τεστ είχαν ολοκληρωθεί με επιτυχία, δόθηκε το σήμα για την εκκίνηση των αγώνων σκι. Ο Αλέξανδρος Δουμάνογλου πήρε θέση επάνω σε μια πλατφόρμα σε ειδικά διαμορφωμένο χώρο στο ΙΤΠΗΛ με εγκατεστημένες κάμερες, αισθητήρες και σύστημα ηλεκτρονικών υπολογιστών, φόρεσε ακουστικά και δήλωσε έτοιμος να συναγωνιστεί τον Βέγκαρντ από την πλαγιά των αυστριακών Άλπεων και τον Μπένζαμιν από το Μόναχο. «Έζησα την εμπειρία του αθλήματος σε εικονικό χώρο αλλά στον ίδιο χρόνο με τους συναθλητές μου. Ήταν σαν να έκανα αληθινό σκι. Φανταστείτε ότι ιδρώσα, αν και βρισκόμουν σε κλειστό χώρο. Είχε πλάκα να μιλάς με τον άλλον και να τον βλέπεις να σε προσπερνά. Νιώθεις ανταγωνιστικά, όσο κι αν πρόκειται για ένα διασκεδαστικό παιχνίδι. Η πίστα είχε εμπόδια, ορισμένα δεν τα πέρασα και είχε πέναλτι χρόνου. Παρ' όλα αυτά, έκανα καλό χρόνο, κάτι δύσκολο για τον Βέγκαρντ, επαγγελματία σκιέρ, ο οποίος κουράστηκε κάνοντας σκι στην πλαγιά. Και εκείνος, φορώντας γυαλιά προσομοίωσης, έβλεπε τον ίδιο εικονικό κόσμο με εμένα και τον Μπένζαμιν, στο Μόναχο, και κάναμε όλοι μαζί σκι», δήλωσε κατενθουσιασμένος στον «Α.Κ» ο κ. Δουμάνογλου, κρατώντας λίγο μετά το... εικονικό χρυσό κύπελλο.

Annex 9. Munich Feb 2015, WT conference banners

Annex 10. Munich Feb 2015, WT conference Flyer



Annex 11. Web news articles after Munich WT conference

#	Country	Magazine/Website/organization	Article / Link
1	UK	Univ of Southampton	http://www.ecs.soton.ac.uk/news/4616
2	UK	MotherBoard VICE	http://motherboard.vice.com/read/a-mixed-reality-ski-race-put-skiers-in-three-countries-on-the-same-slope
3	UK	MobileMarketing magazine	http://mobilemarketingmagazine.com/3dlive-world-first-mixed-reality-ski-race
4	UK	(e) Sciences News	http://esciencenews.com/sources/physorg/2015/02/02/worlds.first.real.time.mixed.reality.ski.race
5	UK	E&T magazine	http://eandt.theiet.org/news/2015/feb/mixed-reality-3d.cfm
6	UK	Phys.Org	http://phys.org/news/2015-02-worldUKK-real-time-reality.html
7	UK	ViralNewsChart	http://www.viralnewschart.com/ShowLink.aspx?linkId=91002932
8	UK	Daily Echo	http://www.dailyecho.co.uk/news/11768539.3D_platform_allows_skiers_to_race_across_the_world/
9	UK / World	BBC News Technology	http://www.bbc.co.uk/news/technology-31145807
10	France	Arts et Mériers ParisTech	http://www.ensam.eu/Actualites/Competition-entre-un-skieur-et-2-joueurs-en-realite-virtuelle?utm_source=feedburner&utm_medium=feed&utm_campaign=Feed%253A+Association-GadzOrg+%28Arts+et+M%25C3%25A9tiers+ParisTech%29
11	France	Scoopnest	http://www.scoopnest.fr/user/motherboard/562610952311668738
12	France	Industrie et Techno	http://www.industrie-techno.com/une-competition-de-ski-en-realite-augmentee.36109
13	France	Ouest France	http://www.ouest-france.fr/laval-toujours-en-pointe-sur-la-realite-virtuelle-3165755
14	France	PanoraNews	http://panoranews.com/articles/1163657-laval-toujours-en-pointe-sur-la-reacutealiteacute-virtuelle
15	France	Maville.com	http://www.laval.maville.com/actu/actudet_-laval-toujours-en-pointe-sur-la-realite-virtuelle_52731-2710268_actu.Htm
16	France	Genereation-VR	https://generation-vr.com/news/9-du-ski-en-realite-mixte-grace-a-loculus-rift.html
17	France	L'ecrit du web	http://lecriduweb.fr/blog/2015/02/03/une-competition-de-ski-en-realite-augmentee/
18	France	Immersion Virtuelle	http://immersion-virtuelle.com/la-premiere-competition-de-ski-virtuelle-et-reelle/

