EXPERIMEDIA

D2.1.5

Second Scenarios and Requirements

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This deliverable updates the scenarios and requirements described in D2.1.2 to include on-demand features identified during connectivity phase development, the usage by driving experiments and experiments funded through the open calls. The document provides a description of the functionality that needs to be developed within the expansion phase, to be included in the V2.0 release.

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1. Executive Summary

This document is the EXPERIMEDIA Deliverable 2.1.5 "Second Scenarios and Requirements". It provides a description of the updated requirements that will drive the second year of the project's development activities, as well as of the (updated) scenarios that motivate these requirements.

Section 2 provides an introductory discussion pertaining to the requirements elicitation process in the context of the new composition of the consortium following the 1st open call, as well as to the significance of this deliverable as a point of reference for further work in the project.

Section 3 provides updates on the embedded experiments' scenarios. It should be noted that we are only providing updates where applicable, i.e. modifications/additions to the Year 1 scenarios, so as to avoid unnecessary verbosity and aid the reader to focus on the important new information.

On the other hand, the scenarios corresponding to the six new experiments of the 1st open call are described in greater detail in Section 4. The structure of the presentation of each scenario is similar to the way the three embedded experiments' scenarios were presented in the first iteration of this deliverable. Hence, for each scenario we provide a short background, the scenario story, the experiment hypotheses and a table summarising the identity of the scenario and its expected value. Besides, the impact of these new experiments on the updated requirements for Year 2 is more significant in comparison to that of the embedded experiments, since emphasis is unavoidably shifting towards the former.

Section 5 documents the updated requirements that will drive the project's development for the second year. This section comprises two main subsections. The first one includes an assessment, in other words a "status update", on the requirements of the first year. The second subsection includes a description of the new tabulated requirements of the second iteration, as these are derived from the updated definitions of the embedded experiments (Section 3) and the scenarios of the 1st open call experiments (Section 4). The requirements are structured and presented on a per component basis for better overview, followed by a conclusion that closes the deliverable (Section 6).

2. Introduction

The aim of this deliverable is to document the scenarios and the derived requirements thereof, which will drive the project's development work during the second phase of the project. This is the second out of three versions of the deliverable. At this time of the project, the first iteration of the embedded experiments has been completed, and the six new experiments from the 1st open call, as well the second iteration of the three embedded experiments are already in progress. As stated in the first version of the deliverable, there is a cyclical dependency in the needs of EXPERIMEDIA partners to receive information from each other on the precise roadmap and decisions each partner develops and makes in order to conduct the project.

- Technical partners need input from Experimenters as to what Scenarios they envision for the use and exploitation of the EXPERIMEDIA Facility. Only if the Technical partners have detailed information as to how their technologies will be used in practice, can they implement the correct technological components for the purposes of the project.
- Experimenters need input from the Technical partners as to what requirements the technologies are going to fulfil. The open call Experimenters of course already had information on the functionality supported by the technical partners since the open call was published, which is an advantage in comparison to the first phase of the project.

However, the number of Experimenters (six new plus three embedded equals nine) and different components (and sub-components) is such, that the involved complexity calls for considerable effort for Experimenters to understand the particularities of the components and to evaluate how to consume (or extend/request updates on) their functionality, and for technology providers to understand, review and plan a large number of new requirements deriving from various different scenarios. The requirements documented in Section 5.3 represent the Experimenters' desired functionality that needs to be supported, but in the same time they are the outcome of discussions, teleconferences, tutorial sessions, e-mail exchanges and face to face meetings organised to achieve this necessary common understanding purpose.

Although planning and work on experiments has progressed, the presented requirements can be revised during the course of the development work and the experiment setup and run. Possible modifications will be documented in the final iteration of this deliverable (D2.1.8 "Final Scenarios and Requirements"), together with the new group of requirements elicited to support the 2nd open call Experimenters, who will have joined the project by the time of delivery of that final version (due PM27).

3. Updated Scenarios for Embedded Experiments

This Section provides a brief summary of the findings and possible challenges or difficulties that arose during the first phase of the three embedded experiments of EXPERIMEDIA. As far as the scenarios are concerned, we hereby refrain from repeating information that has not changed since the first iteration of the deliverable, and only provide updates where applicable.

3.1. Schladming (EX1)

3.1.1. Updated Description

In year 1 of the EXPERIMEDIA project possible involvement of rights holders were looked into but could not be settled. The relevant parties have been involved in their own plans about the championship a lot longer and could not help us in this respect.

This led to some restrictions as far as rights management and access to media material is concerned and has forced us to redesign the scope of the experiment. The involvement and use of the ski championship had to be dropped as no possibility to use information about the athletes or the actual competitions was found. This data is only available to the rights holders, e.g. the Austrian broadcasting service ORF and/or the national skiing association. The broad use of user generated content is also a difficult topic – only general photographs depicting a whole area could be of use, images where an athlete or other persons are clearly recognizable are not fit for publication. Yet the main focus of the experiment is still the added value for tourists and visitors of the greater Schladming area.

This resulted in an updated concept and an app with a broader scope to avoid conflicts with digital rights management and privacy issues.

The tourism board of the Schladming region provided us with the necessary Points of Interest data, which was then copied to the Infonova service where the POI data management takes place. To access the POIs a frontend for web management is provided, as well as a REST interface to fetch the POI data from remote resources such as services on mobile devices. Some requirements for data quality were not met by the provided data set as the definition of the required data fields was not sufficient. This occurred because standards in data and particularly POI management were expected but have not been implemented in the data source. The missing data was added to the Infonova dataset though.

The 3D capturing use case could not be implemented as the setup for this would have required a lot more involvement of the stakeholders which could not be reached. It would have required installing a set of sophisticated hardware on at least a part of the slopes, which in turn also meant that measures to secure the hardware would have to be taken. This set of requirements led to believe that a setup like this would be fit for a whole experiment on its own, rather than a small part of the AR and social network information scenario we are conducting.

The general scenario was not updated, though the available data led to adjustments of the use cases.

3.2. CAR (EX2)

3.2.1. Updated Description

The initial synchronised swimming scenario for the CAR embedded experiment as this has been described in D2.1.2 "First Scenarios and Requirements" is still valid with no modifications, as the experiment is still in progress.

Nevertheless, after CERTH joined the consortium in PM11 to provide for 3D technologies, the wider CAR embedded experiment has been enriched to include additional scenarios and technologies. Hereby we summarise the work done so far from CAR and CERTH in order to find target sports where technologies for 3D reconstruction can have a significant added value for CAR and define related scenarios. Within EXPERIMEDIA definitions of 3D as well as real-time processes, have been now settled and understood as:

- The full 3D reconstruction of humans as geometric models
- Real-time systems must operate faster than what's necessary in the physical world. Some people specify that real-time systems must have a latency lower than a specific threshold (e.g. < 100ms).

During these discussions it was found that accurate measurements from 3D reconstructed models are what is needed for sports cases. Under these constraints a discussion has evolved into a more detailed description of what has to be done so as to add value to the whole project.

The added value to the project that 3D reconstruction offers in terms of sports activity seems to be helpful to the different stakeholders, and therefore, corresponding utilities will be implemented. As far as utilities are concerned, we need to finalise the requirements of the coaches of these different sports as to what they need to visualise either in real time and/or as a post processing task. Input received so far from CAR is valuable, and a detailed description of these requirements should be finalised soon.

Weightlifting

It will be the starting point for the implementation of utilities as provisioned in EXPERIMEDIA. The reason for selecting weightlifting is twofold: firstly, having a short term easy solution will help define the way of working within EXPERIMEDIA. Secondly, this approach will show stakeholders the added value of 3D to their work immediately.

The main idea of the weightlifting scenario is to create a virtual coach assistant, which will provide real-time information to the weightlifting coach and help the training. The information provided by the application is different body angles (knee and/or hip) as well as the angle of the bar and the speed of the lifting. Several differentiations between the two main styles of weightlifting (clean and jerk, and snatch) in the information provided by the application will be implemented as well. The system will collect data for each athlete at each attempt that will be logged and saved on demand, so that the athlete and the coach can go and look at these attempts

at later times. The specific requirements in terms of information that needs to be provided are presented in Section 5.2.5.

Cycling

Cycling is considered as a medium difficulty case. The difficulties for this case arise from the speed of the athlete (i.e., depending on the frequency of the athlete cycling pace) as well as the angles' calculations. Angles in some cases may be occluded by the bicycles part, and therefore are hard to be properly reconstructed. Moreover, the surface of the front upper body of the cyclist is of primordial importance to the cycling coaches, since it provides the factor for the air resistance that accumulates on the cyclist. CAR has provided some very useful information concerning usual experiments for the cycling aerodynamics which gives an insight of what a 3D cycling utility has to provide. The related requirements are presented in Section 5.2.5.

So far a very first version of this application has been tested at CAR's facilities. The feedback from this session was very rich in many aspects. Firstly, we have now a concrete idea of what is really needed from the users of the applications (athletes and coaches). Secondly, several hardware issues were discovered (Kinect calibration procedures, reflectance problems in Kinect reception and others) that will be corrected in the next months. Finally, the importance of accurate measurements has been discussed and we have seen that the provided application needs to be more accurate with respect to the measurements it shall provide.

3.3. FHW (EX3)

3.3.1. Updated Description

In this Section we summarise the lessons learnt from the first iteration of the FHW embedded experiment, as well as the way these impact on the planning for the second year of the project. A significant part of the following description is provided in greater detail in D4.3.2 "FHW Experiment Progress Report". In short, the know-how that we have gathered from the execution of the first stage of the experiment does not lead us to alter the original scenario.

Very early in our work towards the execution of the experiment we came to realise some difficulties with the scheduling of different tasks and events in the timeline of the project that could prove problematic. Most notable among them the fact that the first working versions of the technical partners' contributions were expected late in the project and in fact after the finalization of the plans for the experiment as well as the fact that there would not be a chance for us to have feedback from the project reviewers at a mature stage of the work in order to be sure that we are headed in the right direction. Both constitute very serious dangers for the experiment and therefore appropriate action was required. Therefore, in order to navigate away from the aforementioned dangers we decided to split the experiment in two stages with very distinct character and goals.

The first stage was aimed to run quickly, provide an early confirmation of the project's methodology and technical approach, put technical components to a practical test and generate feedback for the technical partners who are working on them, gather know-how that will help the new partners who are just joining the project to seek even higher goals, allow the consortium to have a demonstrable output from early on in the project and give us an opportunity to present

our approach to experimenting to the project reviewers during the first year review. The second stage is aimed to build on the experiences and know-how of the first stage in order to perform the complete experimental work that was envisaged for the 3rd embedded experiment in the most suitable manner possible. By the time this deliverable is being written (February 2013) we have successfully completed the first stage of the experiment and we are now working on our plans to schedule and execute the second stage.

The execution of the first stage highlighted some quite interesting facts. The first important observation is that people would be willing to pay money for the type of application that was tested. This is probably the safest way to conclude that the augmented reality component did enhance their experience considerably.

Quite interestingly there are huge differences in the average values for the different points of interest. Therefore, we aim to explore the reasons behind this in a focus group during the second stage of the experiment.

EXPERIMEDIA aims to correlate QoE measures with QoS measures in order to assess which technical parameters influence the value that the user receives and in which way. Some interesting related observations are presented in D4.3.2 and need not be repeated here, since they do not influence the scenario for the second iteration.

On the technical side, the technical work done on the augmented reality part of the experimental facility is satisfactory, so we do not expect to be doing any core development work in this direction. We will of course have to link the augmented reality software that we are using to the EXPERIMEDIA experiment monitoring component.

As far as the data itself is concerned, we do hope to make additions. Specifically, our limited initial testing has indicated that the augmented reality points are too sparse and only some of them are truly interesting and relevant to the items they have been coupled with. We have already asked our content experts (historians and archaeologists) to examine whether more points can be created, given the existing physical exhibitions available in Hellenic Cosmos.

Video streaming has also been successfully integrated in the experiment. Regarding the SocialIntegrator component, we have already successfully tested the updated version during the first annual review demo, and are in the process of integrating this component with the venue facility during the second year.

