EXPERIMEDIA

D2.1.8

Final Scenarios and Requirements

2014-03-17

Athanasios Voulodimos (ICCS/NTUA), Michael Boniface (IT Innovation), Stephen C. Phillips (IT Innovation), Diego Esteban Rodriguez (ATOS), Kleopatra Konstanteli (ICCS/NTUA), Sandra Murg (JRS), David Salama Osborne (ATOS), Simon Crowle (IT Innovation), Nicholas Vretos (CERTH), Georgios Palaiokrassas (ICCS/NTUA), Antonio Gomez Muriana (ATOS), Gerald Binder (Evolaris), Omar Niamut (TNO), Rosa Peral (Tecnalia), Bertram Müller

This deliverable presents the scenarios and requirements of the third year of the project and provides a brief description of the vision and requirements for the Final EXPERIMEDIA Facility in the Sustainability Phase.

SEVENTH FRAMEWORK PROGRAMME

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Project acronym	EXPERIMEDIA
Full title	Experiments in live social and networked media experiences
Grant agreement number	287966
Funding scheme	Large-scale Integrating Project (IP)
Work programme topic	Objective ICT-2011.1.6 Future Internet Research and Experimentation (FIRE)
Project start date	2011-10-01
Project duration	36 months
Activity 2	Construction
Workpackage 2.1	Architecture blueprint
Deliverable lead organisation	ICCS/NTUA
Authors	ICCS/NTUA: Athanasios Voulodimos, Kleopatra Konstanteli, Georgios Palaiokrassas IT Innovation: Michael Boniface, Stephen C. Phillips, Simon Crowle ATOS: Diego Esteban Rodriguez, David Salama Osborne, Antonio Gomez Muriana JRS: Sandra Murg CERTH: Nicholas Vretos Evolaris: Gerald Binder TNO: Omar Niamut RTS: Manuel Vera Tecnalia: Rosa Peral Qualisys Scientific Advisor / Motion and More: Bertram Müller
Reviewers	Diego Esteban Rodriguez (ATOS) Stefan Prettenhofer (Infonova)
Version	1.0
Status	Final
Dissemination level	PU: Public
Due date	PM29 (2014-02-28)
Delivery date	2014-03-17

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1. Executive Summary

This document is the EXPERIMEDIA Deliverable 2.1.8 "Final Scenarios and Requirements". It provides a description of the requirements that will drive the third year of the project's development activities, as well as of the scenarios that motivate these requirements. It also provides a brief description of the vision for the Final EXPERIMEDIA Facility.

Section 2 provides an introductory discussion to the deliverable.

The scenarios corresponding to the five new experiments of the 2nd open call are described in Section 3. 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.

Section 4 documents the current requirements that will drive the project's development for the final year. These have been derived from the scenarios of the 2nd open call experiments. The requirements are structured and presented on a per component basis for better overview.

Since we have entered the final year of the project, it is important to present at this point the vision and requirements for the EXPERIMEDIA Facility beyond the lifetime of the project. This is the scope of Section 5, which is succeeded by a concluding section.

2. Introduction

This deliverable aims at documenting the scenarios and requirements that will drive the project's development work during the final phase of the project. At this point in the project's lifecycle there are five experiments from the 2nd open call (the three embedded experiments and six experiments from the 1st open call have been completed in the end of the second year of the project), two based in Schladming (Smart Ski Goggles and iCaCoT), two based in CAR (CARVIREN and 3DRSBA) and one based in FHW (PLAYHIST). The scenarios behind each one of these experiments dictate a number of requirements for the baseline components.

The project is structured in three phases. The focus of Phase 1 was Connectivity, in terms of deploying baseline services at the smart venues that were instrumented for observation and measurement. In Phase 2, the focus shifted towards Expansion by providing specific added value integrations between baseline components. The project is currently within Phase 3 where it is essential to focus on developments that contribute to the sustainability of the software and services offered by the facility. The project must also take into consideration the recommendations of the 2nd annual project review, where the reviewers asked for an increased cohesion between the baseline technologies. To this end, a brief description of the vision for the Final EXPERIMEDIA Facility is provided in this document, where the core of the facility are baseline components hosted as services offered to experimenters using the Software-as-a-Service paradigm.

The related developments, the resulting components and services and the Final Facility will be described in the D2.2.4 "EXPERIMEDIA baseline upgrade for v2.1" and D2.1.9 "Final blueprint architecture".

3. Scenarios for Second Open Call Experiments

In this Section we provide a description of the "actionable" scenarios pertaining to the current five 2nd open call experiments.

3.1. SmartSkiGoggles (EX10)

3.1.1. Introduction

The experiment Smart Ski Goggles aims at the experimentation of a real-time information system implemented into a wearable data goggle (Oakley Airwave). The displayed information about lifts, slopes, weather, hospitality, community activities and the resort in general support users with congestion monitoring and basic navigational hints. Smart Ski Goggles is aiming to enhance the visitor experience while skiing on the mountain.

The proposed experiment builds upon the outcomes of a field study conducted during the FIS Alpine World Ski Championships 2013 by the competence centre for mobile communication and innovation Evolaris. During this study regular skiers were asked to test the Oakley Airwave ski data goggles with an integrated mini display, where information like speed, altitude and airtime were shown. The overall feedback of the testers was very positive. Wearing the goggles was for almost every tester not distracting and they liked the speed information, though it was judged as 'nice-to-have'. When asked which functions the testers would appreciate in a future version of the goggles, most of them named weather, navigation and information about slopes, huts and lifts. Context was commonly judged as very important.

3.1.2. Scenario Background

The venue partner (Schladming) has hosted the Alpine Skiing World Championship in February 2013 and thus became well-known to many new potential guests. So, the ski resort wants to maintain its reputation as modern winter sports destination and ever new services for its guests.

To achieve this, we want to learn:

- Which kind of real-time information and what kind of functionality do the user want to have accessible in their data ski goggles?
- How can optimized usability and user experience be designed?
- How is the users general technology acceptance for data ski goggles?
- How do users use the provided functionalities?
- How could such a service being implemented in a ski resorts ecosystem?
- What is the performance of real-time services based on a 3G network on the slopes and how can it be improved?

3.1.3. Scenario Story

We assume the users are regularly skiing on slopes (at least once a year), have an Android smartphone and are downloading apps from time to time. To make sure, these assumptions are being met in the experiment, we will select the participants based on these parameters.

We will implement an application for the Oakley Airwave digital data goggle displaying and processing information, which was found most useful by skiers in a real-life test. Thus the Smart Ski Goggles app will integrate real-time information about current load and basic navigation for lifts, slopes and hospitality points of interest in the ski area, as well as social media features. Current temperature, actual weather forecasts and avalanche warnings will be implemented in the app to keep the users well informed about the current conditions on the slope.

