

Deliverable

Project Acronym:	IMAC
Grant Agreement number:	761974
Project Title:	<i>Immersive Accessibility</i>



D5.1 Pilot operation plan - First and Second Phase

Revision: 2.1

Authors: Angel Quero (CCMA)

Delivery date: M23 (02-08-19)

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 761974		
Dissemination Level		
P	Public	PU
C	Confidential, only for members of the consortium and the Commission Services	

Abstract:

This document defines the pilot operation plan describing the strategy for the operational phase of the platform, tools and access services developed in the Immersive Accessibility (ImAc) project. It defines which service components need to be integrated for their evaluation through a set of pilot actions in Spain, Germany and England. In order to feed the pilots, immersive media is produced and enriched with accessibility content using the editing tools developed in the project's scope.

This is the second and final iteration of D5.1. The first version, delivered in M07, was focused on the pilot phase 1 and describes a set of closed pilot actions aiming to gather feedback to improve the ImAc access services and tools. This final version is enhanced with updates from the already executed pilot phase 1 and a detailed planning of pilot phase 2, which includes some open pilot actions.

REVISION HISTORY

Revision	Date	Author	Organisation	Description
0.1	03-04-2018	Francesc Mas	CCMA	First Structure and ToC
0.2	11-04-2018	Francesc Mas	CCMA	Updated ToC
0.3	12-04-2018	Francesc Mas	CCMA	Contributions
0.4	13-04-2018	Anna Matamala	UAB	Contributions
0.5	16-04-2018	Sonali Rai	RNIB	Contributions
0.6	18-04-2018	Sven Glaser	RBB	Contributions
0.7	20-04-2018	Francesc Mas	CCMA	First merged version
0.8	23-04-2018	Francesc Mas	CCMA	Ready for Review
0.9	27-04-2018	Themistoklis K.	I2CAT	Reviewed and Improved
1.0	30-04-2018	Francesc Mas	CCMA	Final version
2.0	05-06-2019	Angel Quero	CCMA	First Updated Structure and ToC
2.1	26-07-2019	Angel Quero	CCMA	Final draft document
2.2	02-08-2019	Angel Quero	CCMA	Final version

Disclaimer

The information, documentation and figures available in this deliverable, is written by the IMAC – project consortium under EC grant agreement H2020-ICT-2016-2 761974 and does not necessarily reflect the views of the European Commission. The European Commission is not liable for any use that may be made of the information contained herein.

Statement of originality:

This document contains original unpublished work except where clearly indicated otherwise. Acknowledgement of previously published material and of the work of others has been made through appropriate citation, quotation or both.

EXECUTIVE SUMMARY

This document defines the pilot operation plan describing the strategy for the operational phase of the platform, tools and access services developed in the Immersive Accessibility (ImAc) project. It defines which service components need to be integrated for their evaluation through a set of pilot actions. For this purpose, an execution plan is produced including the details of the different trials in Spain, Germany and England (T5.3, T5.4 and T5.5). According to T5.2, immersive media is produced to feed the pilots and enriched with accessibility content using the editing tools developed in the project. Professional users will validate these tools by means of specific pilots.

CCMA, RBB and RNIB participate in the definition of the pilot scenarios, the pilot objectives, the needed evaluation methodology in conjunction with UAB, and in the definition of an integrated roadmap for setting up the needed pilot execution and evaluation infrastructure.

The German and the Spanish pilots are being executed in two phases, whereas the cross-national pilot will be executed in a single phase. Pilot actions for ImAc editing tools are also planned in two phases.

The present document extends its first iteration, in which the first phase pilots (M07) were defined, to include the planning of the second phase pilots (M28).

Pilot phase 2 (M28) will test and evaluate the project results in an open environment, extending the German and the Spanish pilots by deploying access services publicly, although a closed pilot will be also addressed in Spain and Germany to guarantee an acceptable sample of participating using HMD Contributors.