As has already become clear, the integration of the experiment monitoring component with our venue and experiment is a core goal for the upcoming period.

As far as the involved hardware is concerned, we hope to be able to have more smart devices for the second stage of the experiment, so that we can run the augmented reality part of the experiment with more participants.

With regards to the methodology, although we have only managed to run few experiments with the augmented reality component and none with the video streaming component, we have

already had the chance to identify some weaknesses in our methodology, which may call for the corresponding adjustments.

Specifically:

- It is hard to perform extensive tests with the augmented reality component because having only 3 devices we can only have 3 participants at a time. Considering the size of the venue and the dispersion of the augmented reality points, this practically means that only 3 participants may be considered per day, which does not allow for much flexibility. Moreover, a single damaged or stolen device can have a major impact on our ability to run experiments.
- We have already painfully realised that the planned scenario asks for some of our most valuable (and therefore busy) staff members to stop their work for the whole duration of the experiment's shows (about 45 minutes each time) in order to be readily available to help. This is clearly not easy for a large scale implementation, so we will have to put extra attention on the scheduling and duration of the experiments.

Overall, the first stage of the experiment has provided an immense amount of information. Based on this information we now have clearer directions in both the methodological and technical aspects of the experiment. When it comes to the experimental scenario, though, we have seen no reason to alter it. Therefore, both the scenario and its technical requirements from the EXPERIMEDIA facility components are the same as detailed in D2.1.2.

4. Scenarios for 1st Open Call Experiments

In this Section we provide a description of the "actionable" scenarios pertaining to the six open call experiments, two for each Venue. The requirements driving the development of the second year are derived from these scenarios (in addition to the updated scenarios of the embedded experiments presented in the previous Section).

4.1. DigitalSchladming (EX4)

4.1.1. Introduction

DigitalSchladming provides the necessary services to Schladming to engage with guests visiting the region. The experiment addresses the needs of visitors for a wide range of information access, from practical issues during their stay, e.g. what to do tomorrow or where to find the best Italian restaurant, to sharing their experiences.

4.1.2. Scenario Background

In a recent event, World Tourism Organisation Secretary-General, Taleb Rifai said: "New communication technologies, particularly the Internet, have been game-changers for the tourism sector". Still many new technologies (e.g. platforms for social connectivity and user engagement, mobile information access) are just now beginning to be employed in the tourism sector. Because of their novelty it is not yet known which kind of innovative services based on these technologies will create real impact among the visitors and local citizens alike. Nevertheless, early experiments presented at the latest World Congress on Snow and Mountain Tourism indicate that better information access and experience sharing can really increase the performance indicators of mountain and ski resorts.

The DigitalSchladming experiment proposes to test how innovative services of the Future Media Internet can increase visitor experience, connect and promote better quality of life. The aim is to incorporate the experiment results into the next generation of hyperlocal social media services which are fun to use, provide value to all stakeholders and have a high take-up rate.

Since information access is not only restricted to guests visiting the region, local citizens also benefit in the same way from DigitalSchladming. In addition to this, the project provides local businesses with a new digital channel to reach their target audiences and offer their services. Businesses not only can engage in advertising targeted to consumers but also listen to needs or requests of consumers and react accordingly.

Finally, destination managers can take advantage of the curational aspects of DigitalSchladming and promote the region as a whole, with the aim to deliver the best experience to visitors and guests and so make them return in the next season.

4.1.3. Scenario Story

Alan, Sue and their five year-old daughter Katie are spending a one-week vacation in Schladming. As usual, they stop by the tourist information point during their first day, in order

to get practical information. There they learn about the new free service offered in the region: DigitalSchladming.

Finding local businesses

That very same evening they decide to create an account just as they were getting ready to go for the first family dinner. Using her pad, Sue begins to browse the Schladming PinBoard and is amazed by the wealth of information available. She quickly notices that she can play with the different filters on left-hand side of the screen in order to display only certain topics. Alan decides to put in a search for "food", and he quickly receives a feed related on this topic. One of the pictures catches the attention of Katie; the caption reads "Dinner for 3, with complementary drinks on the house". They click on this item and a video starts playing, introducing them to the specials for that evening. Already by the time Sue clicks to see where the restaurant is on the map, they have already decided where they will have their first dinner in Schladming.

Finding practical information

Next day Alan and Sue want to try a more advanced slope, but they are not sure what to do with Katie. Using the advanced search functionality of the Schladming PinBoard, Alan and Sue search for the closest nursery school to the slope. The system shows that there is one just 500m away and the parents are able to access all the necessary information, i.e. what their schedule is, telephone number, how much it costs and whether or not they can take care of kids over lunch as well.

Sharing experiences

Up on the slopes, taking a break at the cabin, Sue is taking a quick snapshot with her smartphone. She is sending it via email to their unique personal mailbox writing in the subject line "What a great view from up here! Who can recommend another great route? #skiing @public". The picture gets immediately stored on their online repository and is also posted on the Schladming PinBoard for everyone to see and comment. Later on Alan is taking some snapshots of his own and is uploading them to MySchladming. At the end of the day, the family is pleasantly surprised when they receive in their inbox a visually appealing electronic journal containing all of the great pictures of their day. Together with Katie they relive the great experiences.

Building a lasting relation with Schladming

At the end of their holiday, Alan is downloading an archive with all of the content that they upload during the family holiday. The system then asks if he would like to temporarily suspend the account and receive via email a bi-weekly newsletter containing the best posts of the Schladming PinBoard. Thinking that he might go to Schladming again in the future, Alan follows this suggestion and over the course of the year, is unobtrusively reminded about the resort. After about 5 months, impressed with the summer pictures of Schladming that are reaching his inbox, he decides that it is time to see how the place looks without all the snow.

4.1.4. Experiment

DigitalSchladming is based on own work and results of previous projects and plans to use the SCC, ECC and to a certain extent the AVCC baseline components of EXPERIMEDIA. The

proposed experiment is centred around an information-rich, web-based media channel for the entire region, the Schladming Pinboard, and a personal hub for media contents of each end-user, MySchladming. The two systems are seamlessly interconnected, allowing the end-users of MySchladming to effortlessly publish the content they want to the Schladming Pinboard. Together the two systems are able to create a hyperlocal temporally bound community.

Since information access is not only restricted to guests visiting the region, local citizens also benefit in the same way from DigitalSchladming. In addition to this, the project provides local businesses with a new digital channel to reach their target audiences and offer their services. Businesses not only can engage in advertising targeted to consumers but also listen to needs or requests of consumers and react accordingly. Thus, we believe that DigitalSchladming can evolve into a marketplace of services for both visitors and citizens and this will have a very large impact for the Schladming region. Finally, destination managers can take advantage of the curational aspects of DigitalSchladming and promote the region as a whole, with the aim to deliver the best experience to visitors and guests and so make them return in the next season.

Our proposed experiment plans to test the feasibility of an innovative service for hyperlocal information provision and consumption, which will allow citizens of Schladming to have a better quality of life and guests an enhanced visitor experience.

During the experiment we aim to investigate:

- If a Future Internet (FI) enabled region, such as Schladming (with over 170 WiFi hotspots and mobile broadband, soon also including LTE), provides the necessary connectivity infrastructure for guests to use multimedia based digital services for information provision with ease (i.e. whenever and wherever they need them).
- If hyperlocal information services will be taken up successfully by the guests of the region of Schladming and the local stakeholders. What the take-up barriers are.
- What patterns of usage of hyperlocal services are most relevant to the guests of a touristic region and its local stakeholders. What kind of an influence does the season (i.e. winter or summer) play on these patterns of usage, can we figure out the main causes.
- Which kind of information, what amount and in what way should the information be presented to the guests of a touristic region (in winter and in summer).
- If the EXPERIMEDIA infrastructure is appropriate for running such an experiment and if it can provide user friendly tools for monitoring the experiments.

4.1.5. Summary Table

Scenario ID	4
Venue	Schladming
Scenario Name	Digital Schladming Scenario
EXPERIMEDIA Technologies used	ECC, AVCC, SCC
Actors	Visitors to the region, local businesses, citizens of Schladming, municipality and tourism board

Physical Locations involved in the scenario	Schladming
Future Media Internet Context	Implementation and experimentation of a FIRE application used in the context of hyperlocal media content
End-User Value	Visitors use the service to store and share their digital experiences in Schladming as well as to get valuable information from a vibrant online community about the day-to-day life during their holiday. Locals can use the service in order to gain a new channel for reaching their target audiences. Local citizens benefit from a new up-to-date information stream about their region and can additionally use the service to connect with the visitors of the resort and even their own local community.
Venue Value	Boost tourism in the area, boost local business and improve the life of the Schladming citizens.

4.2. MediaConnect (EX5)

4.2.1. Introduction

Mobile Augmented Reality and Interactive Video provide novel ways of interacting with information that is situated in the real world and thus promises that users more actively engage with content delivered to them. However, it is still unclear if this technology shift to ubiquitous video and Augmented Reality will be taken up by mainstream end-users (as prosumers[1], and not only consumers) and will become an important facilitator in everyday activity. The MediaConnect experiment investigates these open issues, namely the influence of novel user interfaces on the Quality of Experience (QoE).

4.2.2. Scenario Background

While the richness of content provided by ubiquitous, interactive, personalised media should add value to the users' experience of digital content in real world contexts it still has to prove that it can actually fulfil this promise, mainly regarding the interface with this content. The MediaConnect experiment aims at investigating the impact of mobile Augmented Reality and Interactive Video interfaces on tourists' Quality of Experience (QoE) when visiting the Schladming ski resort. Assessing the QoE of different mobile interfaces should have multiple benefits for business stakeholders in Schladming and in other resorts. First, content providers in Schladming can present their services and products in an engaging way to visitors, before, during and after the stay, potentially increasing customer loyalty both to the region and to businesses themselves. Second, the amount of resources needed to present local services or products through mobile interfaces can be assessed better. In addition, this experiment will help the research community to better understand the potentials and challenges when employing these interfaces with user generated and situated content in the wild.

[1] Someone who is both a producer and consumer (of content in this case).

4.2.3. Scenario Story

When Erica and Karl arrive at the ski slopes in Schladming they discover a large printed poster of the slope panorama. They see a young couple standing and discussing in front of the poster. Erica and Karl join them and see that they are exploring pictures which were taken directly at the slopes. "How cool! You can easily relate that picture to the mountain you have been on." Erica says. "And the view is magnificent!". They also can see the current status of the ski lifts and easily find out which ones are open and closed. They see 3D models of the different types of lifts and can better decide which ones to take as Erica does not to ride with t-bar lifts at all. After a great skiing day on the slope they return to their hotel. When connecting to the local WiFi network Karl sees a link to a PlanaiTV video which introduces the region to new visitors. Unlike the program he can also see on TV in his room or over the WLAN on his tablet, this stream is interactive - as it switches to an advertisement for the local InterSport shop he likes the look of one of the ski caps and finds it cool that by a touch he can pull up more information, see the price, and even reserve one for himself at the Schladming store! You couldn't do that just watching Planai on the hotel TV.

4.2.4. Experiment

Objectives of the MediaConnect experiment are to capture the user experience when interacting with local services, products and events in Schladming made accessible through novel interfaces including Augmented Reality and Interactive Video on the users' mobile devices.

Specifically, to be able to investigate the discussed issues, following questions should be addressed:

- How is the Quality of Experience in interacting with digital content embedded in a physical environment influenced by the particular interface metaphor (AR, map view) through which the content is made available?
- What impact does the representation of the environment (overlaid information items on the 2D poster vs. 3D representation of the region) have on the Quality of Experience?
- If users' access to video content contains interesting objects, are they more likely to interact with the video to get more information about those objects? Or is video likely to remain a more passive consumption activity?

The Augmented Reality part of the experiment will be centred at already installed physical ski slope panoramas in the Schladming ski fields but can also be extended to mobile maps which visitors carry with them. The interactive video part allows interacting with interesting services in videos from multiple locations. The first run of the experiment will be a semi-controlled field experiment and the second run aims at deploying the experiment remotely to tourists in Schladming.