3.1.4. Experiment

A co-creation approach will be applied to integrate all the relevant actors and stakeholders (users, venue operator, technology provider, etc) into the conception, implementation and evaluation of this experiment. To maximize the impact of the proposed technical solutions end-users and stakeholders will be continuously involved in the development process.

The focus will be on the potential users. In order to maximize Quality of Experience the potential and real users will actively take part in the experimental & explorative prototyping within an agile development process. Thus, a four step methodology will be applied. First, two focus groups will be conducted to discuss user requirements, screen designs and interaction concepts. This is the basis for the conception of the Smart Ski Goggles software and a representative online survey. This second step examines the user requirements on a representative level and will serve as a basis for a detailed target group specification for the pilot runs. Furthermore, this step will provide important data for the scientific analysis of the experiment.

To examine the user experience in a real-life setting, two pilot tests will take place at the venue of Schladming ski resort and with a representative number of participants. From the first pilot results the revised prototype software and final release of the Smart Ski Goggles software will be derived for the second and final pilot test. During the pilots the participants will be shortly briefed about the system setup and provided features. Additionally the smartphone app is being installed on the user's smartphone. After that they are equipped with the data goggles and can use the hardware freely for the whole pilot run (from one hour to a whole day). At the end of the pilot run the users are asked to fill in a feedback form within the smartphone app to gain quantitative feedback. After that there is a short group discussion to capture verbal qualitative feedback.

3.1.5. Summary Table

Scenario ID	10
Venue	Schladming
Scenario Name	Smart Ski Goggles
EXPERIMEDIA Technologies used	ECC, AVCC, SCC
Actors	Ski tourists
Physical Locations involved in the scenario	Schladming

Future Media Internet Context	Investigating in an emerging technological solution, bring the user in at an experimental stage of an upcoming commercial solution and understanding the practical usage potential of real-time information displayed in digital data goggles.
End-User Value	The developed real-time information service enhances the visitor experience while skiing on the mountain. It provides the visitor with interesting and important information, which is useful during skiing on the slopes.
Venue Value	The venue will have a good indication on whether real-time information on data goggles would be a service their guests like. The venue will get business model scenarios to decide how such a service could be operated.

3.2. iCaCoT (EX11)

3.2.1. Introduction

With the interactive Camera-based Coaching and Training (iCaCoT) experiment, we want to test how actual users use the concept of tiled adaptive streaming in a live and real-world environment. We envision that several statically mounted high resolution (i.e. HD or higher) cameras will be placed at a suitable location around the Schladming venue, such as around a ski slope for training or a fun park for winter sport enthusiasts. The video recorded by these cameras will be spatially segmented in real-time using tiled streaming ingest components. Once the video has been tiled, it will be offered to users in and around Schladming venue who can use their own smartphone and tablet to download a Schladming-specific version of our tiled streaming application from the Apple Appstore and navigate around the video, seeing themselves coming down the slope or performing tricks in the fun park.

With the advent of high resolution and panoramic cameras, which are able to record in HD or higher resolutions, it becomes interesting to also segment content spatially. By dividing a video frame up into multiple tiles, where each tile contains a particular area of the video, a client can choose to only receive certain areas of a video. Such a tiled streaming solution enables an inherently scalable method for users to interact with and navigate in a video using pan-tilt-zoom (PTZ) commands. In the EU FP7 project FascinatE[1] we have developed a tiled streaming application, available for both iPhones and iPads, that provides PTZ video using tiled adaptive streaming. Through many discussions with interested parties at our technology demonstrations, we noted that the concept of tiled adaptive streaming is particularly well suited to training and coaching applications. That is, using a smartphone or tablet, a coach is able to zoom in on his trainee coming down the mountain, focusing on specific areas, both temporally as well as spatially. We refer to this as interactive camera-based coaching and training. This is especially useful in snow activities, where the exact line followed by the trainee is not known a-priori and can therefore only be captured using a wide-angle lens located relatively far from the action.

[1] http://www.fascinate-project.eu/

3.2.2. Scenario Background

Schladming is a well-known and popular ski training area, and the venue partner is involved in supporting and facilitating such ski trainings. They have a clear interest in testing tiled adaptive streaming technology in practice, specifically as a tool for training and coaching and as a novel way for Schladming visitors to record themselves coming down the mountain and sharing their experiences with friends and family.

The experiment has the following three main objectives:

1) Capture the user experience when interacting with the tiled streaming application;
2) Test the feasibility of tiled adaptive streaming as a tool for training and coaching activities;
3) Leveraging information obtained through large-scale user tests to improve tiled adaptive streaming bandwidth efficiency.

3.2.3. Scenario Story

We assume the ski trainers operate their training with small group of students on skiing slopes, have an Apple iOS tablet. To make sure, these assumptions are being met in the experiment, we will select the participants based on these parameters. We will implement an application for the tablet to allow for advanced video interaction, in the context of training and coaching. We will implement an independent video capture system along the ski pistes.

During training, a ski trainer will be able to see areas of the ski piste that are beyond his/her direct field of view. Thus, he can observe his/her students directly from the start. Once a group of students has reached the end of the piste, the trainer can discuss with them their performance, making use of the application functions such as slow-motion, frame-step, trick play and line drawing.

3.2.4. Experiment

A two-phase methodology is applied. In an initial pilot test, a first version of the application is used and tested. Using both logging measurements as well as QoE survey questions, the trainer experience is documented and used as input for developments towards the second and final pilot test. The experiment focuses on

4) capturing the user experience of ski trainers when and after interacting with the tiled streaming application;
5) testing the feasibility of tiled adaptive streaming as a tool for training and coaching activities;
6) leveraging the information obtained through the user tests to improve tiled adaptive streaming bandwidth efficiency.

During the first pilot test, the component focus is on ECC usage. During the second pilot test, the component focus is on AVCC/SCC usage. During the first pilot test, only ski trainers will interact with the application, whereas during the second pilot test, also ski tourist may interact with the application.