CONTRIBUTORS

First Name	Last Name	Company	e-Mail
Angel	Quero	CCMA	aquero.f@ccma.cat
Francesc	Mas	CCMA	fmaz.z@ccma.cat
Jordi	Arraez	ANG	jordi@anglatecnic.es
Sonali	Rai	RNIB	Sonali.Rai@rnib.org.uk
Anna	Matamala	UAB	Anna.Matamala@uab.cat
Sven	Glasser	RBB	Sven.Glaser@rbb-online.de
Zora	Schärer	RBB	zora.schaerer@rbb-online.de

CONTENTS

Revision History	1
Executive Summary	2
Contributors	3
Tables of Figures and tables	5
List of acronyms	6
1. Introduction	7
1.1. Purpose of this document	7
1.2. Scope of this document	7
1.3. Status of this document	8
1.4. Relation to other ImAc activities	8
2. Pilot Execution Plan	9
2.1. Global Pilots Execution Plan	9
2.2. Content Production	12
2.3. Pilot Phase 1: German and Spanish	12
2.3.1. Pilot Definition	12
2.3.2. Pre-Pilot 1: Home Users	13
2.3.2.1. Description of activities	13
2.3.2.2. Calendar of Execution	13
2.3.2.3. Panel of Users	13
2.3.3. Pilot phase 1: Home Users	14
2.3.3.1. Description of activities	14
2.3.3.2. Calendar of execution	15
2.3.3.3. Panel of Users	15
2.3.4. Pilot phase 1: Professional Users	16
2.3.4.1. Description of activities	16
2.3.4.2. Calendar of Execution	16
2.3.4.3. Panel of Users	16
2.4. Pilot Phase 2: German and Spanish	17
2.4.1. Pilot Definition and Preparation	17
2.4.2. Pre-Pilot phase 2: Home Users	17
2.4.2.1. Description of activities	18
2.4.2.2. Calendar of Execution	18

2.4.2.3.	Panel of Users	19
2.4.3.	Pilot phase 2: Home Users	19
2.4.3.1.	Description of activities	20
2.4.3.2.	Calendar of execution	20
2.4.3.3.	Panel of Users	20
2.4.4.	Pilot phase 2: Professional Users	21
2.4.4.1.	Description of activities	21
2.4.4.2.	Calendar of Execution	21
2.4.4.3 .	Panel of Users	21
2.5.	Cross-national Pilot Phases	22
2.5.1.	Pilot Definition and Preparation	22
2.5.2.	Cross-national Pre-Pilot 1	23
2.5.2.1.	Description of activities	24
2.5.2.2.	Calendar of execution	24
2.5.2.3.	Panel of Users	24
2.5.3.	Semi-Open Cross-National Pilot: RNIB, UK and UAB, Spain	25
2.5.3.1.	Description of activities	25
2.5.3.2.	Calendar of execution	26
2.5.3.3.	Proposed schedule	26
3.	Pilot Evaluation Methodology and Plan	27
4.	References	28

TABLES OF FIGURES AND TABLES

Figure 1 – Diagram of relationships between work packages and its cycles (iterations).	7
Figure 2 – Diagram of tasks and its outcomes (deliverables).	8
Figure 3 – Pilot Actions Schedule.	11

LIST OF ACRONYMS

Acronym	Description
ACM	Accessibility Content Manager
AD	Audio description
AV	Audio-Visual
AST	Audio subtitles
CCMA	Corporació Catalana de Mitjans Audiovisuals
D	Deliverable
DMP	Data Management Plan
GUI	Graphical User Interface
HMD	Head-mounted display
ImAc	Immersive Accessibility
IPQ	Igroup Presence Questionnaire
M	Month
PUR	Professional User Requirements
QoE	Quality of Experience
RNIB	Royal National Institute of Blind People
SL	Sign Language
ST	Subtitle
SUS	System Usability Scale
T	Task
UAB	Universitat Autònoma de Barcelona
USAL	University of Salford
VR	Virtual Reality
WP	Work package

1. INTRODUCTION

This introduction describes the purpose of this document, its scope, status and relationship with other ImAc activities.

1.1. Purpose of this document

This document defines how pilots will be organised in order to test the tools and access services developed in the ImAc project. This definition includes details like the immersive contents to be used, the number of users, or the execution plan, among other important aspects.

Pilots will include two phases which will take place in Spain and Germany. Furthermore, a semi-open Cross-National Pilot will be launched, focusing on audio description and audio subtitles.

Evaluation results gathered from the first phase of the pilots in WP5, are described in 'D5.4 Pilot Evaluation Report' [5] and allow further refining of the requirements, functionalities and architecture in the second iteration of the ImAc platform. Pilot phase 2 results will be included in 'D5.4 Pilot Evaluation Report' [5] second iteration.