4.2.5. Summary Table

Scenario ID	5
Venue	Schladming
Scenario Name	MediaConnect Scenario

EXPERIMEDIA Technologies used	Which EXPERIMEDIA Components does the experiment use?
Actors	1. Visitors to the region. Specifically, people looking for services on the ski slopes and tourists who are keen to explore offers in the region. 2. Planai-Hochwurzen GmbH as provider of the ski slopes 3. Selected hotel owner to provide the context for the Interactive Video evaluation 4. Schladming 2030 as supporter for the deployment of the experiment 5. The experimenter
Physical Locations involved in the scenario	Schladming, Hotels and ski slopes
Future Media Internet Context	Implementation and experimentation of a FIRE evaluation for novel user interfaces to interact with user-generated content and digital information situated on physical objects.
End-User Value	Visitors can enrich otherwise static printed ski slope panoramas with digital service information and personalized content. This can raise their awareness about service offers in the ski fields and the personalization of the ski field poster can contribute to a higher identification with the region. Interactive video allows to go beyond static consumption of marketing videos but allows the tourist to directly interact with products or services which they deem interesting in the videos.
Venue Value	Extra service value is added to existing infrastructure (ski field posters) at low cost. Visitors' identification with the region can be strengthened. The novel interfaces build a novel and engaging communication channel to existing products and services. In the competitive field of ski resorts the venue can demonstrate their innovation potential by providing novel and engaging experiences to visitors.

4.3. CONFetti (EX6)

4.3.1. Introduction

The process of training athletes, especially those competing at the highest international level, involves the transfer of very specific and often difficult to formalise knowledge from the mentor to the protégé. Even though scientific insight and findings have an ever increasing influence on sport preparations, the trainer is still the authority making decisions, giving direct advice to the athlete and often combining his intuition with psychological skills and computer data in order to make the right call. The person of the coach, their experience, example and supervision play a very important and sometimes underestimated role in the athlete's success. In the end it is the athlete who gets to perform in the spotlight using their natural and acquired skills, but the quality of guidance and adequacy of the chosen training program often make the difference between hearing the national anthem and going home with unfulfilled hopes.

That is why the CONFetti experiment aims to investigate the possible applications of FMI (Future Media Internet) technologies in the improvement of the training process. As the relationship between the coach and the athletes is irreplaceable, the goal is not to substitute it, but to augment the availability, convenience and effectiveness of the process basing on this relationship. The technologies that will be utilised include HD videoconferencing, stereoscopy, motion tracking and augmented reality. The experiment will be held at the CAR (Centre d'Alt Rendiment) venue, a facility with a long history of training successful athletes. This will allow the experimenters to evaluate their system in a realistic target environment.

4.3.2. Scenario Background

CAR is a high performance sports centre focused on comprehensive upbringing of athletes. What this means is that while the goal of training them to compete and win on the highest international level is very significant, the academic and humane development of students is even more important. CAR was established in 1987 and can boast a history of successes in both those areas. In order to keep reaching the competitive aims on the highest athletic level it's crucial to always try to find applications for state of the art scientific findings and technologies. A testimonial of following this rule by the venue's leaders are the rooms filled with electric treadmills, climatic chambers and other medical apparatus as well as motion sensors, force sensors and even a machine to measure the resistance of the wind for a biker depending on his position on the bike. The technological advance, miniaturisation of devices and ubiquitous connectivity made it possible to move the installations from laboratories to the training rooms themselves, where research and measurements can be done in an almost completely non-intrusive way from the athletes' point of view. An illustration of this trend is CAR's new building finished in 2012 containing state of the art training facilities (combat sports rooms, gymnastics hall, swimming pools for water-polo, synchronised swimming and dive jumping) and a server infrastructure. Examples of cutting edge technological installations that can be found in the building's practice rooms or are planned to be put there are:

- a system to visualise the movement of the bar for weightlifters
- a system to mark the points where the ball hits the table tennis table
- a "chariot" that rides along a side of the pool and records the swimmer using 3 cameras
- a high-quality Bose sound system encompassing the whole new building, operated from on-wall controllers and giving the possibility to play audio per-room, per part of a room or even underwater from a central repository or from external sources
- a system for releasing air under high pressure from the bottom of the pool when a diver jumps to lessen the force of impact on the surface

The fact that CAR is a high performance sports training centre has several consequences for the CONFetti experiment:

- The experiment's results will be reliable, as they will originate from professional coaches and competitive-level athletes using the system in real training sessions.
- The staff and students are used to working with state of the art technology.

Some of the existing infrastructure can be used in the experiment, for example the server resources for deploying experiment components, sound system for the videoconference audio or the cameras that are planned to be installed in some of the rooms.

4.3.3. Scenario Story

Miguel is a gymnastics coach working in CAR. He trains a group of professional horizontal bar athletes, including Arnau, Javier and Ramon. They have a training session planned for today, because they are preparing for a national competition. They are supposed to work on and improve their technique in the dismount phase of the routine. Unfortunately, Miguel's car broke down and he is not able to arrive at the CAR venue in time. In this situation they decide to hold a remote training video session with augmented reality. Miguel connects to the CONFetti system from his home over the Internet, while the gymnasts connect from their terminal in the CAR centre. Miguel tells them what he wants them to do this day, showing them videos of other gymnasts performing that routine recorded with the centre's video infrastructure in the past. Ramon performs the dismount according to Miguel's directions. Miguel observes the performance live, while it is also being recorded. Ramon joins Arnau and Javier by the video terminal. Miguel displays Ramon's dismount in the videoconference. A 3D rendered model of a human body is superimposed on the video in real-time and it follows Ramon's movements thanks to motion tracking analysis. Miguel pauses the video and shows the athletes that in the top instant of the dismount Ramon's shoulder was in the wrong position. He demonstrates the shoulder's position on the 3D model. The next one to perform is Arnau. He performs the routine and it also gets recorded. When he joins the rest by the terminal, Miguel pulls up a 3D (stereoscopic) recording of his dismount. It turns out Arnau did not make the same mistake as Ramon, but thanks to the stereoscopic view it can be seen that the relative position of his legs was not perfect. Miguel points out the fault in detail on the model, which is also stereoscopic. Now it's Javier's turn to do the routine. He does it and awaits Miguel's commentary with the others. Miguel brings up his recording and it turns out he made the same mistake as Arnau. Miguel adds the measurements from the electromyography and isocontrol sensors to the video signal. A slow motion display of the recording shows which of Javier's muscles were responsible for the false movement. In the next series of performances all three gymnasts avoid the mistake thanks to Miguel's advice. After two months of training using the system they proceed to win top places in the competition.

4.3.4. Experiment

The experimenters wish to carry out the experiment in order to investigate the following issues:

- The feasibility of installing and utilising a setup for stereoscopic HD videoconferencing and augmented reality in a real-life training facility
- User acceptance level (concerning both coaches and athletes) of the FMI functionalities provided by the system deployed in a sport training setting
- Performance of a platform combining HD videoconferencing with stereoscopic video and remotely rendered 3D models generated basing on motion tracking

4.3.5. Summary Table

Scenario ID	6
Venue	CAR
Scenario Name	CONFetti Scenario
EXPERIMEDIA Technologies used	ECC, AVCC
Actors	Athletes, coaches
Physical Locations involved in the scenario	CAR gymnastics training room, location of the remote coach
Future Media Internet Context	The CONFetti experiment focuses on the usage of a system allowing for interaction through an HD videoconference between users of the CAR venue (coaches and athletes). This interaction is enriched with the use of stereoscopic and augmented reality materials in order to create an immersive user experience and bring added value to the training process.
End-User Value	• The convenience for the coaches is raised thanks to the possibility of holding sessions from remote locations. • The coach has access to additional motion tracking and sensor data concerning the athletes' performance, on which he can base his decisions. • The use of new technologies like augmented reality or stereoscopy may appeal to young athletes, make the sessions more interesting and, of course, provide a clear benefit to their training.
Venue Value	The system integrated and tested during the experiment will present the following value for the venue: • The availability of coaches for sessions is incremented as they can be held even when the coach is not present at the venue. • The transfer of knowledge and instructions is more efficient with the use of archival footage and 3D model teaching aids.

4.4. 3D Acrobatic Sports (EX7)

4.4.1. Introduction

3D Acrobatics is an experiment within the EXPERIMEDIA project which is focusing on high quality content production for assessment and improvement in gymnastic exercises by the use of motion capture technologies. The goal of this experiment is to record training sessions of gymnastics at CAR venue and automatically generate assessment data for helping the athletes improving their performance. These 3D motion capture data will also be used to compute metadata which will be synchronized and saved with the athlete's motion in order to provide a valuable 3D graphics and virtual reality experience. The experiment will make use of the connectivity and storage facilities available at CAR venue.

In addition, within this experiment, 3D graphics as well as virtual reality and remote stream control will be exploited. The experiment is making research on synchronization of 3D motion

capture, video and metadata. The experiment pays special attention to the quick delivery of data to the coaches, trainers and athletes. To this end it makes use of mobile devices (such as tablets, laptops, etc.) in order to collect data from the inertial sensors and provide feedback to the users in real-time. The information gathered by the mobile devices is transferred to a local computer through a Wi-Fi connection which in turn uploads the information to the server. A data manager (software module) manages this information in the cloud making it available to the community (to those who have been granted access to the data by the system administrator). In this way the athlete has the option of sharing her/his data with coaches, trainers, colleagues and mates who might be geographically distributed, thus enlarge her/his experience in training and gymnastics.

4.4.2. Scenario Background

The main goal in this experiment is to enhance the training process and the training experience of athletes practicing gymnastics and other sports related to acrobatic motions. To this end we foresee the use of motion capture technologies which makes use of inertial sensors to capture the actual motion of athletes. This technology provides feedback in real-time which can be used in the training sessions to analyse the performance of the athletes.

The recorded motions are stored in motion files which are uploaded to the cloud thus allowing to retrieve the data for further analysis at anytime from anywhere. In addition to the motion files, video files are generated using a 3D graphic engine. These videos can be used to identify metadata which can be synchronized with the recorded motion data.

4.4.3. Scenario Story

The story on which the scenario usage is based is described in the following lines. George and Michael are two young boys who live in a small village located in the north of Spain. They are very good friends and have been class mates until the end of the last course. They share the same enthusiasm for gymnastics and they have been part of the same club in the small village where they live. They are taking gymnastics very seriously, training very hard and devoting a lot of time to this activity. They both share the same dream: participating in gymnastics contest at the Olympic Games. They have finished the secondary school and they are facing a tremendous change in their lives: they got the grants they applied for attending a High Performance Training Centre (HPTC). Michael was accepted in a HPTC in London while George was accepted in CAR in Sant Cugat. Once in their destinations they are in touch through Facebook, Whatsapp and email. After a few weeks Michael is getting frustrated because he is not able to improve his technique. He tells his friend that he has difficulties understanding the explanations of the trainer. Michael is not able to visualize in his mind the explanations given by his trainer about corporal expression, motion technique, etc. George tells his friend about a new technique he is using in his training sessions at CAR: motion capture. This technique is based in the use of small wireless sensors which capture the motion of the different segments of the body of the athlete and save the digitalized motion on the cloud. A software displays the motion of the athlete in real-time in the computer screen thus allowing to visualize what the actual motion has been during the training session. Using this tool the trainer explains to George how to improve his technique and George understands everything instantaneously. George says he was afraid about wearing the sensors for the first time. He was not sure how those sensors could affect his availability to perform a motion. However since the very first time he used the sensors he felt

very comfortable with them; he realized that the sensors did not affect at all his mobility. Now he is using this system every day. His training sessions are saved in a server so he can access them at any time. His trainer uses the software on a laptop or tablet to show George how to improve his technique. In this way George can visualize the improvements after specific training exercises and over a given period of time. George explains to Michael other benefits of this tool such as getting advice from other trainers or colleagues who can access the motion files from the cloud from anywhere. These fellows can analyse George's technique and evolution and provide him with useful advice. Using the cloud George can share his motion files virtually with anyone in the world despite where this person is located. George shows his friend how to access the cloud and visualize George's training sessions. Michael finds this application amazing since its use allows understanding in a very simple way all the complexity of gymnastic training and techniques. He would like to have the same tool in London. In this way he is sure he will improve his technique; moreover he would have another way to exchange his experiences with his friend George even if they are in the opposite corners of the world.