3.2.5. Summary Table

Scenario ID	11
Venue	Schladming
Scenario Name	iCaCoT
EXPERIMEDIA Technologies used	ECC, AVCC, SCC
Actors	Ski trainers and tourists
Physical Locations involved in the scenario	Schladming
Future Media Internet Context	In the Future Media Internet (FMI), adaptive streaming technologies such as MPEG Dynamic Adaptive Streaming over HTTP (MPEG-DASH[2]) and HTTP Live Streaming (HLS[3]) are expected to represent a majority share of all video streaming towards mobile devices. With the increasing importance of over-the-top video and connected devices, such as Smart TVs, tablets and networked media players, adaptive streaming is rapidly becoming the most used streaming technology used over the internet, replacing traditional streaming technologies such as RTP and RTMP in all areas apart from managed video delivery networks. Up until now, adaptive streaming is mostly used as a straightforward over-the-top method to increase perceived Quality of Service (QoS) by dividing content in multiple chunks and making each chunk available in multiple qualities, or bitrates, and having a client seamlessly switch between these qualities when the network performance forces it do so. The unique properties of adaptive streaming allow it to be used for much more, and enable entirely new use cases and personalized media services becoming available through the use of segmented media files. One specific use case is centred around interactive video navigation, and the underlying technology to support this use case is referred to as tiled adaptive streaming[4].
End-User Value	The developed interactive video application enhances the training capabilities of the end-user. It provides the trainer with improved and faster feedback possibilities.
Venue Value	The venue will be able to promote its innovative view and in particular, can attract winter sport enthusiasts, training for games and matches.

[2] T. Stockhammer, "Dynamic Adaptive Streaming over HTTP - Standards and Design Principles", MMSys'11, February 23–25, 2011, San Jose, California, USA.
[3] http://developer.apple.com/library/mac/#documentation/NetworkingInternet/Conceptual/StreamingMediaGuide/Introduction/Introduction.html
[4] O.A. Niamut, M.J. Prins, R. van Brandenburg, A. Havekes "Spatial Tiling And Streaming In An Immersive Media Delivery Network", in Adjunct Proceedings of EuroITV 2011, Lisbon, Portugal, June 2011.

3.3. CARVIREN (EX12)

3.3.1. Introduction

CAR Virtual Environment (CARVIREN) Experiment consists in the development of a Virtual Community for the CAR Venue accessible using a browser where cinematic and physiological parameters with high definition recordings (from every Training Session) will be available in real time and/or remotely (if needed), and with the aim to provide rapid feedback to improve the athletes' performance. In High Performance Centres, elaborated information is highly important. Information can come from multiple devices: wearables, machines, cam-recorders or information stored in the Database. There is therefore a lot of raw data that has to be processed in order to be useful. This is one of the big problems: due the different communication protocols and because each one uses his own system, it usually takes too much time to be processed. The other problem is the availability of the coach at the Venue, or even being there, the limitation of having to be in one place at a time, therefore being able to only observe one workout. Right now, the Future Media Internet brings us an opportunity to deal with the previous problems. First, because today technologies give us the chance to synchronize and deal with different devices in real time, and secondly, it gives the coach remote solutions, such access to training sessions from his phone, no matter where he is, and in real time. All that provides rapid feedback: elaborated and relevant information in real time and remotely if needed.

3.3.2. Scenario Background

The main goal of this Experiment is to create a virtual area for the CAR environment where information generated by CAR facilities and machines are available for helping the athletes, couches and staff to improve the performance, the quality of trainings and develop the concept of Smart Avenue. This Virtual Area, will be used to synchronize and save information generated by the athlete. This information shall be ready in real time and remotely. The experiment will make use of the WI-Fi connectivity and storage facilities available at the CAR Venue.

3.3.3. Scenario Story

Scenario 1: Swimming team and AVCC-SCC integration

Joanna is the new member of the Synchro team. She struggles with the new routine. When she is back at his rooms; she connects to CARVIREN and load the daily session from the AV repertory (in High Definition). She reviews the video of the morning training to memorize and observe their mistakes while posting comments. Marianna (another team member) is also watching the video from her room, and posting too. They are giving each other tips about the performance. Now, it's not only a video, it's a reviewed video.

Scenario 2: Trampoline (hub of sensors and fix unit)

Pedro and Alonso are jumping in the trampoline (each one with a WIMU and HR belts) and trying to synchronise their movements. Josep, the trainer, looks carefully. He's checking at the same time his CARVIREN desktop and the widgets "Trampoline Sync" and HR Monitor. With the first monitor, he can know exactly the angle of the back of each one of his boys. This monitor is telling him, Pedro in rotating too fast. He checks the HR Monitor, and sees Pedro has more beats per minutes than Alonso. All this, is telling Jopep that Pedro is maybe a bit nervous and unfocused. He told Petro to stop a few minutes, drink water and get calm. After that, Pedro tries again with Alonso and they start to synchronize better.

Scenario 3: Triathlon (hub of sensors and mobile unit)

Marinelli has an outdoor session today. He is wearing a HR belt, a cadence sensor and a speed sensor. He asks to his trainer if he can use a WIMU while cycling outdoor. His coach allows him. Now, he can connect all the sensors to the WIMU, and also, uses the inside sensors of WIMU (GPS, accelerometer, gyroscope, etc.).

When he is back at CAR and WIMU comes in range, it sends by Wi-Fi the whole session. Marinelli can access now his CARVIREN user and check the route on a map, accelerations, speed at any moment, the heart rate, the stage profile and averages. His coach can also do it, and while he is in his bedroom, this information helps him to plan a session for the next day

3.3.4. Experiment

The Experiment consists in the development of a Virtual Community for CAR Venue where cinematic and physiological parameters with high definition recordings (from Training Sessions) will be available in real time and/or remotely (if needed), and with the aim to provide rapid feedback to improve the athletes' performance. CARVIREN will use an innovative system of Specials Hubs, which collect data from Bluetooth, Ant+ and TCP/IP devices and sync them, called WIMU. They can be part of the Venue Infrastructure and when needed, become mobile transmission units, collect data, process it and send it back to CAR Venue in real time, no matter where in the world, just using Wi-Fi Connection (see Figure 1).

WIMU, a device developed by Realtrack Systems. WIMU is a lightly (11x9x5.5 cms) smart device with Microprocessor, RAM memory, 3D accelerometer, gyroscope, magnetometer, barometer, microUSB and SD Memory. WIMU has integrated Bluetooth, Ant+ or Wi-Fi radios. WIMU develops the concept of virtual sensors. Virtual sensors allow WIMU to deal with data generated by other devices like self-generated data. It can be a whole Mobile Transmission Unit. WIMU's microprocessor can process data without been connected to the server. Internal memory and external memory (until 32 GB) can save the information collected and processed.

Once connection to the CAR data-centre is available, WIMU can upload the information. If connection is available while collecting data, this upload can be in real time too.

Figure 1: WIMUs as mobile transmission units which collect data, process it and send it to CAR.

Just connect WIMU to any Wi-Fi Network and it will send the information to the CAR's Server and the Virtual Community, being able in real time. Or save the data and send it later.

All this data will be accessible to different users though a virtual environment (using a browser), where different actors will have access to a series of small utilities or widgets (called Sport Widgets) that will allow them to observe the trainings and analyse the results without space or time limitation.

The SPORTWIs are small utilities that show elaborated information in a simple and easy way.