The WP5 role in the ImAc workflow is shown in Figure 1.

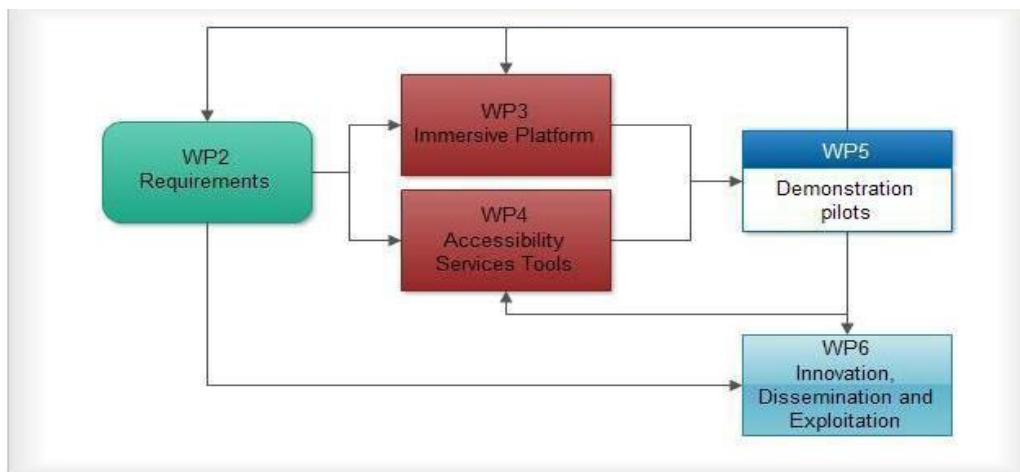


Figure 1 – Diagram of relationships between work packages and their cycles (iterations).

1.2. Scope of this document

This deliverable has the objective of providing the information about the planning and execution of the pilots. Therefore, the consortium decided to define a global level planning and then proceed by adding particular details for each pilot.

Each pilot is described as follows:

- Pilot Definition and Preparation: enumeration of needed actions in order to prepare and enable the execution of the pilot. This will be mainly focused on the generation of contents and the setup of the infrastructure (from a logistical perspective).
- Description of activities: this section explains for each sub-pilot the available contents, and what applications and services will be considered in each pilot.
- Calendar of execution: even if sub-pilots can be susceptible to suffer changes, there is an initial schedule, which is presented in this section. It is important to establish this calendar in order to make sure that the overall project execution will be timely.

- **Panel of Users:** as it is one of the most important parts of the project, this separate section will explain whom the users of each pilot are, how they will be recruited and what is their role in the activities that they will be involved in.

1.3. Status of this document

This is the second version of D5.1 with delivery foreseen in M21. Modifications of the present document include some updates from the first pilot executions and the planning of the second pilot phase.

1.4. Relation to other ImAc activities

D5.1 originates from 'T2.2. User Requirements', which feeds into 'T5.1. Execution and Evaluation Plan', and impacts on all WP5 tasks, as shown in Figure 2.

D5.1 is closely related to 'D5.2. Pilot evaluation methodology and plan' [3] and is the basis for the future 'T5.2. Content Production', which will result in 'D5.3. Pilot Contents' [4].