4.4.4. Experiment

The proposed experiment focuses on high quality content production for the gymnastic training sessions, including 3D motion capture based on inertial sensors and 3D biomechanical analyses.

The use of inertial sensors for motion capture in gymnastic training sessions can be an important improvement for the assessment and training of athletes. Thanks to its reduced size (see Another important characteristic of these sensors is that each one includes its own Bluetooth antenna which allows connecting it directly to the device hosting the antenna. This feature facilitates dramatically the task of fixing the sensors of the athlete's body since no wires are required at any moment (see **Figure 2**).

Figure 1) inertial sensors can be easily attached to the athlete's body without compromising in anyway her/his mobility.

Another important characteristic of these sensors is that each one includes its own Bluetooth antenna which allows connecting it directly to the device hosting the antenna. This feature facilitates dramatically the task of fixing the sensors of the athlete's body since no wires are required at any moment (see **Figure 2**).

Figure 1. Inertial sensor.

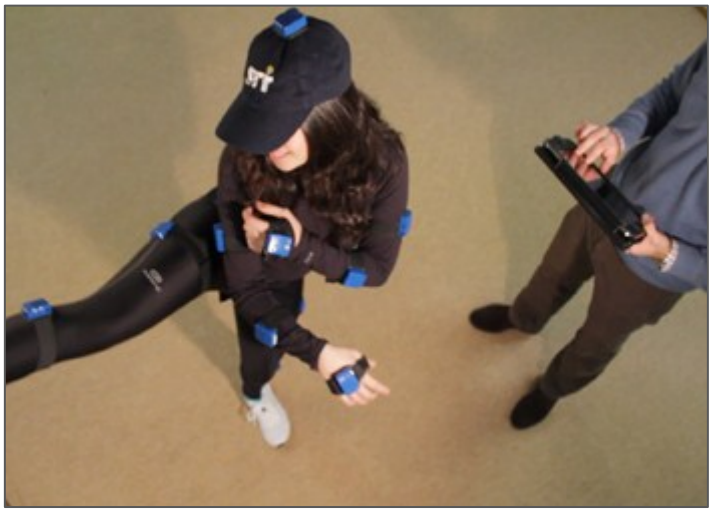

Figure 2. Inertial sensors on athlete's body.

Within this experiment, 3D graphics as well as remote stream control are exploited. The experiment makes research on synchronization of motion capture data, video and metadata. It also concentrates on the training process improvement.

As the experiment is taking place in CAR, the interaction between athletes, coaches and other professionals involved in the preparation of the athletes is ensured. This interaction enables athletes to improve their performance.

Mobile devices, such as tablets or laptops, are used to collect the motion data from inertial sensors. Motion capture data is displayed on those devices in real-time providing in this way instantaneous feedback to coaches and trainers; athletes benefit as well of this visualization since they get feedback immediately after the exercise is performed. Platforms considered for these mobile devices are Windows and Android. An example of the use of such devices is depicted in **Figure 3**.

3D motion data is collected by a computer connected to mobile devices using the Wi-Fi access point. This computer collects the data from the inertial sensors and uploads the information in a repository in the server. This data is analysed in order to generate metadata that will be used for generating reach training contents by the use of advanced 3D graphics.

Figure 3. Use of inertial sensors with tablets.

Finally the 3D motion capture data and the synchronized metadata are stored in the cloud. A data manager module allows the athlete to access her/his data and share it with coaches, trainers, colleagues and mates who might be geographically distributed. In this way the athlete is able to share experience with a large and distributed community. To this end the development of a user interface is foreseen in order to support the use of mobile devices, such as smart phones, tablets, etc.

4.4.5. Summary Table

Scenario ID	7
Venue	CAR
Scenario Name	3D Acrobatic Sports Scenario
EXPERIMEDIA Technologies used	- ECC - AVCC
Actors	Athletes and coaches
Physical Locations involved in the scenario	CAR
Future Media Internet Context	Generation of contents based on motion capture data; synchronization with metadata
End-User Value	Improvement of training experience Sharing training experiences between different training groups (athletes and/or coaches)
Venue Value	The goal of this experiment is to record training sessions of gymnastics at CAR venue and automatically generate assessment data for helping the athletes improving their performance. These 3D motion capture data will also be used to compute metadata which will be synchronized and saved with the athlete's motion in order to provide a valuable 3D graphics and virtual reality experience. The experiment will make use of the connectivity and storage facilities available at CAR venue.

4.5. BLUE (EX8)

4.5.1. Introduction

BLUE experiment aims at investigating the use of people's cognitive profiles and visiting style to personalize their museum visits through smart routing and recommendations, and the exploitation of social network tools to obtain this profile while extending their experience within the museum towards the electronic world. This implies designing, implementing and finding a solution that would help visitors identify exhibitions and items that match their interests the most and to provide them with explanatory material that is suited to their particular cognitive and learning needs. The idea developed here supports an adaptable smart recommender system that will suggest exhibitions to people as they move from one museum room to another based on the visitor's cognitive style as determined by a custom-made social network application. To further build upon this approach, the recommendation strategy can also take into account the visitor's visiting style which is highly correlated with the cognitive profile and may also give insights on the latter.

4.5.2. Scenario Background

The BLUE experiment will be conducted at the Foundation of the Hellenic World's privately owned cultural centre in Athens. Chosen as one of the three experimentation venues of the EXPERIMEDIA project, the Foundation of the Hellenic World is an ultramodern cultural Centre and museum, which fosters visitor experience through technology (e.g. through interactive exhibitions, virtual reality tours, and educational programs).

Before and after a visit respectively, visitors will be able to setup their cognitive profile and preferences regarding things they like and their visiting style, and to share their visits experience with others through a custom-made social application, titled "My Personalised Museum Experience". During the visit, this application offers visitors smart routing recommendations on their mobile device for exhibitions and content to see, as well as personalised content descriptions based on their cognitive profile and content preferences. Visitors can also mark favourite exhibitions and other museum-related data and compile them seamlessly into their personal "My Visit", which they can later on share with friends in their social networks.

While conducting the experiment, the behaviour of visitors when they use the "My Personalised Museum Experience" application and especially their reactions against recommendations will be recorded and analysed. After the visit, visitors fill in questionnaires related to their Quality of Experience (QoE) providing direct feedback on the experiment.

4.5.3. Scenario Story

BLUE focuses on a visit inside a museum. Then, the classical usage scenario follows three phases, depending on the moment regarding the visit, before, during and after:

Phase 1 – Before the visit. During the first stage, visitors can play the game of "My Museum Story". The application will be available through Facebook or, after registration, as a simple web application for those users that do not have a Facebook account. The application's goal is to extract the cognitive profile of the user, their content interests in regards to the museum

exhibitions, as well as their perceived visiting style, while entertaining them through a series of casual games. Furthermore, the application will allow users to check their cognitive profile through the MBTI questionnaire which is a classical and well recognised test for cognitive profile evaluation.

Phase 2 – During the visit. At the second stage, visitors are in the physical space of the museum. Here, they will use a mobile device, provided by the experiment, which runs the "My Museum Guide" application, in order to navigate inside the museum. The mobile application allows them to retrieve their cognitive profile and content interests, mainly from the "My Museum Story", and to log into Facebook. Using profile and interests, as well as some additional initialisation data (e.g. "how much time do you plan to spend inside the museum?") the mobile application then recommends an itinerary to the visitor. This itinerary consists of different exhibitions and timeframes, determined by the content interests and time restrictions that the visitor has. In addition, the mobile application provides information on visited or close based on the cognitive profile. The application also allows the visitor to "keep" a digitalised version of their experiences inside the museum, by assembling images and keeping digital notes about the visited exhibitions. The data gathered by the visitor during their visit, together, formulate the visitor's museum "My Visit", which at the end of the visit they can post on Facebook and share it with their social circle.

Phase 3 – After the visit. At the end of their visit, the visitors are asked to fill in a user satisfaction questionnaire. They can, as also stated above, share their experiences (their personal museum "My Visit") in Facebook through a social functionality that the mobile application provides. Finally, if deemed necessary (since respondents will be mobile and it may not be easy for them to fill in a questionnaire) the visitor might be asked to participate, if they wish, in a structured interview to measure the quality of their experience.

4.5.4. Experiment

The BLUE experiment targets the evaluation of people's cognitive profile from gaming and social interactions and the use of this cognitive profile for personalisation and recommendation purposes. The two underlying hypotheses have not been answered so far.

To investigate these two hypotheses, we focus on two main objectives: (1) Develop a prototype of a social application for museum visitors, "My Personalised Museum Experience", combining it with a dedicated social-network application ("My Museum Story") and an adaptable mobile recommending application ("My Museum Guide"); and (2) Expand our current research regarding cognitive style extraction and its use for enriching user-targeted applications, as well as user routing and recommendations in the physical space of a museum. The prototype will accompany visitors before, during, and after the museum visit; help identify their cognitive profile and visiting style. Furthermore, it can personalise their experience through the use of social networking technology. It will suggest certain exhibitions of interest to visitors and schedule their optimal visit route, based on individual cognitive styles and content preferences. Finally, it will deliver for each exhibition of interest informative material adapted to the cognitive profile of the visitor.

4.5.5. Summary Table

Scenario ID	8
Venue	FHW
Scenario Name	BLUE Scenario
EXPERIMEDIA Technologies used	BLUE will use two sub-components from the ECC: i) Experiment Monitoring (EM) and ii) Experiment Data Managing (EDM). Additionally, the Social Integrator (SI) from the SCC may be used for accessing Facebook accounts.
Actors	Museum visitors
Physical Locations involved in the scenario	FHW
Future Media Internet Context	The BLUE experiment contributes to the vision of the FMI initiative for the "creation of perceptual congruity between real and virtual worlds" by creating a participative user experience that will take place in both a real-world (museum) and an online social network-based setting. In addition the experiment will contribute to the vision of FMI for "Live and Online events" by exploring the above real world/online setting relationship and providing the museum visitors with richer and more personalized user experiences (content and routing adapted to the visitors' personalities, as well as pre and post-museum social network-driven activities). It is based on a two-way continuous interaction between real-world and online communities. Specifically, through its custom-made social application, it involves users in the museum and extracts data (cognitive profile, visiting style and content-related preferences) that will be useful afterwards during their actual visit to the museum premises. From another perspective, the real-world community also interacts with the online one, by enabling of users to upload online their personal museum "Story Lines" (featuring exhibits that the users found interesting during their visit, as well as personal comments/notes to share with one's friends) and share it with their social network circles. This way, data from the online community are used to improve user experience and data from the accomplished museum visit are used to spread user experiences, and motivate more users to visit the museum.
End-User Value	- The Museum visitor will be offered a personalized museum experience, which is materialised through: (1) a personalised electronic guide to drive him during his visit, especially tailored for him; (2) a social gaming application, providing him a funny way to extend his museum experience and share it with friends. - Social network users will gain access to museum experiences and stories shared by their friends - All users will be able to learn about their cognitive profile

Venue Value	The BLUE experiment has a positive impact on FHW visitors, as well as on directly interested stakeholder. On one side, visitors having had a good experience might bring additional visitors through social network effect. On the other side, through the visitor movement observations that will be performed, museum curators might obtain valuable knowledge regarding highlight exhibitions or the optimal rearrangement of the exhibition.

4.6. REENACT (EX9)

4.6.1. Introduction

The goal of the REENACT experiment is to investigate a new approach to improve the understanding of battles and wars that became milestones in human history. This will be done by taking advantage of the technological features provided by the EXPERIMEDIA facility, and of the spaces, equipment, personnel and contents available at the Foundation of the Hellenic World (FHW).

4.6.2. Scenario Background

Human history has been shaped by the outcomes of countless battles and wars. Unfortunately, the classical pedagogy of these events merely tells about who the belligerent forces were, how long the fights lasted, and who ended up winning. This way, major historical events are put down as occasional events that just happen, that involve two sides (often appearing as the good and the evil forces) and that apparently end fortuitously, as by tossing a coin. Nothing is that simple in reality, and so the common pedagogical approach neglects many facts about the reasons for the battles, alliances and supporters, why things went on the way they did, what were the winning or losing choices, what were the consequences in the short, medium and long terms, etc. As a result, the general awareness of history in our society is rather partial and deficient.