19	France	FaceBook RA channel	https://www.facebook.com/permalink.php?id=233646354970&story_fbid=10150464306554971
20	France	Association de pomotion de la realite aumgentee	http://www.augmented-reality.fr/2015/02/augmented-times-les-nouvelles-hebdomadaires-de-la-realite-augmentee-s7/
21	France	RVA (Realite Virtuelle Realite Augmentee)	http://www.realite-virtuelle-augmentee.com/oculus-rift/experience-de-ski-virtuelle-a-ete-rendue-possible-grace-a-loculus-rift/
22	Germany	Virtual Reality Magazine	http://www.virtual-reality-magazin.de/das-erste-echtzeit-mixed-reality-skirennen
23	Germany	Win Verlag magazine	www.win-verlag.de/mit-mixed-reality-auf-die-piste
24	Austria	OE24	http://www.oe24.at/digital/Skipiste-kommt-live-ins-Wohnzimmer/175284122
25	India	PrayerApp : Future of Technology	http://prayerapp.in/a-mixed-reality-ski-race-put-skiers-in-three-countries-on-the-same-slope/
26	Sri Lanka	VivaLanka	http://www.vivalanka.com/newspage/851965ai-skier-races-oculus-wearing-virtual-reality-rivals-hill-won
27	Canada	xt1.ca info - news	http://xt1.ca/info/fr/ski-premiere-competition-en-realite-mixte-au-monde-video-et-resultats
28	US	C|NET (CBS)	http://www.cnet.com/news/skier-races-oculus-wearing-virtual-reality-rivals-down-the-same-hill/
29	US/ Europe	Gamasutra	http://www.gamasutra.com/view/pressreleases/235538/European_project_launches_the_worldrsquos_first_realtimelsquomixed_realityrsquo_ski_race.php
30	US	Muck Rack	http://muckrack.com/link/yRg75/a-mixed-reality-ski-race-put-skiers-in-three-countries-on-the-same-slope
31	US/ Europe	FudZilla	http://www.fudzilla.com/news/36898-real-skier-takes-on-virtual-reality-gamers
32	US	The Daily Dot	http://www.dailydot.com/technology/skiing-3d-live-virtual-reality/
33	US	The Next Mob	http://thenextmob.com/2015/02/03/spotlight-3dlive-and-the-worlds-first-mixed-reality-ski-race/
34	US	CrossMap	http://www.crossmap.com/news/oculus-rift-consumer-version-updates-skiers-stationed-in-austria-greece-and-germany-all-raced-down-the-same-run-at-the-same-time-thanks-to-vr-and-gaming-technology-16299
35	World News	Technology Blog	http://tech-blog.org/computer-sciences-news/cluster1144278/

36	World News	Discovery News	http://news.discovery.com/tech/gear-and-gadgets/real-downhill-racer-to-battle-two-virtual-skiers-150202.htm
37	World News	ICT FIRE	http://www.ict-fire.eu/news/view/article/worlds-1st-mixed-reality-skiing-competition-on-live-successfully-completed-at-munich-wt-conferenc.html
38	World News	Rift Dev	http://riftdev.com/european-project-launches-the-worlds-first-real-time-mixed-reality-ski-race/
39	World News	Technologycloud	http://technologycloud.org/crave/skier-races-oculus-wearing-virtual-reality-rivals-down-the-same-hill-see-who-won/
40	World News	WearableElectronics.org	http://www.google.fr/url?sa=t&rct=j&q=&esrc=s&source=web&cd=23&ved=0CDEQFjACOBQ&url=http%3A%2F%2Fwearableelectronics.org%2Farticle%2Feuropean-project-launches-the-world-39-s-first-real-time-39-mixed-reality-39-ski-race%2F54cf66cbf4c29371c5060b67&ei=UDjTVJSlII7OaNnPgYAC&usg=AFQjCNGBvd_0OPkLQgFpoFq80t75NH0tRA&sig2=ehb0N59Vl1JMuXfFglFnkg&bvm=bv.85142067,d.d2s
41	World News	ScienceNewsDaily	http://www.sciencenewsdaily.org/computer-sciences-news/
42	World News	TheSenpai.com	http://www.thesenpai.com/skier-races-oculus-wearing-virtual-reality-rivals-down-the-same-hill-see-who-won
43	World News	BlogLovin.com	https://www.bloglovin.com/blogs/cnet-5805803/skier-races-oculus-wearing-virtual-reality-4166167177
44	World News	WN.com (WorldNews Network)	http://article.wn.com/view/2015/02/04/Skier_races_Oculuswearing_virtual_reality_rivals_down_the_sa/
45	World News	Awaiter.com	http://awaiter.com/news.php?id=730898
46	World News	HotHeadlines.com	http://www.hotheadlines.com.au/redirect.php?h=Skier_races_Oculus_wearing_virtual_reality_rivals_down_the_same_hill_see_who_won&artid=3755716
47	World News	HiTech News.org	http://hitechnews.org/crave/skier-races-oculus-wearing-virtual-reality-rivals-down-the-same-hill-see-who-won/
48	World News	NetKafa	http://www.netkafa.com/2015/02/04/1417344/skier-races-oculus-wearing-virtual-reality-rivals-down-the-same-hill-see-who-won
49	Middle East Asia	T3.com	http://www.t3me.com/en/news/wearable-devices/vr-headsets/watch-world%E2%80%99s-first-mixed-reality-skiing-competition
50	World News	Slahdot	http://beta.slashdot.org/submission/4180785/skiin