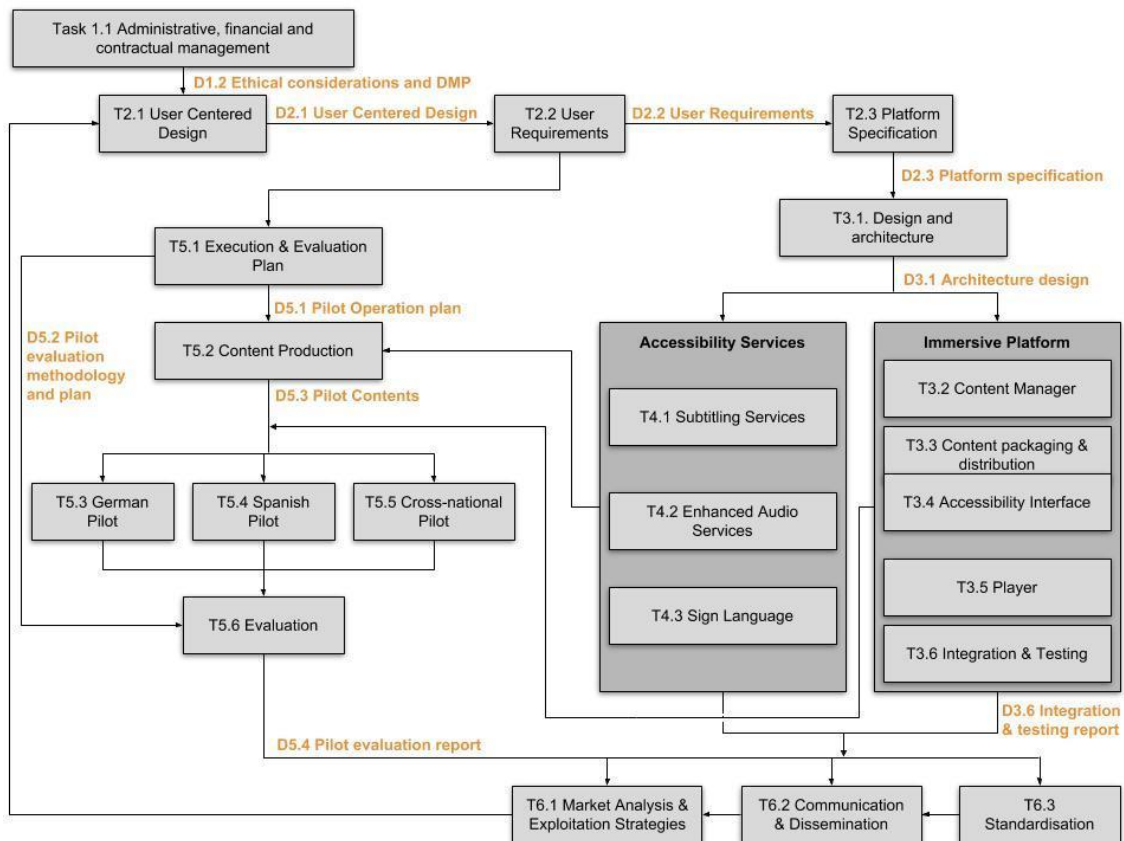


Figure 2 – Diagram of tasks and its outcomes (deliverables).

2. PILOT EXECUTION PLAN

2.1. Global Pilots Execution Plan

This document defines the pilot operation plan describing the strategy for the operational phase of the platform, tools and access services developed in the Immersive Accessibility (ImAc) project. It defines which service components need to be integrated for their evaluation through a set of pilot actions. For this purpose, an execution plan is produced including the details of the different trials in Spain, Germany and England (T5.3, T5.4 and T5.5). According to T5.2, immersive media is produced and enriched with accessibility content using the editing tools developed in the project. Professional users will validate these tools by means of specific pilots.

CCMA, RBB and RNIB participate in defining the pilot scenarios, the pilot objectives, the needed evaluation methodology in conjunction with UAB, and an integrated roadmap for setting up the needed pilot execution and evaluation infrastructure.

The German and the Spanish pilot is being executed in two phases, whereas the cross-national pilot will be executed in a single phase. Pilot action for ImAc immersive accessible content production tools are also planned in two phases. The present document extends its first iteration, in which the first phase pilots (M10) were defined, to include the planning of the second phase pilots (M28).

Pilot phase 2 (M28) will test and evaluate the project results in an open environment, extending the German and the Spanish pilot by deploying accessibility services publicly, although a closed pilot will be also addressed in Spain and Germany to assure a minimum report with the use of HMD. The services to be tested in the second phase are the subtitling presentation modes, the ImAc player improved interface and its personalisation options, in both the German and the Spanish Pilot, as well as the sign language presentation modes, interface personalisation and interaction just in the German Pilot.