The REENACT proposal is to engage groups of people into an immersive collective experience that will make them learn about a certain battle or war both from the inside, as reenactors, and from the outside, as historians. They will learn about the prelude, the course and the aftermath of the event with the aid of multimedia contents and experts. The approach will be instantiated in the specific scenario of the Battle of Thermopylae. This is a propitious scenario because the Foundation of the Hellenic World has produced its own multimedia contents about this battle, which is invaluable material for the three stages. This event is quite popular as a symbol of courage against overwhelming odds, but it is not really well understood due to non-rigorous treatment in movies and comics.

The hypothesis of the REENACT proposal is that an immersive experience provided by Future Internet technologies will help understand historical events more deeply and more analytically. Users' ratings will be sought to assess the values of 3D contents, augmented reality features, videos, images, experts' feeds and so on.

4.6.3. Scenario Story

Barbara and Carl, two 20-year-old students from the UK are visiting the Hellenic Cosmos exhibitions. When they enter the main building, they feel curious about a proposal to engage in an interactive collective experience to learn about the Battle of Thermopylae. They have heard about this battle many times before, but they can barely give any specific information about its context and its impact in History, even though they recall from a recent movie that it was a fight between Spartans (handsome good guys) and Persians (abnormally-ugly bad guys). They also remember that the Persian army was overwhelmingly bigger than the Spartan opponent, so they won this battle after facing heroic resistance for a couple of days. For some reason, however, the Persians were defeated shortly afterwards.

Barbara and Carl decide to participate in the proposed experience, and they are taken to a room with other participants. Once there, a guide gives one tactile mobile device to each participant, asks them to choose a nickname and provides a very brief introduction to the historical context of the battle with the aid of a video and a few static images. Then, the mobile devices offer the participant the possibility of choosing the roles they would like to play in a reenactment of the battle. Barbara bids for the role of Persian king Xerxes, and she gets it. Carl asks for the role of a Spartan soldier, but there are already too many people for this role and nobody for others, so he ends up in the role of a Phocian infantryman —the roles are picked from a pool, and the distribution is supervised so as to have people in all the relevant roles.

Barbara and Carl proceed to choose an avatar to represent them in the game: Barbara decides to use a close-up photo of herself with an angry face, whereas Carl chooses one pre-designed picture of a soldier. When everybody is ready, the mobile devices tell each participant to move to a specific zone of the room in order to start the recreation —the different zones are indicated by markers on the floor, which trigger location changes when scanned. Once in their places, Barbara and Carl can see a 360º augmented reality view of a reconstruction of the Persian and Greek camps in the landscape of Thermopylae back in those ancient times. They can also choose to see a map depicting what each one knows at the moment.

During the next 10 minutes, Barbara moves around certain zones (never too close to the opponents' stand) and makes decisions about the movements and actions of the Persian troops by choosing among sets of options. Barbara's map is revealed progressively as the Persians get to know new parts of the environment. Carl, in turn, tries to follow the orders decided by the participant who plays the role of Spartan king Leonidas. When he is sent to guard a path above Thermopylae, he engages in a fight against Persian soldiers. At this moment, his mobile device displays a sword on screen, which Carl can move around to inflict damage on the opponents. Even though Carl notices that his sword is more powerful than the Persians', the Phocian infantryman he represents dies. Nonetheless, the game is not over for Carl, because he can rejoin the game by picking up another role from a pool. He decides to become one Theban soldier, fighting next to the Spartans —other roles that existed at first are no longer available ("they may have died as well", Carl guesses). In the end, the Persians are victorious and the battle finishes with a number of Thebans fleeing and all the Spartans dead.

The guide announces that this is the end of the reenactment stage. Now it is time to move to the Tholos projection room, which was one of the major attractions for Barbara and Carl to visit the Hellenic Cosmos. When all the participants are sitting, a woman called Doris appears on the big screen saying that she is an expert in Ancient History and she is going to explain how the participants' recreation compares to the real happenings. Her explanations are supplemented by animations representing the map of the battle area and the main movements of the troops, plus a number of other videos and images. At this time, the mobile devices given to Barbara and Carl are displaying keyboards that allow them to exchange comments in a virtual chatting room, with the possibility of sending text to specific individuals (identified by nickname or avatar) and posting to Facebook. Barbara starts chatting actively with other participants who are sat two rows behind, while Carl posts several comments on his Facebook wall. The screen also shows a row of emoticons to let Barbara and Carl indicate their mood as Doris delivers her stuff.

At one point during her explanations, Doris proposes a collective quiz game with multiple-choice questions, and they make it to the last round. Later on, nearing the end of Doris' explanations, she asks the audience what they think could have been the fate of Ephialtes (a man who betrayed the Spartans). Only 30% of the participants (including Carl but not Barbara) are right to guess that Ephialtes did not have time to enjoy any reward from the Persians due to their defeat in a subsequent battle.

When Doris finishes the comparison of the participants' recreation with the historical facts, she opens a collective debate about the consequences of the battle in the short, medium and long terms. Barbara and Carl find it very engaging to comment and vote on the topics proposed by Doris: "up to what point would there be fewer ruins in Athens if Leonidas had stopped the Persians' advance?", "would the Parthenon ever have been built?", "would the Persians have conquered the whole of Europe?", "what would our languages sound like?" Barbara typically chooses the options with fewer supporters, but she is happy to see that she is often aligned with Doris' opinions and arguments.

After a few minutes, Doris thanks everybody for their participation and finishes the debate. Prior to returning the mobile devices, Barbara and Carl are asked to fill in a questionnaire about how they liked the experience. Both Barbara and Carl provide short and positive responses. They return the devices and move on to explore the other offerings of the Hellenic Cosmos.

4.6.4. Experiment

The hypothesis of the REENACT proposal is that an immersive experience provided by Future Internet technologies will help understand historical events more deeply and more analytically. This will be done within the framework of the Value Impact Assessment (VIA) methodology put forward in D2.1.1 “First EXPERIMEDIA methodology”, looking at Quality of Service (QoS), Quality of Experience (QoE) and Quality of Community (QoC) metrics.

QoS data typically reflects direct, objective measurements of physical characteristics of the environment of an experiment or the performance characteristics of software or hardware components. Some important aspects are (i) the responsiveness of the interfaces offered during the reenactment stage, (ii) the responsiveness of the communication with the different pieces of

software lodged remotely in the EXPERIMEDIA facility, (iii) the battery consumption of the participants' tactile mobile devices. The obvious requirement is to be up for the whole duration of the three stages, regardless of how much the users interact with the mobile application, (iv) the delays incurred in processing the user-generated contents during the replay and debate stages, and (v) the promptness of the interfaces provided to the expert to locate relevant material to illustrate situations arisen during the replays and arguments raised during the debates.

To understand the experiential aspect of the REENACT experiment, QoE data will include both quantitative and qualitative measures. On the one hand, the software will keep track of all the movements and actions of the participants during the reenactments, and also of their interactions during the replay and debate stages. Likewise, the application running on the tactile mobile devices will be providing stats about how and when the participants use its different features and interfaces. On the other hand, the mobile application will provide brief questionnaires to gather opinions about the REENACT approach and to rate different features of the experience: educational value, level of entertainment, convenience of the interfaces, quality and completeness of the contents, preferences for certain types of contents, etc. Those ratings will be matched against anonymous information about the participants' educational background and interest in specific topics.

Halfway between quantitative and qualitative, the voting and quiz games offered during the replay and debate stages will be used as sources of information about the participants' level of engagement and learning about the historical events. As a research question, it will be checked whether any of the aforementioned parameters depends on the roles played by the participants during the reenactment stage, since it might happen that the QoE measurements are better for someone who has played a main role (say, King Xerxes in the Battle of Thermopylae) than for someone who has played a secondary role (e.g. a Persian infantryman), or maybe that differences appear between winning and losing sides.

Finally, QoC measurements may also reflect both quantitative and qualitative aspects of the community of people that participate in a REENACT session. To this aim, the experimenters will primarily look at the interactions among the participants during the replay and debate stages, e.g. counting the number of ratings and analyzing the length, mood and depth of the comments they exchange using their tactile mobile devices. Special attention will be paid to what happens among people who did not know each other before, for which they will all be asked to tick out the nicknames of their acquaintances right before starting the reenactment stage. Thus, it will be possible to address questions like whether strangers keep distances during the reenactment, whether they comment on the others' arguments, whether there is any apparent bias in the ratings given to acquaintances and strangers?

Some subjective input from the administrators will also be sought over the different experimentation sessions, to rate the general mood of the participants during the reenactment stage: were they engaged? Were they apparently bored or having fun? Did they dare to talk aloud when required by their roles?

The experimentation is ultimately intended to evaluate the impact of the REENACT proposal for venues like the Foundation of the Hellenic World and the different people involved in the

experiences. The data gathered about the aforementioned QoS, QoE and QoC metrics will be used to assess the potential truth of the following claims for end users and History-related museums like the FHW. Yet, the experimenters will try to assess whether the REENACT solution could be taken out of the museums, for example, to enable new pedagogical experiences in primary and secondary schools.

Commercial exploitation of the solution could also happen through the selling of the technology, its implantation in the venue, training courses for professors, implementation of reenactment scripts and production of multimedia contents.

4.6.5. Summary Table

Scenario ID	9
Venue	FHW
Scenario Name	REENACT Scenario
EXPERIMEDIA Technologies used	ECC, AVCC, SCC, PCC
Actors	• Museum visitors. • Educators. • Experts. • Experimenters.
Physical Locations involved in the scenario	FHW
Future Media Internet Context	• Implementation and experimentation of an FMI application to enable new live and collective experiences that help gain understanding about major historical events. • Use of tablets (together with big screens and sound systems) to provide an augmented reality vision similar to a multiplayer role game for the reenactment of battles and wars. • Social networking features to enable interactions among visitors, geographically-distributed experts and museum guides, shaping new shared edutainment experiences.

End-User Value	• Museum educators will be able to participate in a new type of collective experience, supplementing the expertise and knowledge provided by the experts in replays and debates. • Museum visitors will enjoy new edutainment experiences aimed at improving the understanding of historic events, relying on social networking functionalities and augmented reality capabilities. They will also have the opportunity of interacting with one another, and also with geographically distributed experts via user-friendly interfaces. The most likely target group is that of schoolchildren accompanied by their teachers. • Experts will be able to offer their services to collaborate with museum educators in new pedagogical experiences, interacting more closely than ever before with people interested in knowing more about major historical events. They will be able to efficiently browse repositories of multimedia contents to relate historical facts to specific situations lived by museum visitors during the reenactment of the events, providing annotations, images, diagrams, animations, video clips, etc. Besides, they will be able to conduct live debates about the consequences of the fights in the short, medium and long terms. • Content creators/providers will find an additional outlet for the multimedia contents they produce, which will be usable to provide historically-meaningful explanations to the situations arisen during the reenactments and to the arguments raised during the debates. • Last but not least, the experimenters will draw useful conclusions from metrics proposed to assess QoS, QoE and QoC from the data gathered during the experiments, about the ease of use of the game-like interfaces provided for the reenactment, the didactic value of the different stages, the interest of engaging in social discussions, etc. This valuable insight will serve to enhance their ongoing research activities in the area of information services, which deal with various flavours of technology-enhanced distance learning.
Venue Value	• First-hand experimentation with an innovative FMI (Future Media Internet) application that makes the most of the (possibly unused) spaces, technological facilities, contents and personnel. • Offering of a new kind of collective experience to reinforce the understanding of events that have shaped the history of a certain area of the world. • New means for remote interaction with geographically-distributed actors towards the organisation of new exhibitions, projections of multimedia productions, collection of opinions about new contents and activities, etc.

5. Updated Requirements for Embedded and 1st Open Call Experiments

This Section consists of two sub-sections. The first one provides a "status update" on the requirements documented in the first iteration of this deliverable (D2.1.2). The second one presents the tabulated requirements per EXPERIMEDIA Content Component, as derived from the scenarios of Sections 3 and 4.