			g-competition-merges-real-life-slopes-with-virtual-reality
51	US	Technodaliies	http://www.technodailies.com/News/Technology/Skiing-competition-merges-real-life-slopes-with-virtual-reality-303499
52	World Scientific & Edu	ACM	http://cacm.acm.org/news/182976-european-project-launches-the-worlds-first-real-time-mixed-reality-ski-race/fulltext

Annex 12. 3D LIVE web page, visitor origin country statistics (Jan-Feb 2015)

EU countries	#	Other countries	#	Other countries	#
Belgium	1	**Albania**	27	**Jordan**	56
Bulgaria	2	**Algeria**	28	**Kazakhstan**	57
Croatia	3	**Argentina**	29	**Kenya**	58
Cyprus	4	**Australia**	30	**Kyrgyzstan**	59
Czech Republic	5	**Austria**	31	**Laos**	60
Denmark	6	**Azerbaidjan**	32	**Lebanon**	61
Finland	7	**Bahamas**	33	**Malaysia**	62
France	8	**Bahrain**	34	**Mexico**	63
Germany	9	**Bangladesh**	35	**Morocco**	64
Great Britain	10	**Belarus**	36	**New Zealand**	65
Greece	11	**Brazil**	37	**Pakistan**	66
Hungary	12	**Canada**	38	**Palestinian Territories**	67
Ireland	13	**Chile**	39	**Peru**	68
Italy	14	**China**	40	**Philippines**	69
Latvia	15	**Colombia**	41	**Qatar**	70
Lithuania	16	**Congo**	42	**Republic of Serbia**	71
Luxembourg	17	**Costa Rica**	43	**Russian Federation**	72
Malta	18	**Ecuador**	44	**Saudi Arabia**	73
Netherlands	19	**Egypt**	45	**Singapore**	74
Poland	20	**El Salvador**	46	**South Africa**	75
Portugal	21	**Estonia**	47	**South Korea**	76
Romania	22	**Georgia**	48	**Sri Lanka**	77
Slovak Republic	23	**Guatemala**	49	**Switzerland**	78
Slovenia	24	**Hong Kong**	50	**Taiwan**	79
Spain	25	**India**	51	**Thailand**	80
Sweden	26	**Indonesia**	52	**Turkey**	81
		Iran	53	**Ukraine**	82
		Israel	54	**United States**	83
		Japan	55	**Venezuela**	84
				Vietnam	85

Annex 13. IPR ASSET Table

Asset	Partners (Ownership)	IPR Status	Remarks
UX model and methodology	CENG	CENG will make it available on a royalty free basis for 3D LIVE related projects and initiatives	Guidelines and process to conduct UX sessions (co-creation, exploration, experimentation and evaluation) to co-design new FI services and apps. Work completed
Environment Reconstruction Service	IT Innovation	Available in accordance with the terms of consortium agreement. Specific rights to be negotiated on a case-by-case basis.	Web service for classifying visual effects based on environment observations. Work Completed
Environment Observation Service	IT Innovation	Available in accordance with the terms of consortium agreement. Specific rights to be negotiated on a case-by-case basis.	Mobile application for sensing weather conditions. Work Completed
Outdoor HUD Skier Application	IT Innovation, ARTS	Available in accordance with the terms of consortium agreement. Specific rights to be negotiated on a case-by-case basis.	Mobile application for Recon Goggles supporting the outdoor using in the skiing scenario Work Planned
QoE and QoS Assessment Experimental Methodology through EXPERIMonitor (ECC)	IT Innovation, ARTS	Processes Creative Commons Attribution 4.0 International Tools (EXPERIMonitor) are LGPL v3	Processes and tools supporting user centric trials for assessment of QoE and QoS Work Completed
3D Reconstruction Pipeline Performance Models	IT Innovation, CERTH	Available in accordance with the terms of consortium agreement. Specific rights to be negotiated on a case-by-case basis.	Simulation models and knowledge about the performance of the 3D reconstruction pipeline under different network infrastructure conditions Work in Progress
Outdoor jogger application	Cyberlightning ltd.	Available in accordance with the terms of consortium agreement. Specific rights to be negotiated on a case-by-case basis.	Android application for outdoor scenario, which handles GPS-location tracking, motion sensor tracking and transmission of data to indoor users.