SPORTWIs run in a web browser allowing any authorized person to access information from their tablet, laptop or smartphone (regardless of model or operating system) (see Figure 2).

Figure 2: SPORTWIs on a smartphone

Whenever possible, SPORTWIs will be available in two modes: Real Time and Historical.

In real time mode, information will be displayed a few seconds after it's been generated, while in History mode any information can be displayed by the system according to previously established access criteria (coaches, athletes, federations, etc.).

Each user can setup his own individual SPORTWIs dashboard, obtaining only the information he desires in every moment.

Access to the dashboard is not restricted to be in CAR Wi-Fi Network's range. It is possible to access remotely from wherever location (as long as there is Wi-Fi access).

Elaborated information provides a better rapid feedback, and the possibility to perform changes at the very same time the athlete is training in the aim of a much better High Performance. Coaches will not have to analyse raw data collected by different devices one by one. It would be the CARVIREN system that will process and sync all this data, which will be shown with their corresponding HD recordings (if available).

Finally, the different actors will access to the system, like with any other network, using a login system. This web browser will contain different SPORTWIs, depending on the type of actor, allowing access to the information at any time and place (as long as there is an Internet connection).

3.3.5. Summary Table

Scenario ID	12
Venue	CAR
Scenario Name	CARVIREN Scenario
EXPERIMEDIA Technologies used	AVCC, ECC, AVCC-SCC Integration
Actors	Trampoline, Triathlon and Swimming athletes and coaches
Physical Locations involved in the scenario	Athletes, Coaches and Technical Stuff
Future Media Internet Context	Generation of training session with video, cinematic and physiological training parameters, available from any device with Internet connection.
End-User Value	Elaborate information in real time, generating rapid-feedback, remote access and better understanding of the trainings
Venue Value	CAR is one of the top venues regarding high performance trainings. All newest technologies are there. This experiment is an opportunity to test a new way of analyzing training, adding several layers of information into one single session, easy to visualize by coaches, athletes and technical stuff.

3.4. 3DRSBA (EX13)

3.4.1. Introduction

Clinical measurements of functional capabilities in athletes are limited to controlled laboratory settings, due to the complex technology and specialised professionals employed to perform such tests. This project aims to improve this situation by utilising modern technologies and new biomechanical approaches. The project aims to combine the power of 3D motion capture in biomechanical laboratories (CAR) with the necessities in sports analysis to provide reality-close surroundings in measuring (training sites at CAR). Scenario Background

3.4.2. Scenario Background

The proposed experiment will focus on bringing biomechanical screening techniques directly to the training site of the athlete at CAR. The high number of athletes at CAR does not allow monitoring and testing all of them and general biomedical services are limited. Notwithstanding these concerns, the screening of muscular-skeletal performance has been widely suggested in sports science and yet, other than in a few exceptional cases, there is no widespread provision. By bringing together these powerful technologies – the motion tracker by Qualisys, control remote technologies as well as the communication interface established at CAR – under the auspices of the EXPERIMEDIA project, one can expect a direct payoff in the Quality of Service (QoS) provided by the institution, as well as Quality of Experience (QoE) for the athlete.

3.4.3. Scenario Story

Marc, Pere and David are young athletes dreaming on winning Olympic gold in their life. In order to achieve such goal, they have a very tight schedule of school and training every day. The health service of their training centre monitors general health issues of their athletes, but are fully aware of the high risk of possible lesions in non-contact situation, as it might occur when jumping and landing on a bended food, tearing muscles and tendons. The centre is relatively small and is not able to buy the newest and most advanced technology. However, the service became aware of a new screening tool, which can be brought to the training field. The centre organises three days of applying this service and at those days all athletes wishing to participate are spending 30 minutes of their time doing motion tests with 3D markers placed on their body. With remote support from an expert in such systems, the system was set-up and the tests performed. Seeing the results, it is clear that for Marc the risk of lesion is very low, as his motion is very controlled and does not show signs of instability. It is different for Pere and David, where the data are showing some indications for instability. The professional support at the sports centre is not quite sure about the data and initiating a remote session with a clinical expert. Seeing the data, the expert sees very little risk for Pere and recommends monitoring the future progress. However, the data from David are showing some possible risk indicators and a full biomechanical study is proposed for him. A visit to a biomechanical laboratory is arranged where a full test is conducted. The initial doubts are manifested and recommendation is given for specific training in order to overcome those instabilities. From all 60 athletes of the centre, only 8 needed the additional biomechanical service. Due to the success, the sports centre decided to implement this screening routing in their annual health programme.

3.4.4. Experiment

The major aspect of the experiment is to see the viability of this approach consisting in:

1) The feasibility to use remote control techniques in biomechanical analysis;
2) The clinical viability of this approach, including clients satisfaction;
3) The easier presentation of such complex biomechanical data to non-experts.

3.4.5. Summary Table

Scenario ID	13
Venue	CAR
Scenario Name	3DRSBA Scenario
EXPERIMEDIA Technologies used	ECC (QoE, QoS) 3DCC (using avatars for together with clinical data syncronised)
Actors	Athletes, clinical service in sports centre (here CAR), Biomechanical services, other experts
Physical Locations involved in the scenario	CAR Outside sports locations
Future Media Internet Context	Using specific clinical tools outside their normal laboratory surrounding. Remote control and remote expertise gathering in screening. Presentation of complex functions of the human body by new presentations.
End-User Value	Additional service individualised and based on real requirements. Better health monitoring and risk assessment.
Venue Value	New clinical service, enhanced use of technology. Increased income.

3.5. PLAYHIST (EX14)

3.5.1. Introduction

The PLAYHIST experiment outcome is to enhance visitor learning experiences related to the Historical and Cultural Centre by offering a new way of interacting with cultural content (integrating both digital and real content) from the exhibitions in the FHW. The serious game will allow visitors to act and interact as a historical character in a 3D environment recreating one of the historical moments depicted in the FHW. Visitors will be proposed with a mission or set of tasks that must be developed to achieve a specific goal, in an engaging and collaborative experience enhancing the learning process and therefore achieving a better historical knowledge.

3.5.2. Scenario Background

Games are powerful educational tools that have been used successfully by cultural heritage organisations. Such an approach integrates art and education into a game-like structure, through which end-users absorb information via non-traditional routes, which stimulate fun-loving but mentally challenging brain processes.

The development of the PLAYHIST experiment will involve the combination of gamification technology and 3D avatars. The interactive and collaborative serious game will be developed by reusing 3D content from the FHW 3D Model Repository, related to one of the interactive movies projected at the FHW, and adapting it for the experiment. Some technological features provided by the EXPERIMEDIA facility, such as the 3DCC module for avatar creation and the ECC module for the registration of the experiment activities, will also be used. Additional research will be conducted on the integration of 3DCC avatar models with 3D commercial engines (e.g. Unity) for game production.