5.1. Update on Year 1 Requirements

Each one of the Y1 requirements (as appearing in D2.1.2) has been assigned one of the following "status" values: "Completed", "In progress", "Revised", "Postponed" and "Cancelled", accompanied by a comment, if necessary. It should be noted that this list had been compiled at a very early stage in the project (PM3), when still a lot had not been clarified and disambiguated. This justifies the existence of requirements that at the current stage of the project have been revised, postponed, or cancelled. However, the vast majority of these requirements are either completed or in progress.

Requirement ID	1.0
Requirement	Streaming of video rendered in real-time on the "Tholos" system.
Description	This is a more specific case of Requirement 2. The video produced in real time by the "Tholos" system will be connected with the EXPERIMEDIA video streaming capability.
Priority	Mandatory
Responsibility	Task 2.2.4, WP4.3
Status	Completed
Comment	

Requirement ID	1.1
Requirement	Accessibility to multiple Social Networks.
Description	The EXPERIMEDIA Social Media Tool will provide an API based on SocIoS for built-in access to multiple Social Network Sites, e.g. Facebook, Google+, Twitter etc. It will provide accessibility and handling capabilities of users' SNS accounts.
Priority	Mandatory
Responsibility	Task 2.2.2
Status	Completed
Comment	

Requirement ID	1.2
Requirement	A video stream produced at a Venue can be streamed to mobile devices at any geographic location

Description	The EXPERIMEDIA facility running at a Venue will provide a video input feature, capturing video from cameras, or receiving a video stream from other IT infrastructure at the Venue. The facility will then be able to provide real-time video streaming (essentially relaying the input video stream) to any compatible receiver, e.g. appropriately connected mobile devices.
Priority	Mandatory
Responsibility	Task 2.2.4
Status	Completed
Comment	

Requirement ID	1.3
Requirement	The EXPERIMEDIA "HD Live Streaming Service" allows the distribution of high quality video to a large audience, supporting different terminals.
Description	The EXPERIMEDIA facility includes a high-capability video streaming component, capable of supporting multiple receiving devices at the same time; the receivers may be different types of physical devices.
Priority	Mandatory
Responsibility	Task 2.2.4
Status	Completed
Comment	

Requirement ID	1.4
Requirement	The "Tholos" audience will be able to send Social messages to the remote Panel of Experts monitoring the presentation.
Description	The EXPERIMEDIA Social Networking components will set up a Social Networking environment in which the "Tholos" audience members can post messages that will be specifically identified in real time as originating from the current presentation. The messages will be provided to the panel members through the standard Social Network interface, and also in an aggregated format.
Priority	Mandatory
Responsibility	Task 2.2.2, WP4.3
Status	Completed
Comment	

Requirement ID	1.5
Requirement	Experiment-mediated Groups will function through Social Networking Sites to support experiment-specific message exchange during the experiment

Description	The EXPERIMEDIA facility will allow access to a variety of Social Networking Sites through a unified interface. It can set up experiment-specific Groups under the SNSs. It provides the option of making the default environment of the Social Networks essentially transparent, i.e. use the social connectivity information (e.g. Friends links) to interface users with each other, but replacing the presentation layers of the SNSs with an EXPERIMEDIA-specific messaging service. This allows the easy setup of communication channels between users during an experiment. Messages created during the experiment can also be posted to the user's normal SNS profiles if desired.
Priority	Mandatory
Responsibility	Task 2.2.2
Status	Revised/Almost completed
Comment	Instead of “messaging service”, just "service".

Requirement ID	1.6
Requirement	A specific messaging vocabulary will be provided through the EXPERIMEDIA live + mobile Social Networking capability, to support Group movements, activities and scheduling during an experiment.
Description	The EXPERIMEDIA facility will allow users to send and receive specific messages related to the Group dynamics that are relevant to an experiment where connected users navigate potentially large spaces. The messages consist of imperatives including "come here", "meet at X location at Y time", "see Z object in the Venue".
Priority	Mandatory
Responsibility	Task 2.2.2
Status	In progress
Comment	Requested by EX9 and EX3.

Requirement ID	1.7
Requirement	A recording of the athletes' movements synchronized with audio segments can be saved to a database.
Description	Through the use of the EXPERIMEDIA facility trainers at the CAR facility will be able to record (synchronized) video and audio of training sessions.
Priority	Mandatory
Responsibility	Task 2.2.4, WP4.2
Status	In progress
Comment	

Requirement ID	1.11
Requirement	An application can be used by trainers to set metadata tags on video and audio.

Description	EXPERIMEDIA metadata manipulation software will give trainers the ability to tag particular video scenes and audio segments of a training session.
Priority	Mandatory
Responsibility	Task 2.2.4, WP4.2
Status	In progress
Comment	

Requirement ID	1.12
Requirement	A "metadata video overlay application" will provide trainers with an interface to view and manipulate metadata tags on video and audio content.
Description	EXPERIMEDIA metadata manipulation software will give trainers the ability to seek to a specific position of the video using the music tags instead of searching through the content the desired position to show, as fast as possible, what should be corrected.
Priority	Mandatory
Responsibility	Task 2.2.4, WP4.2
Status	In progress
Comment	Due to usability issues, it won't be in overlay mode.

Requirement ID	1.13
Requirement	Experts within Experiment-mediated Groups will manipulate metadata with the use of augmented reality software.
Description	The EXPERIMEDIA facility will allow access to augmented reality software. Using this software, experts can view and manipulate metadata tags. This allows for more efficient ways of synchronizing multiple visual or audio outputs.
Priority	Mandatory
Responsibility	Task 2.2.6
Status	Revised
Comment	AR software is being implemented in the context of the PCC, however EX3 will be using in-house software instead.

Requirement ID	1.14
Requirement	Augmented Reality capabilities in EXPERIMEDIA will be delivered on standard mobile devices (e.g. smartphones)
Description	Tools and services will be provided through EXPERIMEDIA augmented reality capabilities thus eliminating current performance bottlenecks of mobile devices through the use of intelligent algorithms. Traditional web information sources will be enhanced to allow their integration in mobile location-based and/or augmented reality applications. The EXPERIMEDIA facility will allow users to manage mobile and/or augmented reality application providing state of the art functionality.
Priority	Mandatory

Responsibility	Task 2.2.6 (supported by Task 2.2.7 where necessary)
Status	In progress
Comment	JRS AR toolkit used in Android App needs fine-tuning and ECC integration for 1st run. Passage with video overlays does not seem to fit the requirement description.

Requirement ID	1.15
Requirement	A "remote process management application" will provide trainers and athletes with the ability to interact and provide input from remote locations.
Description	Perhaps one of the trainers couldn't be at the site that day, but his opinion is very important. That person might connect with through the EXPERIMEDIA testbed from home or some other place and see the same images the team is watching at the swimming pool. The person at home should be able to seek forward and backward how he wants, once he has found the position of the video he wants to comment he could control remotely what the athletes are watching on the television next to the swimming pool.
Priority	Mandatory
Responsibility	Task 2.2.4, WP4.3
Status	In progress
Comment	

Requirement ID	1.16
Requirement	QoE-optimised path-finding capabilities
Description	The EXPERIMEDIA Path-finding application will provide the optimal path and location recognition for guided user positioning and/or touring (e.g. viewing interesting "sights", i.e. also taking into account from where it is best to view something).
Priority	Mandatory
Responsibility	Task 2.2.2 (supported by WP4.1 and WP4.3)
Status	Cancelled
Comment	Outdated

Requirement ID	1.21
Requirement	A Smartphone application will provide visitors with location-based and activity based information.
Description	Visitors accessing the EXPERIMEDIA mobile application will be provided with list of recommendations regarding nearby walking trails, sites to visit, on-going exhibitions or free parking spots. A map will display all of the related information, including current location and suggested path. The suggestions that are made will be influenced by social media content e.g. things friends liked.
Priority	Mandatory
Responsibility	Task 2.2.2, WP4.1
Status	In progress
Comment	Facebook likes and check in view is implemented, though not with

	the SocialIntegrator

Requirement ID	1.22
Requirement	The EXPERIMEDIA facility running on mobile devices will provide location-based (e.g. displayed on Google Maps) and activity-based information appearing in the form of a list.
Description	The EXPERIMEDIA facility will provide information on a map along with suggested sites. The Venue will provide information regarding the listed suggestions through the mobile interface. An Experiment Group will sign into an account and be able to manipulate information regarding suggested meeting locations etc.
Priority	Mandatory
Responsibility	Task 2.2.2, WP4.1
Status	Completed
Comment	"Manipulation" of meta data by sharing information (meeting points) and liking 'places'.

Requirement ID	1.23
Requirement	The EXPERIMEDIA facility will draw upon social insight and knowledge from online communities and will list customized information tailored to each logged on user. Large scale user generated content, management, delivery and evaluation will be handled by the EXPERIMEDIA testbed.
Description	For example a group will be provided with a link to a restaurant that may take into account the preferences of majority of the members and that takes into account the size. A map providing the closest parking lot with adequate availability in proximity to the desired location.
Priority	Mandatory
Responsibility	Task 2.2.3, WP4.1
Status	Postponed
Comment	Have not found a way to harvest personal interests (also with regards to privacy issues)

Requirement ID	1. 24
Requirement	The Social Network Smartphone application will give users the ability to make collaborative decisions with other remotely located groups.
Description	E.g., a larger group that had been split up would like to make a change regarding the previously proposed meeting place. The EXPERIMEDIA mobile application will give the user the ability to relay information in more than one way, by means of a simple text message, or as a location meeting update notification, or even a voice message. The new proposed meeting location will appear on the application map along with the proposed path.
Priority	Mandatory
Responsibility	Task 2.2.2, WP4.1

Status	Revised
Comment	Outdated - replaced by new requirements of EX1 and EX4.

Requirement ID	1.25
Requirement	The EXPERIMEDIA facility will provide the graphical user interface on a mobile application.
Description	It will provide the ability to a user/group of users to connect to a Venue Social Network. The software will provide information adequate in dealing with the specific needs of groups visiting the Venue, thus restricting the possible choices but gaining on ease of use.
Priority	Mandatory
Responsibility	Task 2.2.2, WP4.1
Status	Completed
Comment	

Requirement ID	1.26
Requirement	The EXPERIMEDIA facility will provide functionality for cooperative production, prioritization and synchronization of UGC across large numbers of (mobile) users in real time. User interfaces will enable visualization and shared control for large scale events, where users could be participating at the same live event, geographically separated live events, or across time in a series of events.
Description	The EXPERIMEDIA facility will handle the complexity of synchronizing input of multiple groups. Multiple inputs provided by a plethora of groups will notify all interested participants of the Social Network group, the application will automatically take the input provided and generate the additional information needed, thus decreasing complexity of use. For example the map locations and suggested paths will automatically be generated based on new proposed meeting location.
Priority	Mandatory
Responsibility	Task 2.2.3 (supported by Task 2.2.2), WP4.1
Status	Cancelled
Comment	Eventually not required

Requirement ID	1.27
Requirement	An application relaying video and other relevant information to skiers.
Description	A user accessing the EXPERIMEDIA mobile application will be able to view relevant video information regarding ski lift times, suggested runs of the day and live video feed of junction points on the ski runs.
Priority	Mandatory
Responsibility	Task 2.2.4, WP4.1
Status	Postponed

Comment	Discussions pending

Requirement ID	1.31
Requirement	Scalability of the EXPERIMEDIA Cloud
Description	The EXPERIMEDIA services that will be hosted in the Cloud infrastructure, such as social networking applications, image-rendering services, etc, should be able to support a dynamically varying number of users. Therefore, the EXPERIMEDIA cloud should be able to scale up/out and down to support the variations in the workload, due to the dynamically varying number of users and patterns of requests. To this direction, possible federation solutions with other clouds should also be investigated.
Priority	Mandatory
Responsibility	Task 2.2.7
Status	Partly completed
Comment	Elasticity rules missing, but they haven't been required yet.