AMQP messaging plugin	Cyberlightning ltd.	Available in accordance with the terms of consortium agreement. Specific rights to be negotiated on a case-by-case basis.	Plugin for RealXtend which connects to AMQP-server and relays messages to other modules of realXtend.
Skeleton animation component for RealXtend	Cyberlightning ltd.	Available in accordance with the terms of consortium agreement. Specific rights to be negotiated on a case-by-case basis.	Entity-Component in RealXtend rendering module, which animates avatar using Kinect data from AMQP-module.
Intermediate web service between outdoor <-> indoor jogging client software.	Cyberlightning ltd.	Available in accordance with the terms of consortium agreement. Specific rights to be negotiated on a case-by-case basis.	Service which stores data of outdoor jogger android application updates and handles ERS requests from RealXtend clients.
Webservice communication plugin for RealXtend	Cyberlightning ltd.	Available in accordance with the terms of consortium agreement. Specific rights to be negotiated on a case-by-case basis.	Plug-in for RealXtend, which communicates with intermediate web service to query ERS and outdoor jogger data.
Golfing Indoor/Outdoor Scenario Implementation under Unity 3D(Windows, Android)	ARTS	Available in accordance with the terms of consortium agreement. Specific rights to be negotiated on a case-by-case basis.	It corresponds to the design and implementation of all the scenario and game elements inside Unity3D (this apply to Ski and Golf use-cases) Work in Progress
Skiing Indoor/Outdoor Scenario Implementation under Unity3D (Windows, Android)	ARTS	Available in accordance with the terms of consortium agreement. Specific rights to be negotiated on a case-by-case basis.	It corresponds to the design and implementation of all the scenario and game elements inside Unity3D (this apply to Ski and Golf use-cases) Work in Progress
Environment Reconstruction component for Unity3D (Windows, Android)	ARTS, IT Innovation		Environment request manager based on the ERS specifications from IT Innovation. + Weather effects adoptions on the Unity plug-in for Unity3D. Work complete
Kinect based skeleton capturing and filtering (Kinect capturer)	CERTH	Available in accordance with the terms of consortium agreement. Specific rights to be negotiated on a case-by-case basis.	Module to capture the skeleton data and filter the noise, to offer more realistic avatar movement. Work complete

Kinect based skeleton capturing and filtering from multiple Kinects (Kinect capturer)	CERTH	Available in accordance with the terms of consortium agreement. Specific rights to be negotiated on a case-by-case basis.	Module to capture the skeleton data from multiple kinects, that filters the noise, and merges the multi skeleton data, to offer more realistic avatar movement that overcomes (self-) occlusions. Work complete
Skeleton Animation component for Unity3D (Windows, Android)	ARTS, CERTH		Component able to handle incoming skeleton animation from CERTH Kinect Capturer, and animate an avatar under Unity3D. Work Complete
3D Human Reconstruction creation module	CERTH	Available in accordance with the terms of consortium agreement. Specific rights to be negotiated on a case-by-case basis.	Component able to create the 3D human reconstruction in real-time. Work complete
Compression, decompression and transmission of 3D reconstructed humans	CERTH	Available in accordance with the terms of consortium agreement. Specific rights to be negotiated on a case-by-case basis.	Component able to compress, transmit and decompress the produced 3D reconstruction. Work complete
3D-reconstruction rendering module for RealXtend	CERTH, Cyberlightning ltd.	Available in accordance with the terms of consortium agreement. Specific rights to be negotiated on a case-by-case basis.	Module for RealXtend, which handles 3D-reconstruction rendering in rendering module.
3D-reconstruction rendering module for Unity 3D	CERTH, ARTs	Available in accordance with the terms of consortium agreement. Specific rights to be negotiated on a case-by-case basis.	Module for Unity 3D, which handles 3D-reconstruction rendering in rendering module.
ExperiMonitor component for Unity3D	ARTS, IT Innovation		Unity3D Client of the ExperiMonitor service based on the API provided by IT Innovation. Work complete