The objective of the PLAYHIST experiment is to assess the effects of using gamification in Quality of Learning (QoL) and Quality of Experience (QoE). The hypothesis that will be tested is that learning by playing provides a better understanding of an historical subject.

3.5.3. Scenario Story

Alice, Sophia, John and Arthur are a group of middle aged tourists form the UK, visiting the Hellenic Cosmos exhibitions. When they enter the main building to attend one of the interactive films in the Tholos, they are offered a new interactive activity recently developed for the film they want to view. They are explained it consists in a collective serious game aiming to get a more engaging and productive experience for history learning. Alice and John refuse to take part in the activity, but Sophia and Arthur, accept to participate in the game.

While Alice and John are conducted to the Tholos for watching the interactive film, Sophia and Arthur enter in an adjoining room where personnel from the museum explain them the serious game and the way of playing it. They also meet other persons who are going to take part in the experience.

First of all, each visitor is given a tablet to interact and play the serious game. They are given the possibility of choosing an avatar from the collection of 3D available characters or customizing one of them with their own face. Sophia, who wants to try this functionality, puts herself in front of a webcam, where her face is scanned an integrated in the 3D avatar she has chosen.

Once the group has received the instructions for the serious game, and after the interactive film has finished, they enter the Tholos to play.

Each participant takes the role of one of the historical characters and, using the tablet and headsets, moves around the scene and interacts with places and historical characters to achieve a set of tasks. The serious game plot has been developed for better learning of the historical moment represented and is totally aligned with the interactive film. Players can get clues and information to solve the different questions or problems proposed, from the characters they find or the places they visit. They compete among each other to get the maximum score before the serious game finishes.

Sophia gets involved very quickly, and using her tablet, she moves around the scene and gets a lot of information for solving the questions. She can see her competitors avatars in different places of the 3D scene projected in the Tholos screen, while she can see her achievements and tasks to do in her own tablet.

Arthur has been playing for a while but he looks a bit lost, so he asks for help using the tablet. A person from the museum is supervising the experiment in another room. He can see what each player is doing and gets an alert of Arthur asking for help. He decides to appear in the serious game, and standing in front of the Kinect, he starts doing signs, waving… to recall Arthur´s attention and showing in the virtual world the direction Arthur must take. He can also interact with Arthur by typing instructions or via voice.

After twenty minutes, the serious game ends and the players get their score and the final ranking. The best player wins a prize from the museum.

3.5.4. Experiment

The experimenters' aim to carry out the experiment is to investigate the following issues:

- The feasibility of using gamification model to communicate historical information along with the improvement on the Quality of Learning (QoL) for the visitors of a history museum as FHW. The analysis of the QoL can provide the feasibility of using a gaming model to improve the learning experience of the FHW visitors. The idea of the learning object is to demonstrate and measure the engagement of the visitor being an active part of the interactive experience showed in the FHW, in the way of a 3D personalized avatar.
- The feasibility of connecting the EXPERIMEDIA modules with Unity 3D engine including the avatar creation and real time animation modules. ECC, 3DCC and PCC could be used them for future game and interactive application development with new and rich functionalities.
- The feasibility of cluster rendering with Unity in a cutting edge facility as the Tholos. This is the most challenging of the objectives and its inclusion in the final experiment execution is not definitively decided.

3.5.5. Summary Table

Scenario ID	14
Venue	FHW
Scenario Name	PLAYHIST Scenario
EXPERIMEDIA Technologies used	ECC, 3DCC (avatar creation module and avatar animation module)
Actors	Museum visitors, Museum experts (optional)
Physical Locations involved in the scenario	FHW (Tholos)
Future Media Internet Context	PLAYHIST experiment focuses on novel ways to deliver learning experiences using 3D content where visitors and experts participate/interact in virtual worlds. This interaction is provided using a multi-user game where players appear as 3D avatars, through the EXPERIMEDIA 3DCC module. Additionally, cluster rendering for immersive presentation technologies in the THOLOS is used.

End-User Value	Improve the overall experience of the audience through their interaction with a serious game, in two facets: engagement and learning. Visitors will enjoy new education experiences aimed at improving the understanding of historic events, relying on serious games. Motivate visitors to go deeper into the historical core concepts, especially for scholars and children, as they take control of their own learning and are engaged participants rather than passive observers.
Venue Value	Capacity to attract more visitors and offer better experience by offering a new additional service to the ones currently available to their visitors. Examine the suitability of serious games for improving visitors' experience, in two facets: engagement and learning. Achieve FHW's mission: the preservation and dissemination of Hellenic history and tradition, the creation of an awareness of the universal dimension of Hellenism and the promotion of its contribution to cultural evolution. Reutilization of FHW digital assets for new ways of interacting with their visitors.

4. Requirements for Second Open Call Experiments

This Section presents the tabulated requirements per EXPERIMEDIA Component, as derived from the scenarios of Section 3 above.

4.1. ECC

4.1.1. ECC data requirements

The following requirements have been identified relating to the data handled by the ECC.

Requirement ID	3.01
Requirement Name	Activity monitoring
Description	Ability to report on activities that a user is undertaking, ranging from user-interactions with a software interface to activities taking place in the real-world.
Component Mapping	ECC
Experiment Mapping	All but in particular EX10
Priority	Medium
Dependencies	

Requirement ID	3.02
Requirement Name	Data exploration
Description	The ECC dashboard needs to provide tools to explore and interpret the data that the ECC receives.
Component Mapping	ECC
Experiment Mapping	All
Priority	Medium
Dependencies	3.01, 3.05

Requirement ID	3.03
Requirement Name	Infrastructure metrics
Description	Metrics related to the services and infrastructure should be collected and reported to better understand the performance of the EXPERIMEDIA facility.
Component Mapping	ECC
Experiment Mapping	All
Priority	Medium
Dependencies	

Requirement ID	3.04
Requirement Name	Enhanced metric types
Description	The unit typing of metrics should be standardised, e.g. using UCUM
Component Mapping	ECC
Experiment Mapping	All

Priority	low
Dependencies	

Requirement ID	3.05
Requirement Name	Standardised naming
Description	A recommendation is required for how to name metrics and entities. This will help data exploration functions.
Component Mapping	ECC
Experiment Mapping	All
Priority	medium
Dependencies	

4.1.2. ECC service requirements

The following requirements have been identified from the use of the ECC during the first two years of the project. They relate primarily to the ECC service.