The demonstration pilots are divided into:

- **German Pilot (M10-M28):** RBB in cooperation with IRT executed this pilot focused on subtitling and sign language services. The Pilot Phase 1 was composed of a pre-pilot action for sign language and subtitling services to narrow the proposed options and a pilot action for subtitling services consisting of a small-scale lab tests with a dedicated group of users. The later pilot explored aspects such as presentation modes and interface personalisation and interaction. The pilot phase 2 is also composed by a pre-pilot action, and a pilot action consisting of large-scale deployment of services and also a small-scale lab tests with a dedicated group of users to get a minimum feedback of the use of HMD devices.
- **Spanish Pilot (M10-M28):** CCMA in cooperation with i2CAT and UAB executed this pilot focused on the subtitling service. The pilot phase 1 explored aspects such as presentation modes and interface personalisation and interaction. It was composed of a pre-pilot action to narrow the proposed options and a pilot action consisting of a small-scale lab tests with a dedicated group of users. The pilot phase 2 is also composed by a pre-pilot action for subtitling, and a pilot action consisting of large-scale deployment of subtitling services in different scenarios (web stand-alone 360° content, TV content consumption on HbbTV device with synchronized 360° content on a second Screen, and TV content on PC with synchronized 360° content on a second Screen), and also a small-scale lab tests with a dedicated group of users to get a minimum feedback of the use of HMD devices.

- **Cross-national Pilot (M11-M28):** RNIB in cooperation with USAL, UAB and CCMA, will execute this pilot focused on audio description, including audio subtitling where relevant. The cross-national pilot will be preceded by a pre-pilot action to test the methodology, and then it will be executed in a single phase that will test and evaluate the project results with a reduced panel of users in a semi-open environment.

The setup and execution of tests and the subsequent analysis of results for the three pilots and their respective pre-pilot actions follow the methodology defined in the second iteration of the deliverable 'D5.2 Pilot evaluation methodology and Plan' [3]. This will allow an evaluation of the tools, platform and accessibility services, as well as a coherent gathering of new requirements, that will allow implementing improvements in an iterative way.

Regarding, the production tools developed and enhanced as part of WP4, RBB and CCMA tested the ACM, and UAB tested the subtitling web editor and the AD web editor with professional users during pilot phase 1. This allowed gathering feedback and improving the tools for the second phase pilot. Anyway, the consortium decided that an additional pilot action was needed to validate the ImAc production tools developed during the project. RBB, CCMA, RNIB and UAB will conduct this pilot with a panel of professional users for testing each one of the ImAc production tools during pilot phase 2 to validate the feedback and improvements gathered during the first phase pilot:

- **Accessibility Content Manager (ACM):** RBB and CCMA tested a preliminary version of ACM tool during German and Spanish pilots phase 1. They will also execute in M23 a pilot on the final version of the tool in phase 2 with a panel of professional users.
- **Subtitling Editor:** UAB tested a preliminary version of ST editor during pilot phase 1. RBB and CCMA will execute a pilot on the final version of this tool in German and Spanish pilots phase 2 with a panel of professional users.
- **Audio Description Editor:** UAB tested a preliminary version of AD editor during the pilot phase 1 and, as a part of the cross-national pilot, will test the final version of the tool with a panel of professional users in phase 2.
- **Sign Language Editor:** RBB will test the final version of SL Editor in German pilot phase 2.

The schedule of the described pilot actions is summarized in *Figure 3*.