Activity recognition of joggers based on kinect data.	CERTH	Available in accordance with the terms of consortium agreement. Specific rights to be negotiated on a case-by-case basis.	Posture evaluation, and posture based speed estimation of joggers Work complete
Activity recognition of skiers based on kinect data.	CERTH	Available in accordance with the terms of consortium agreement. Specific rights to be negotiated on a case-by-case basis.	Posture evaluation, and posture based speed estimation of skiers Work complete
Activity Recognition of skiers based on Wii balance board/Pro Ski Simulator	ARTS	Available in accordance with the terms of consortium agreement. Specific rights to be negotiated on a case-by-case basis.	Process, sensors, and algorithm to move an avatar thanks to the movements of the real user. Work complete
Activity Recognition of Golf shots using IMU sensors for Unity 3D (Windows, Android)	ARTS	Available in accordance with the terms of consortium agreement. Specific rights to be negotiated on a case-by-case basis.	Algorithm to connect the EXEL IMU sensors to Unity3D + Algorithm of shot characteristics calculation + Physics algorithms applied to the virtual golf ball. Work in Progress
GUI elements of the scenarios Ski Golf	ARTS	Available in accordance with the terms of consortium agreement. Specific rights to be negotiated on a case-by-case basis.	GUI design and individual elements produced for the three scenarios. Work complete
Trajectory prediction algorithm based on GPS and Inertial sensor data fusion for Unity3D	ARTS	Available in accordance with the terms of consortium agreement. Specific rights to be negotiated on a case-by-case basis.	Algorithm fusing GPS data with inertial data to predict the trajectory of an avatar under Unity3D Work in progress
RabbitMQ messaging plug-in for Unity3D	ARTS	Available in accordance with the terms of consortium agreement. Specific rights to be negotiated on a case-by-case basis.	Work complete
Unity3D game server	ARTS	Available in accordance with the terms of consortium agreement. Specific rights to be negotiated on a case-by-case basis.	The Game server handling all the game data information between the users Work complete

Custom map tracking tools for 3DLive in Unity3D (Windows/Android)	ARTS	Available in accordance with the terms of consortium agreement. Specific rights to be negotiated on a case-by-case basis.	Map and drawing algorithm to display smoothly the users locations on a map using Unity3D. Work complete
Followers Social Platform	ARTS, IT Innovation,	Available in accordance with the terms of consortium agreement. Specific rights to be negotiated on a case-by-case basis.	Android application integrating the common Unity 3DLive games components + ERS requests. Work in progress
Events messaging and Logger under Unity3D	ARTS	Available in accordance with the terms of consortium agreement. Specific rights to be negotiated on a case-by-case basis.	Text messaging logging each event (using the same protocol than the voice chat plugin for Unity3D) and sharing it among users. Work complete.
3D Models of the Golfing scenario	ARTS	Available in accordance with the terms of consortium agreement. Specific rights to be negotiated on a case-by-case basis.	The Unity terrain, and the scene arrangement of the Golfing scenario
3DModels of the Skiing scenario	ARTS, IT Innovation	The slope was scanned. Is this the property of IT Innovation? All the other 3Dmodels are available in accordance with the terms of consortium agreement. Specific rights to be negotiated on a case-by-case basis.	The Unity terrain belongs to ARTS, based on a slope scanned by IT Innov. The 3D elements of the scene belong to ARTS.
Android API for managing sensor data via Bluetooth connectivity	SportsCurve	Available in accordance with the terms of consortium agreement. Specific rights to be negotiated on a case-by-case basis.	API for managing the sensor data with max. 4 sensors in parallel for Android OS. The API is developed dedicated for the handling via Bluetooth 2.1
Java Unity 3D sensor data app for calling the retrieving sensor data in background	ARTS,	Available in accordance with the terms of consortium agreement. Specific rights to be negotiated on a case-by-case basis.	Java Unity 3D sensor data app for calling the retrieving sensor data in background

Windows API for managing sensor data via Bluetooth connectivity	SportsCurve	Available in accordance with the terms of consortium agreement. Specific rights to be negotiated on a case-by-case basis.	API for managing the sensor data with max. 4 sensors in parallel for Windows OS. The API is developed dedicated for the handling via Bluetooth 2.1
3D Tele-immersion Adaptive Streaming Module	IT Innovation	Available in accordance with the terms of consortium agreement. Specific rights to be negotiated on a case-by-case basis.	Dynamic rule-based content adaption service based on real-time network QoS Work Completed