Requirement ID	3.06
Requirement Name	Multiple independent dashboard views
Description	Currently if there is more than one web-browser view of the dashboard open then those views are synchronised. Independent dashboard views are required.
Component Mapping	ECC
Experiment Mapping	All
Priority	Medium
Dependencies	

Requirement ID	3.07
Requirement Name	Long-lived client connections
Description	Currently an experiment is started in the ECC, clients are connected, data reported and clients disconnected when the experiment finishes. For many clients (in particular those that are themselves long-lived services such as the SAD) it is advantageous if the connection can be maintained between experiments so that the client does not have to be manually reconnected when the next experiment begins.
Component Mapping	ECC
Experiment Mapping	All
Priority	High
Dependencies	

Requirement ID	3.08
Requirement Name	Flexible ECC/client connection order
Description	The ECC needs to handle the situation when a client connects to the RabbitMQ before the experiment starts. This reduces the manual synchronisation of clients and services currently required.

Component Mapping	ECC
Experiment Mapping	All
Priority	High
Dependencies	

Requirement ID	3.09
Requirement Name	Dashboard login
Description	The ECC should provide a login mechanism with saved user state.
Component Mapping	ECC
Experiment Mapping	All
Priority	medium
Dependencies	3.06

Requirement ID	3.10
Requirement Name	Revisiting completed experiments
Description	It should be possible in the ECC dashboard to explore the data from a previous (now completed) experiment.
Component Mapping	ECC
Experiment Mapping	All
Priority	medium
Dependencies	

4.1.3. ECC Client Requirements

The following requirements relate only to ECC client implementations.

Requirement ID	3.11
Requirement Name	iOS client library
Description	A client library for interacting with the ECC from iOS devices.
Component Mapping	ECC
Experiment Mapping	All
Priority	Low (adopted solution is to use a proxy, see 4.1.4)
Dependencies	

4.1.4. ECC proxy requirements

Requirement ID	3.21
Requirement Name	ECC Proxy solution for iCaCoT experiment (EX11)

Description	Revamp the existing ECC proxy to support the needs of the iCaCoT experiment since there is no iOS ECC client available: • Change ECC Proxy RESTful interface to support and validate iCaCoT specific incoming data. • Implementation of the metric model for iCaCoT experiment. • Upgrade to latest version of ECC.
Component Mapping	ECC
Experiment Mapping	EX11
Priority	High
Dependencies	ECC, iOS iCaCoT client application

Requirement ID	3.22
Requirement Name	Measurement persistence
Description	Persist all measurements received by the ECC proxy regardless of whether they have been transferred to the ECC: • Integrate EDM agent database solution and use it to store/retrieve measurements locally. • Map incoming measurements to the corresponding measurement sets, entities and attributes.
Component Mapping	ECC
Experiment Mapping	EX11
Priority	High
Dependencies	ECC

Requirement ID	3.23
Requirement Name	Handling of measurement batches for multiple metrics
Description	• Change ECC proxy RESTful interface to accept batches of iCaCoT measurements for multiple metrics in JSON format. • Store reports for multiple measurements belonging to multiple measurement sets.
Component Mapping	ECC
Experiment Mapping	EX11
Priority	High
Dependencies	ECC

Requirement ID	3.24
Requirement Name	Communication of multiple measurements to the ECC
Description	• Pushing all new measurements received from the ECC proxy to the ECC within a given time interval. • Handling of unsynced measurements. • Synchronization of the ECC proxy database with ECC's database.
Component Mapping	ECC

Experiment Mapping	EX11
Priority	High
Dependencies	ECC

4.2. SCC

Requirement ID	3.31
Requirement Name	Enhanced metric data from SAD
Description	The SAD needs to send additional metric data from the service and the plugins, relating to performance and activities.
Component Mapping	SCC
Experiment Mapping	EX10 / possibly EX12
Priority	High
Dependencies	3.05 (standard naming)

Requirement ID	3.32
Requirement Name	SAD-as-a-service
Description	The SAD needs to be enhanced so that all configuration changes can be performed without a service administrator being involved.
Component Mapping	SCC
Experiment Mapping	EX10/ Unfunded experiments
Priority	Medium
Dependencies	

Requirement ID	3.33
Requirement Name	Synchronisation with Facebook at runtime
Description	Synchronise the service's database with the posts on Facebook at runtime to prevent errors when a photo is deleted from Facebook
Component Mapping	SCC (Social Annotation Service)
Experiment Mapping	EX11
Priority	Medium
Dependencies	AVCC

Requirement ID	3.34
Requirement Name	Posting user's name
Description	Post the end user's name in the description of the photo post.
Component Mapping	SCC (Social Annotation Service)
Experiment Mapping	EX11
Priority	Medium
Dependencies	AVCC

Requirement ID	3.35
Requirement Name	Posting video link
Description	Post the link to the video in Drupal in the description of the

	photo post
Component Mapping	SCC (Social Annotation Service)
Experiment Mapping	EX11
Priority	Medium
Dependencies	AVCC

Requirement ID	3.36
Requirement Name	Clear Database
Description	Clear the database upon the contextualization of the service (optional)
Component Mapping	SCC (Social Annotation Service)
Experiment Mapping	EX11
Priority	Medium
Dependencies	AVCC

Requirement ID	3.37
Requirement Name	Upgrade Social Integrator core API
Description	Upgrade to latest version of the Social Integrator core API
Component Mapping	SCC (Social Annotation Service)
Experiment Mapping	EX11
Priority	Medium
Dependencies	AVCC

Requirement ID	3.38
Requirement Name	Photo uploading for Android
Description	• Upload photo method for Android (target: Facebook event, album, page feed) • New application for uploading photos from a given directory to Facebook.
Component Mapping	SCC
Experiment Mapping	EX10
Priority	Medium
Dependencies	

Requirement ID	3.39
Requirement Name	Get photos form Facebook album
Description	Get all photos posted to a given Facebook album
Component Mapping	SCC
Experiment Mapping	EX10
Priority	Medium
Dependencies	

Requirement ID	3.40
Requirement Name	Upgrade SocialAuth version

Description	• Upgraded to latest version of SocialAuth • Bug fixes and enhancements, changes due to Facebook API changes
Component Mapping	SCC
Experiment Mapping	Facility
Priority	Medium
Dependencies	

4.3. AVCC

Requirement ID	3.51
Requirement Name	VoD transcoding service
Description	Transcode video to the following profiles: • html5- mp4 • html5- webm • html5-ogg • rtmp
Component Mapping	AVCC VoD
Experiment Mapping	EX11, EX12
Priority	High
Dependencies	

Requirement ID	3.52
Requirement Name	VoD thumbnail generation
Description	Generate thumbnail
Component Mapping	AVCC VoD
Experiment Mapping	EX11, EX12
Priority	High
Dependencies	3.51

Requirement ID	3.53
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 Ingest
Experiment Mapping	EX11, EX12
Priority	Medium
Dependencies	