Requirement ID	1.32
Requirement	Private and public cloud solution
Description	The EXPERIMEDIA facility should build a complete Cloud software solution that will enable organizations to build their own private cloud platform around it to fit their own needs. Depending on the experiment, it may be desirable to provide the usage of the EXPERIMEDIA facility in the Venues themselves to third parties as a complete product. To this direction, the EXPERIMEDIA Cloud computing software will support the creation of on-premise clouds as well as of public clouds, to support the customers interested in conducting experiments in the existing Venues.
Priority	Mandatory
Responsibility	Task 2.2.1,Task 2.2.7
Status	Completed
Comment	

Requirement ID	1.33
Requirement	QoS provisioning and support for various types of multimedia services
Description	As the media services that will be deployed in the EXPERIMEDIA facility will support different types of multimedia, for example VoIP, multimedia streaming, image search, image-based rendering, video transcoding, etc, in order to meet their different QoS requirements, the EXPERIMEDIA testbed management services and cloud infrastructure shall provide QoS provisioning and support for various types of multimedia services.
Priority	Mandatory
Responsibility	Task 2.2.1,Task 2.2.7
Status	Cancelled
Comment	There were no strong requirements in that respect eventually.

Requirement ID	1.34
Requirement	Provisioning for various types of end-user devices
Description	As the described scenarios involve different types of devices, such as personal computers (PCs), smart-phones, and tablet PCs , the EXPERIMEDIA Cloud facility shall be able to adapt the multimedia content to fit the processing capabilities of the different types of devices.
Priority	Mandatory
Responsibility	Task 2.2.4 (supported by Task 2.2.1 and Task 2.2.7)
Status	Revised
Comment	Content adaptation is done at the media servers.

Requirement ID	1.35
Requirement	In order to distribute audio visual content over the Internet, the content should be encoded properly to ensure the content consumer experience.
Description	The EXPERIMEDIA HD Audio/Video Live Transcoding Service will support high codification (e.g. in H.264) and multiple qualities so the user receives the best possible stream his network temporal conditions allow.
Priority	Mandatory
Responsibility	Task 2.2.4
Status	Completed
Comment	

Requirement ID	1.36
Requirement	Certain QoS and QoE requirements will have to be met when accommodating large audiences.
Description	The EXPERIMEDIA HD Live Streaming Service will allow for the distribution of high quality video to large audience from a good connection supporting different terminals.
Priority	Mandatory
Responsibility	Task 2.2.4
Status	Completed
Comment	

Requirement ID	1.37
Requirement	Synchronization of multiple video feeds and the data it relates to.
Description	The EXPERIMEDIA Time Synchronized Metadata Service will provide the capability to synchronize video with other correlated data, which can be used to change the behaviour of the Player. Users will obtain synchronised information together with the video.
Priority	Mandatory
Responsibility	Task 2.2.4
Status	Postponed

Comment	Not requested yet.

Requirement ID	1.41
Requirement	High QoE of voice and video chat capabilities.
Description	The EXPERIMEDIA integrated video chat service will provide communication through voice and video chat. Voice and video chat allows telephone and video calls between pairs of users and conference calling, and uses a proprietary audio/video codec.
Priority	Mandatory
Responsibility	Task 2.2.4
Status	Revised
Comment	Supplied by open call EX6

Requirement ID	1.42
Requirement	High QoE of VR solutions
Description	The EXPERIMEDIA 3D Virtual Reality Immersive Solution will give users the option to interact with other users, vendors and/or sites through a VR world representing the Venue.
Priority	Mandatory
Responsibility	Task 2.2.5
Status	Cancelled
Comment	Outdated – introduced at early stage, before 3D partner joined the consortium.

Requirement ID	1.43
Requirement	High QoE of cross-media integration
Description	The EXPERIMEDIA Technologies for user centric interactions cross-media channels will give users the ability to participate with the use of major platforms mobile and/or PC in a VR game or a TV broadcast in real-time.
Priority	Mandatory
Responsibility	Task 2.2.5
Status	Cancelled
Comment	Outdated – introduced at early stage, before 3D partner joined the consortium.

Requirement ID	1.44
Requirement	High QoS of dynamic motion analysis
Description	The EXPERIMEDIA Marker-less Dynamic Motion Analysis tool will provide capability for generating relevant data regarding tracking subject motion through input provided by a grid of 2D video cameras.
Priority	Mandatory
Responsibility	Task 2.2.5
Status	Cancelled
Comment	Outdated – introduced at early stage, before 3D partner joined the

	consortium.

Requirement ID	1.45
Requirement	Being able to track the location of users.
Description	The EXPERIMEDIA Tracking tool will handle outdoor location tracking input from many devices, and provide location information to any other Facility service or component requiring it.
Priority	Mandatory
Responsibility	Task 2.2.6
Status	In progress
Comment	Tracking is done through the PCC. Integration is in progress.

Requirement ID	1.46
Requirement	Provide evaluation features to track quality of services
Description	The EXPERIMEDIA Tracking tool will handle evaluation input from mobile participants.
Priority	Mandatory
Responsibility	Task 2.2.6
Status	In progress
Comment	Babylon will be used on the Android device

Requirement ID	1.47
Requirement	Ability to index and cluster large text-based datasets according to semantic similarity.
Description	The EXPERIMEDIA Advanced Index Tool will provide Indexing based on vector-space models, employing techniques from computational linguistics to organize, cluster, find and present 'similar' texts based on a metric that resembles semantic similarity as experienced by humans, i.e. texts that are about the same topic, even if they might use different words.
Priority	Mandatory
Responsibility	Task 2.2.6
Status	Postponed
Comment	

5.2. Requirements for v2.0

The following subsections include the tabulated requirements for the five EXPERIMEDIA Content Components, as these have been drawn from the scenarios of the open call experiments and the updated embedded experiments. These will drive the development work during the second phase ("Expansion") of the project.

5.2.1. ECC

5.2.1.1. ECC client API requirements

The following requirements have been identified for ECC client software writers/dashboard users.

Requirement ID	2.01
Requirement Name	Support for constrained metric sampling
Description	It should be possible for ECC clients to specify how often and at what maximum frequency a specific metric should be requested by the ECC.
Component Mapping	ECC
Experiment Mapping	All
Priority	High
Dependencies	2.04

Requirement ID	2.02
Requirement Name	Support for parent-child entity relationship
Description	It should be possible for ECC clients to describe a parent-child relationship between one entity and another.
Component Mapping	ECC
Experiment Mapping	All
Priority	Medium
Dependencies	2.04

Requirement ID	2.03
Requirement Name	Support for abstract inter-entity relationship
Description	It could be possible for ECC clients to describe an abstract relationship between one entity and another.
Component Mapping	ECC
Experiment Mapping	All
Priority	Low
Dependencies	2.04

Requirement ID	2.04
Requirement Name	Entity template-instance modelling
Description	It should be possible for ECC clients to describe types of entities (and their relationships) then then declare instances of those entity types (which will be linked to a specific metric measurement set).
Component Mapping	ECC
Experiment Mapping	All
Priority	High
Dependencies	

Requirement ID	2.05

Requirement Name	Dynamic client connection
Description	It should be possible for ECC clients to disconnect and re-connect to an experiment at any point in time, advancing to the current experimental phase.
Component Mapping	ECC
Experiment Mapping	All
Priority	High
Dependencies	

Requirement ID	2.06
Requirement Name	Dynamic entity instance creation
Description	It could be possible for ECC clients to dynamically declare instances of entities they wish to observe during the course of an experiment.
Component Mapping	ECC
Experiment Mapping	All
Priority	Medium
Dependencies	2.04

Requirement ID	2.07
Requirement Name	Dynamic entity instance enablement
Description	It could be possible for ECC clients to dynamically enable/disable instances of entities during the course of an experiment. Metrics associated with enabled entities would be requested by the ECC during monitoring.
Component Mapping	ECC
Experiment Mapping	All
Priority	Medium
Dependencies	2.04

Requirement ID	2.08
Requirement Name	Batched metric reporting during monitoring
Description	It should be possible for ECC clients to send a batch of metrics to the ECC rather than on a per-metric basis.
Component Mapping	ECC
Experiment Mapping	All
Priority	Medium
Dependencies	

Requirement ID	2.09
Requirement Name	Binary file transmission
Description	It could be possible to transmit binary files for storage in the ECC during the post-reporting phase.
Component Mapping	ECC
Experiment Mapping	All
Priority	Medium

Dependencies	

Requirement ID	2.10
Requirement Name	C++ client API
Description	A C++ based API should be available for client writers to use.
Component Mapping	ECC
Experiment Mapping	EX6
Priority	High
Dependencies	

Requirement ID	2.11
Requirement Name	Data export
Description	It should be possible for experimenters to selectively export captured metrics to a file using the ECC dashboard.
Component Mapping	ECC
Experiment Mapping	All
Priority	High
Dependencies	

5.2.1.2. ECC metric data requirements

The following requirements have been identified as types of metric data that should be supported by the ECC metric model. It is important to note that ECC client software writers are responsible for developing the software to take the actual measurements before sending them to the ECC.

Requirement ID	2.12
Requirement Name	System metric description (QoS)
Description	It should be possible to describe computer based metrics such as CPU usage; RAM usage; network traffic; VM usage.
Component Mapping	ECC
Experiment Mapping	All
Priority	Low (current functionality should already meet this)
Dependencies	

Requirement ID	2.13
Requirement Name	Content usage metrics description (QoS)
Description	It should be possible to describe digital media content usage statistics such as content retrieval time; content access counts; new content creation counts; retrieval error counts.
Component Mapping	ECC
Experiment Mapping	All
Priority	Low (current functionality should already meet this)
Dependencies	

Requirement ID	2.14
Requirement Name	Location metrics description (QoS)
Description	It should be possible to describe a device's position and orientation in the real world. A dedicated metric type may be developed to support this.
Component Mapping	ECC
Experiment Mapping	EX1: Schladming, EX4: DigitalSchladming, EX5: MediaConnect EX9: REENACT
Priority	Medium
Dependencies	

Requirement ID	2.15
Requirement Name	Video data metrics description (QoS)
Description	It should be possible to describe media streaming statistics for server and client contexts such as frame resolution; frame rate; encoding rate; stream bitrate.
Component Mapping	ECC
Experiment Mapping	AVCC metrics
Priority	Low (current functionality may cover most of these)
Dependencies	

Requirement ID	2.16
Requirement Name	Interaction logging metrics (QoE)
Description	It should be possible to describe interaction events and statistics such as interaction periods, events, service requests. Some dedicated metric types may be developed to support some cases, if required.
Component Mapping	ECC
Experiment Mapping	EX1: Schladming, EX5: MediaConnect, EX9: REENACT
Priority	Medium (current functionality should cover most of these)
Dependencies	

Requirement ID	2.17
Requirement Name	Content attitude metrics (QoE)
Description	It should be possible to describe the most popular content related interactions such as the top 10 searches; the top 10 most popular hash-tags; the most popular physical locations.
Component Mapping	ECC
Experiment Mapping	EX3: FHW, EX4: DigitalSchladming
Priority	Medium+ (extension to current functionality may be required)
Dependencies	

Requirement ID	2.18
Requirement Name	System attitude metrics (QoE)

Description	It should be possible to describe user attitudinal scales for dimensions such as perceived usefulness; effectiveness; ease-of-use; fun.
Component Mapping	ECC
Experiment Mapping	All
Priority	Low (current functionality should already support this)
Dependencies	

Requirement ID	2.19
Requirement Name	Community interaction metrics (QoC)
Description	It should be possible to describe on-line community statistics such user login frequency; number of content uploads; percentage of community uploading content; number of comments posted.
Component Mapping	ECC
Experiment Mapping	EX4: DigitalSchladming, EX8: BLUE
Priority	Low (current functionality should already support this)
Dependencies	

Requirement ID	2.20
Requirement Name	Community member metrics (QoC)
Description	It should be possible to describe community membership statistics such as number of new registrations; number of deleted accounts; number of non-registered users; number of member connections.
Component Mapping	ECC
Experiment Mapping	EX4: DigitalSchladming
Priority	Low (current functionality should already support this)
Dependencies	

5.2.2. SCC

Requirement ID	2.31
Requirement Name	Twitter Support
Description	Include support for Twitter to SocialIntegrator
Component Mapping	SCC
Experiment Mapping	EX3: FHW
Priority	Medium
Dependencies	