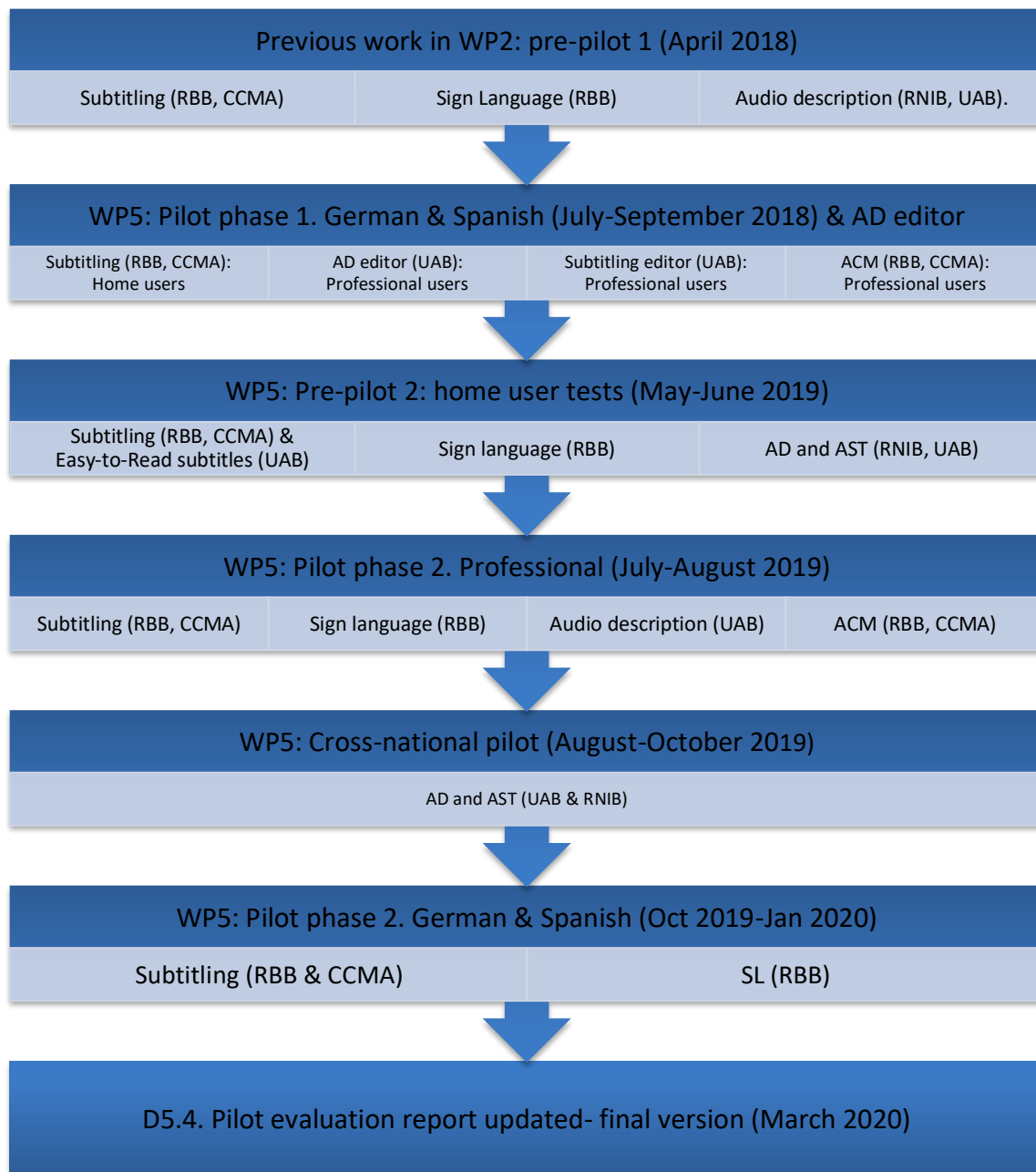


Figure 3 – Pilot Actions Schedule

Pilot contents may be also used, subject to copyright issues, to gather feedback from professional and end users at special related events where it is intended to have a demonstration booth, such as:

- IBC - International Broadcasting Convention
- EBU Access Services Experts Meeting
- VR Days - VR specialized conference

2.2. Content Production

For the ImAc project and its pilots it is essential to produce adequate contents that will allow demonstrating the quality and relevance of the project's contributions. As omnidirectional media contents are quite new in the media consumption domain, ImAc must ensure to choose AV contents that demonstrate the key characteristics of 360° productions. This should preferably include a narrative suitable for 360° exploration, as well as spherically well distributed elements carrying speech and other audio-related information. These characteristics can then be enriched with the help of ImAc tools, which will add perfectly matching subtitles, sign language translation and audio description elements. The result should support any kind of user in finding themselves well immersed and in enjoying every information bit natively included in the 360° video.

Document '*D5.3 Pilot Content*' [4] will extensively describe the pilot content production for every pilot in the project.

2.3. Pilot Phase 1: German and Spanish

2.3.1. Pilot Definition

Different access services were tested with end users during the German and Spanish pilots phase 1:

- **Home User Subtitling:** both the German and the Spanish pilots included actions for testing subtitles in immersive content during the pre-pilot phase 1 and the pilot phase 1. UAB also contributed with some intermediate additional actions not initially planned to test two types of displaying the speaker's position information, as well as to perform an overall evaluation of personalisation and interaction of the traditional UI.
- **Home User Sign Language:** a pre-pilot action was planned and executed during the pilot phase 1.