Requirement ID	3.54
Requirement Name	VoD ingest service
Description	Integrates the transcoding, thumbnail, http distribution and CMS

Component Mapping	AVCC Ingest
Experiment Mapping	EX11, EX12
Priority	High
Dependencies	3.51, 3.52, 3.53

Requirement ID	3.55
Requirement Name	HTTP VoD distribution
Description	Deliver media assets over http: • html5- mp4 • html5- webm • html5-ogg • Generate thumbnail
Component Mapping	AVCC VoD
Experiment Mapping	EX11, EX12
Priority	High
Dependencies	3.54

Requirement ID	3.56
Requirement Name	RTP stream record
Description	• Record RTP live sources • API for start/stop recording/streaming.
Component Mapping	AVCC Streaming
Experiment Mapping	EX11, EX12
Priority	High
Dependencies	

Requirement ID	3.57
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 SCC Annotation
Experiment Mapping	EX11, EX12
Priority	Low
Dependencies	3.54

Requirement ID	3.58
Requirement Name	ECC connection module for http distribution
Description	• Report on user requests • http server metrics
Component Mapping	AVCC
Experiment Mapping	EX11, EX12
Priority	Low
Dependencies	3.55

Requirement ID	3.59
Requirement Name	ECC connection module for CMS
Description	• Report on user requests • http server metrics
Component Mapping	AVCC
Experiment Mapping	EX11, EX12
Priority	Medium
Dependencies	3.53

Requirement ID	3.60
Requirement Name	Video Analysis Service
Description	• Analyse video stream from a network connected camera • Get percentage of crowded area • Report data set to experiment backend • Report to ECC
Component Mapping	AVCC (VAS)
Experiment Mapping	EX10
Priority	High
Dependencies	ECC C++ client, ECC instance for EX10 hosted at Infonova

4.4. PCC

Requirement ID	3.71
Requirement Name	Updated Babylon interface
Description	Revamp Babylon's interface to provide a more intuitive look and feel
Component Mapping	PCC
Experiment Mapping	All
Priority	Medium
Dependencies	

4.5. 3DCC

Requirement ID	3.81
Requirement Name	Ancient Avatars
Description	Adaptation of ancient avatars for the Avatar Creator Component
Component Mapping	3DCC
Experiment Mapping	EX14
Priority	High
Dependencies	

Requirement ID	3.82
Requirement Name	Tablet Avatars

Description	Avatar creator to run on an Android Tablet
Component Mapping	3DCC
Experiment Mapping	EX14
Priority	High
Dependencies	

Requirement ID	3.83
Requirement Name	Avatar Motion
Description	Experts' avatars moving from a Kinect base station
Component Mapping	3DCC
Experiment Mapping	EX14
Priority	High
Dependencies	

Requirement ID	3.84
Requirement Name	Qualisys Files Web Viewer
Description	A web based viewer for files that Qualisys system outputs
Component Mapping	3DCC
Experiment Mapping	EX13
Priority	High
Dependencies	3DRSBA system output

4.6. Sport Management Systems

Requirement ID	3.91
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 – Sport Management System
Experiment Mapping	EX12
Priority	High
Dependencies	

Requirement ID	3.92
Requirement Name	Retrieve personal information about athletes
Description	• Retrieve personal information about athletes associated to the discipline of a given coach • Restricted to CARVIREN server invocations only
Component Mapping	Sport Management System
Experiment Mapping	EX12
Priority	High
Dependencies	

Requirement ID	3.93
Requirement Name	ECC connection module for personal information access
Description	• Report on user requests
Component Mapping	Sport Management System
Experiment Mapping	EX12
Priority	Low
Dependencies	3.92

5. Final Facility

5.1. Background

The purpose of this section is to describe the vision and requirements for the EXPERIMEDIA Facility beyond the lifetime of the project. The project is organised into three distinct strategic phases as shown in Figure 3. Firstly, in Phase 1 the project focused on Connectivity by deploying baseline services at target smart venues that were instrumented for observation and measurement. Secondly, in Phase 2, the project focused on Expansion by providing specific added value integrations between baseline components. The project is currently within Phase 3 where it is essential to focus on developments that contribute to the sustainability of the software and services offered by the facility.

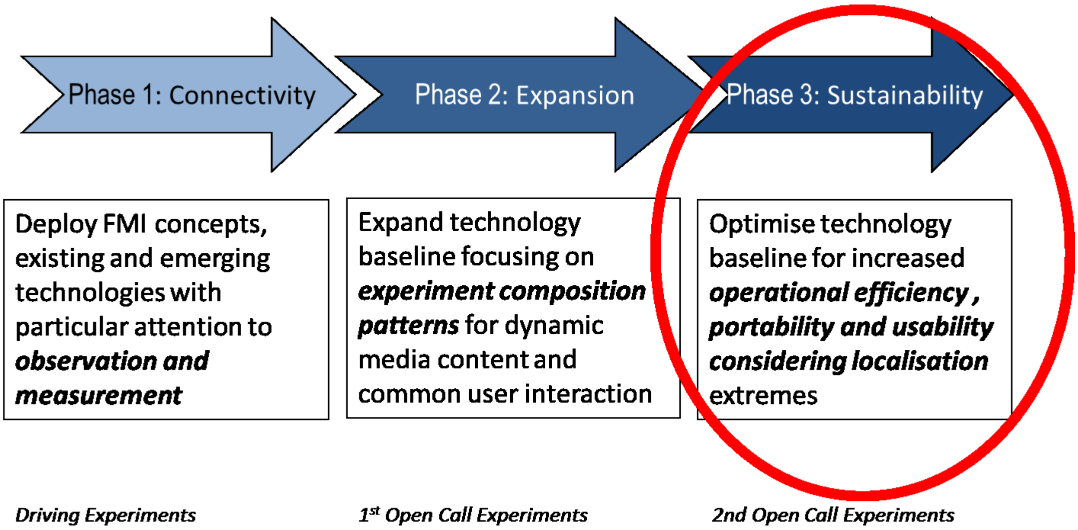

Figure 3: EXPERIMEDIA Project Strategy

The project must also consider the recommendations of the 2nd annual EC review conducted in November 2013. The thrust of the recommendations focused on increasing the technical cohesion between the baseline technologies in specific areas. These included:

- handling of QoS/QoE by the baseline components, and aligning this more clearly with the methodology.
- post experiment data handling and analysis by the facility to elicit features, opportunities and risks of the Future Media Internet
- greater consideration of networking aspects in experiments.
- stress testing baseline components
- verification and validation by independent experts and external stakeholders

5.2. Vision

The vision for the EXPERIMEDIA facility is shown in Figure 4. The core of the facility comprises baseline components hosted as services that are offered to experimenters using the Software-as-a-Service paradigm. The services expected to be offered after the project are the Experiment Content Component (ECC), Creator, Social Analytics Dashboard (SAD), Social

Annotation Services (SAS) and Video-on-Demand (VoD). The services are described formally through a service-oriented architecture based on RESTful protocols. Each service is modelled and instrumented to provide structured metric and provenance data monitoring that is collected by the ECC via RabbitMQ. The services offered by the facility are monitored using Nagios to capture service performance metrics such as response time and throughput.