Requirement ID	2.32
Requirement Name	Custom Labels to SN Objects
Description	Extend the FHW Android and Expert app for rating textual comments by attaching such labels as “I like”, “I don’t like”, “it makes sense”, “it is nonsense”, “it is funny”. Build this functionality on Facebook.
Component Mapping	SCC
Experiment Mapping	EX9: REENACT

Priority	High
Dependencies	

Requirement ID	2.33
Requirement Name	Multiple Choice Questions
Description	Support multiple choice functionality on Facebook
Component Mapping	SCC
Experiment Mapping	EX9: REENACT
Priority	High
Dependencies	

Requirement ID	2.34
Requirement Name	User Activity Monitoring
Description	Define monitoring metrics based on the comments/multiple choice questions - record everything that is posted by the participants (comments, ratings, voting, replies to multiple choice questions)
Component Mapping	SCC
Experiment Mapping	EX9: REENACT
Priority	High
Dependencies	

Requirement ID	2.35
Requirement Name	Text Filtering
Description	Provide plugins for real-time parsing to highlight words (for the expert side), filter foul language (possibly using experimenter-provided dictionaries).
Component Mapping	SCC
Experiment Mapping	EX9: REENACT
Priority	Low
Dependencies	

Requirement ID	2.36
Requirement Name	Mobile Social monitoring
Description	- Mobile version of the Social Integrator monitoring client for Android devices for registering the users' interactions with social media through the mobile device. - Attach as a metric generator to the ECC - Implement new monitoring metrics (number of pictures, comments, likes, private messages, etc.)
Component Mapping	SCC, ECC
Experiment Mapping	EX8: BLUE
Priority	Medium
Dependencies	

Requirement ID	2.37

Requirement Name	Social Integrator extension
Description	Enable listeners to be defined and notified upon the interaction with social media. See the Social Listener detailed above - Provide method to add listeners - Define events that the listener will receive and can use to determine what happened.
Component Mapping	SCC
Experiment Mapping	EX8: BLUE
Priority	Medium
Dependencies	2.36

Requirement ID	2.38
Requirement Name	Location based utilities
Description	- Get surrounding places (pages) with description and profile pictures (possible diameter of interest: 5km) - Get check ins filtered by position and time, i.e. last couple of check ins (time) near me (space). For example, check ins within 1km around me from the last week -public FB events by location
Component Mapping	SCC
Experiment Mapping	EX1: Schladming
Priority	High
Dependencies	

Requirement ID	2.39
Requirement Name	General and Friends Content
Description	In public pages-events-locations content of friends and content of others can be presented separately -Get general and friends' likes of pages that represent places - Show future FB events near the user
Component Mapping	SCC
Experiment Mapping	EX1: Schladming
Priority	High
Dependencies	

Requirement ID	2.40
Requirement Name	Content Posting
Description	-Allow posting (text, picture) to FB pages, groups, streams. -Users will post content about their visit in their own FB accounts, content: text, photos, possibly videos depending on connectivity.
Component Mapping	SCC
Experiment Mapping	EX1: Schladming and EX8: BLUE
Priority	High
Dependencies	

Requirement ID	2.41
Requirement Name	RSS Endpoints
Description	The SCC should provide an RSS endpoint for posts/tweets about Schladming found on Facebook and Twitter. SchladmingPinboard would then poll the RSS according to a schedule (e.g. every 10min), and display on the feed the content from Facebook and Twitter which is related to Schladming.
Component Mapping	SCC
Experiment Mapping	EX4: DigitalSchladming
Priority	Medium
Dependencies	

Requirement ID	2.42
Requirement Name	Followtheplace Content Retrieval
Description	The SCC may have a method for grabbing content from Followtheplace, so that it is the SCC making Followtheplace content available to SchladmingPinboard (currently we built a specific connector between the SchladmingPinboard and Followtheplace). Implement related SAD plugin.
Component Mapping	SCC
Experiment Mapping	EX4: DigitalSchladming
Priority	Low
Dependencies	

Requirement ID	2.43
Requirement Name	Analytics Reporting
Description	SAD reporting analytics data to Schladming stakeholders
Component Mapping	SCC
Experiment Mapping	EX5: MediaConnect
Priority	Low
Dependencies	

Requirement ID	2.44
Requirement Name	Custom object handling
Description	Extend the SocialIntegrator API to provide support for customized objects in terms of posting content to the SNs
Component Mapping	SCC
Experiment Mapping	EX8: BLUE
Priority	High
Dependencies	2.40

5.2.3. AVCC

Requirement ID	2.51
Requirement Name	VoD transcoding service

Description	• Transcode video to the following profiles: o html5- mp4 o html5- webm o html5-ogg o rtmp
Component Mapping	AVCC
Experiment Mapping	EX4: DigitalSchladming, EX5: MediaConnect, EX6: CONFetti and EX9: REENACT
Priority	High
Dependencies	

Requirement ID	2.52
Requirement Name	VoD thumbnail generation
Description	• Generate thumbnail
Component Mapping	AVCC
Experiment Mapping	EX4: DigitalSchladming, EX5: MediaConnect, EX6: CONFetti and EX9: REENACT
Priority	High
Dependencies	2.51

Requirement ID	2.53
Requirement Name	VoD ingest service
Description	• Integrates the transcoding, thumbnail, http distribution and CMS
Component Mapping	AVCC
Experiment Mapping	EX4: DigitalSchladming, EX5: MediaConnect, EX6: CONFetti and EX9: REENACT
Priority	High
Dependencies	2.51, 2.52, 2.54

Requirement ID	2.54
Requirement Name	Content Management System
Description	• Software that store and retrieve content URIs together with the content description • Integrated with the VoD ingest • Integrated with reference player
Component Mapping	AVCC
Experiment Mapping	EX4: DigitalSchladming, EX5: MediaConnect, EX6: CONFetti and EX9: REENACT
Priority	Medium
Dependencies	

Requirement ID	2.55
Requirement Name	HTTP VoD distribution

Description	• Deliver media assets over http: o html5- mp4 o html5- webm o html5-ogg o Generate thumbnail
Component Mapping	AVCC
Experiment Mapping	EX4: DigitalSchladming, EX5: MediaConnect, EX6: CONFetti and EX9: REENACT
Priority	High
Dependencies	2.53

Requirement ID	2.56
Requirement Name	ECC connection module for the ingest
Description	• Report experiment activity in the ingest process • Log, target profiles, errors and time required
Component Mapping	AVCC
Experiment Mapping	EX4: DigitalSchladming, EX5: MediaConnect, EX6: CONFetti and EX9: REENACT
Priority	Low
Dependencies	2.53

Requirement ID	2.57
Requirement Name	ECC connection module for http distribution
Description	• Report on user requests • http server metrics
Component Mapping	AVCC
Experiment Mapping	EX4: DigitalSchladming, EX5: MediaConnect, EX6: CONFetti and EX9: REENACT
Priority	Low
Dependencies	2.55

Requirement ID	2.58
Requirement Name	ECC connection module for CMS
Description	• Report on user requests • http server metrics
Component Mapping	AVCC
Experiment Mapping	EX4: DigitalSchladming, EX5: MediaConnect, EX6: CONFetti and EX9: REENACT
Priority	Medium
Dependencies	2.54

Requirement ID	2.59
Requirement Name	RTP stream record

Description	• Record RTP live sources • API for start/stop recording/streaming. ○ Support of wildcards to select several streams atomically.
Component Mapping	AVCC
Experiment Mapping	EX6: CONFetti
Priority	High
Dependencies	

Requirement ID	2.60
Requirement Name	VoD and LIVE content switching

Description	• Provide a unique RTP stream, switching dynamically from the following inputs:
	  ○ RTP remote source
	  ○ Previous recording
	  ○ VoD ingested

Component Mapping	AVCC
Experiment Mapping	EX6: CONFetti
Priority	High
Dependencies	2.59, 2.53

Requirement ID	2.61
Requirement Name	Store and retrieve content of training sessions
Description	• Store synchronised (manually) videos generated by the application • Associate them to the training sessions • Recover videos
Component Mapping	AVCC – CAR Training management
Experiment Mapping	EX7: 3D Acrobatic Sports
Priority	High
Dependencies	

5.2.4. PCC

Requirement ID	2.71
Requirement Name	AR Viewer UI enhancements
Description	• Pop up bubble with info • Navigation to detail view from bubble • Customizable POI icons • Default icons for categories
Component Mapping	PCC
Experiment Mapping	EX1: Schladming
Priority	High
Dependencies	

Requirement ID	2.72
Requirement Name	2D Image Recognition
Description	Recognize 2D Images (QR, Smart Tags), show interaction possibility, link to content Monitor: time spent on smart tag, times a smart tag was recognized, variance of viewing angles
Component Mapping	PCC
Experiment Mapping	EX3: FHW
Priority	High – possible with 3rd party framework
Dependencies	

Requirement ID	2.73
Requirement Name	Indoor location tracking with 2D markers
Description	keep the delimitation of different zones in the re-enactment space, identified by 2D markers or some other technical means
Component Mapping	PCC
Experiment Mapping	EX8: BLUE and EX9: REENACT
Priority	High
Dependencies	

Requirement ID	2.74
Requirement Name	Babylon for Android
Description	Client or library fit for integration in Android app
Component Mapping	PCC
Experiment Mapping	EX1: Schladming
Priority	High
Dependencies	

Requirement ID	2.75
Requirement Name	Babylon slider
Description	Add slider input method to Babylon
Component Mapping	PCC
Experiment Mapping	EX9: REENACT
Priority	High
Dependencies	

Requirement ID	2.76
Requirement Name	Event Creator
Description	Use Creator to orchestrate events on the re-enact stage
Component Mapping	PCC
Experiment Mapping	EX9: REENACT

Priority	High
Dependencies	

5.2.5. 3DCC

Requirement ID	2.81
Requirement Name	Bar Trajectory (weightlifting)
Description	Path that the bar takes during the lift
Component Mapping	3DCC
Experiment Mapping	EX2: CAR
Priority	High
Dependencies	

Requirement ID	2.82
Requirement Name	Vertical axis (weightlifting)
Description	The vertical axis painted in the centre of the bar since beginning of the snatch. To compare with the trajectory
Component Mapping	3DCC
Experiment Mapping	EX2: CAR
Priority	High
Dependencies	

Requirement ID	2.83
Requirement Name	Knee angle (weightlifting)
Description	Curve of Knee flexion angle / time of the snatch
Component Mapping	3DCC
Experiment Mapping	EX2: CAR
Priority	Medium
Dependencies	

Requirement ID	2.84
Requirement Name	Hip angle (weightlifting)
Description	Curve of the Hip flexion angle vs. time of the snatch. Hip angle is the angle between trunk and thigh
Component Mapping	3DCC
Experiment Mapping	EX2: CAR
Priority	Medium
Dependencies	

Requirement ID	2.85
Requirement Name	Recognise Trigger (weightlifting)
Description	Sound or voice that inform to the athlete that he has been recognised by Kinect and he can start the movement
Component Mapping	3DCC

Experiment Mapping	EX2: CAR
Priority	Medium
Dependencies	

Requirement ID	2.86
Requirement Name	Bar velocity (weightlifting)
Description	Resultant Velocity in m/s during snatch
Component Mapping	3DCC
Experiment Mapping	EX2: CAR
Priority	High
Dependencies	

Requirement ID	2.87
Requirement Name	Frontal area (cycling)
Description	Frontal area of the of the cyclists and bicycle combined (m^2)
Component Mapping	3DCC
Experiment Mapping	EX2: CAR
Priority	High
Dependencies	

6. Conclusion

The first purpose of this deliverable was to describe the scenarios that will be brought forward during the second year ("Expansion" phase) of the project. These scenarios comprise a) the updated versions of the embedded experiments and b) the "actionable" stories behind the six new experiments that have joined EXPERIMEDIA as a result of the first open call. The second purpose of the deliverable was to document the requirements derived from the aforementioned scenarios. These requirements drive the development of the upgraded components of EXPERIMEDIA for the second year.

The final iteration of this deliverable (D2.1.8) will be created in PM27 to document the final scenarios and requirements following the completion of the second open call.