An SLA Service is deployed to constrain usage of facility services in accordance with SLA agreements between the facility provider and experimenters (customers). The SLA service is a demonstration of how a facility could be managed in a commercial situation where experimenters negotiate access to services and where a facility provider is accountable for delivering a guaranteed quality of service. A demonstration of the SLA service will help explore how the EXPERIMEDIA Facility could operate as a commercial service. The project does not expect experiments conducted within the lifetime of the project to be constrained by SLA terms, although test cases will be implemented to verify and validate the capability.

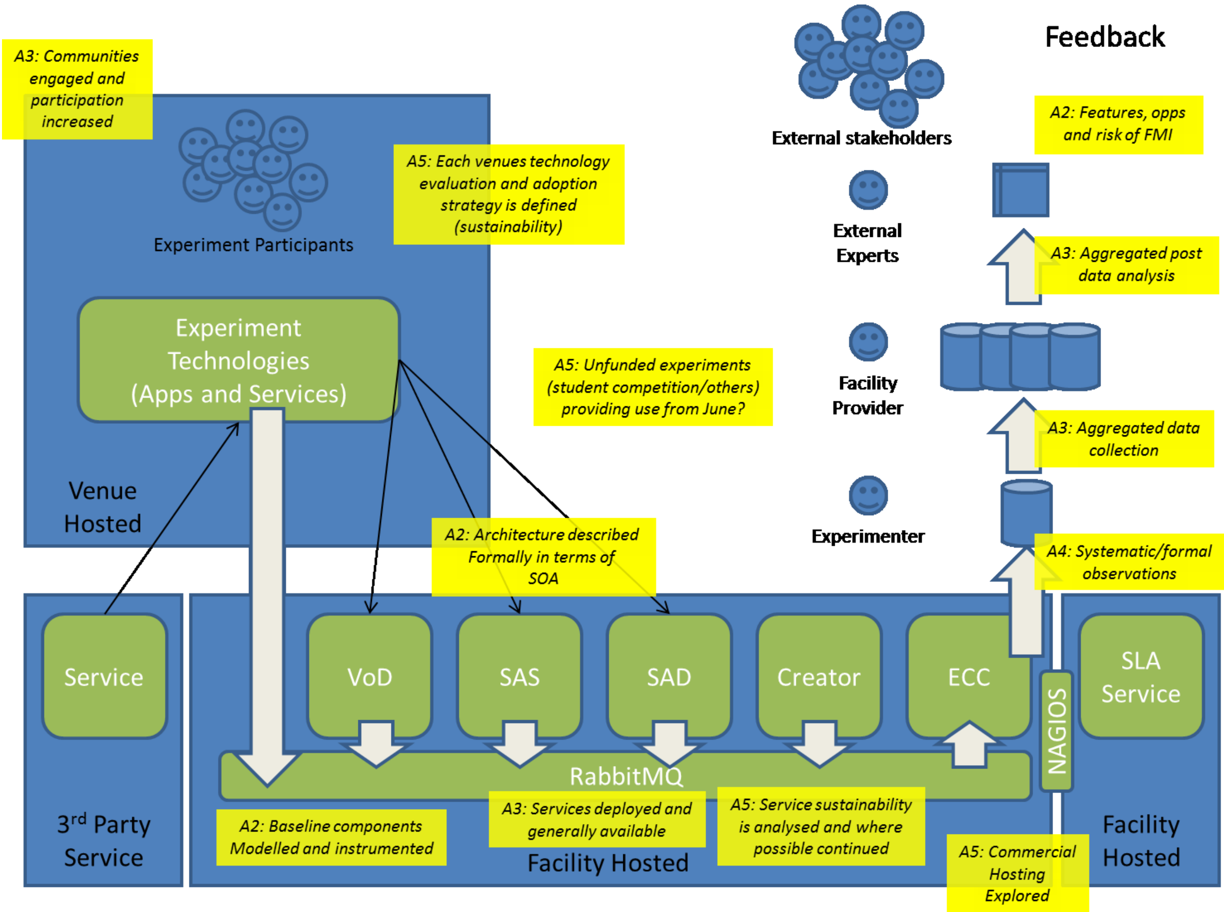

Figure 4: Final Facility Vision

Each venue hosts experiment technologies under test (e.g. applications and services) that are integrated with facility hosted services and 3rd party services. The latter could be services provided by experimenters themselves or other services offered on the Internet. Each venue has described their technology RTD strategy and how this relates to services offered by EXPERIMEDIA and community participation.

Experiments conducted using the EXPERIMEDIA facility will generate data that is available for further processing and analysis by the facility provider. The purpose of aggregated post data analysis and processing is to identify the features, opportunities and risks associated with Future Media Internet technologies. The data will be derived from metadata describing experiment and baseline component models along with small samples of experiment results all collected via the ECC. The results of the aggregated data analysis will be validated by external experts before publishing to external stakeholder communities. Data will be processing in accordance with data protection law

The final facility will be tested by unfunded experiments. This will be by participants of a Student Competition to be conducted at Schladming, HCI research groups associated with FHW and sports scientists associated with CAR.

5.3. Implementation Consequences

The vision described above informs general technical strategy and system requirements that need to be considered in the final architecture. This includes

- A service deployment plan describing how each of the services will be hosted after the end of the project
- A service provisioning model for each service describing how services are provisioned for experimenters on-demand
- Self-service operations with minimal intervention by system administrators and adequate user documentation
- Deployment of an SLA service for constraining access to services in accordance with defined metrics representative of a future commercial EXPERIMEDIA facility
- Deployment of Nagios monitoring probes for all services reporting metrics to an SLA service hosted by Infonova
- Formal modelling and instrumentation of all services
- Stress testing of key components such as the ECC using other FIRE facilities such as BonFIRE

6. Conclusion

This deliverable described the scenarios on which the five experiments of the 2nd open call are based. Requirements for technical developments have been derived from these scenarios and are documented in a detailed list. Since the project is currently in its final phase, it is essential to focus on developments that contribute to the sustainability of the software and services offered by the facility; the vision of the Final Facility and the related plans are also briefly presented here. The impact on the final architecture and the final versions of the EXPERIMEDIA software and services will be described later in the year in D2.2.4 "EXPERIMEDIA baseline upgrade for v2.1" and D2.1.9 "Final blueprint architecture" deliverables.