Additionally, the professional tools developed in the ImAc project have been tested during the pilot phase 1 with the goal of gathering input that allowed improving them:

- **Accessibility Content Manager:** RBB and CCMA tested a preliminary version of ACM tool during the German and Spanish pilot phase 1.
- **Subtitling professional tool:** the subtitling editor was tested by UAB in its preliminary version.
- **Audio description professional tool:** the AD editor testing was performed over a preliminary version by UAB as part of pilot phase 1.

2.3.2. Pre-Pilot 1: Home Users

The pre-pilot phase 1 included actions focused on the home users subtitling and sign language access services that were executed as part of the German and Spanish pilots.

The pre-pilot action concerning subtitles was performed simultaneously in Germany and Spain, and it was considered necessary in order to narrow down the features of presentation modes and guidance methods needed to be implemented and evaluated in pilot phase 1. A group of 25 users carried out the pre-pilot 1 testing at RBB and CCMA in April and May 2018, and its results are reported in D2.1 [2].

For the sign language interpretation service, a pre-pilot test was carried out with a small group of home users at RBB in April 2018. The focus was on the evaluation of the different presentation modes and the definition of the comfort field of view to consume the sign language interpretation. The results of this pre-pilot test are reported in D2.1 [2].

2.3.2.1 Description of activities

For the home user tests in pre-pilot phase 1, the following preparation and execution activities were required:

- 1 - Meetings** - To discuss and prepare the pre-pilot actions and details.
- 2 - Development of a player prototype** - The development of a player prototype which allowed to start testing several features with subtitles and sign language.
- 3 - Pre-pilot execution** - An in-house test was conducted in the facilities of RBB in Germany and CCMA in Spain, involving a low number of users of subtitling and sign language services from each target group. The pilot allowed to gather a first feedback about the user experience when consuming those services in an immersive environment.
- 4 - Pre-pilot Evaluation** - This activity is detailed in deliverable 'D5.2-Pilot evaluation methodology and plan' [3].

2.3.2.2 Calendar of Execution

The following steps were taken, in order to successfully deploy and evaluate the pre-pilot 1.

- 1 - Meetings** - from March to April 2018
- 2 - Development of a player prototype** - from March to April 2018
- 3 - Pre-pilot execution** - April 2018
- 4 - Pre-pilot evaluation** - May 2018

2.3.2.3 Panel of Users

In Spain and Germany, a low number panel of testers were recruited through several Spanish and German hearing impaired associations. CCMA achieved the participation of 4 volunteers, while RBB had the participation of 5 users.

2.3.3 Pilot phase 1: Home Users

The pilot phase 1 included actions focused on the home users subtitling access service that were executed as part of the German and Spanish pilots.

A panel of users in both Germany and Spain evaluated the developed solutions for consuming fully accessible subtitled 360° contents and allowed to gather valuable feedback about the user experience when consuming those services in an immersive environment, especially about the subtitle presentation modes (arrow versus radar) and the interface interaction and personalisation features using HMD and tablet devices.

2.3.3.1 Description of activities

For the home user tests in pilot phase 1, that were common in both Germany and Spain, the following preparation and execution activities were required:

1 - Meetings - To discuss and prepare the acquisition and/or production of 360° content, as well as the future production of subtitles for this material.

2 - Immersive content recording - CCMA provided the recording of 'Desconcert' immersive content for the user interface test and some tasks of installation, testing and finally recording were executed at the same day of the event. By means of a cooperation with the German/French broadcaster Arte, RBB contributed with the 'I Philip' 360° production for the testing of the subtitling presentation modes.

Activities related with the production of immersive contents are explained in detail in deliverable 'D5.3 Pilot Content' [4].

3 - Post-production of immersive content - The preparation of the content for the 'Desconcert' required long time to process and adjust the immersive audio and video. 'I Philip' was already produced, so no additional work was needed.

4 - Production of accessibility content - The production of subtitles was carried out with the help of conventional subtitling tools. In a second step, the subtitle files were loaded into the ImAc editing tool in order to add the spatial information needed for the speaker position information.

5 - Publication of final immersive content - Immersive subtitles were linked with the immersive content, prepared for delivery, published and distributed through a dedicated instance of the ImAc web player on a dedicated URL for the pilot.

6 - Pilot execution - An in-house test was conducted at the facilities of RBB in Germany and CCMA in Spain, involving end users of subtitling services. The pilot allowed to gather qualitative measurements and feedback about the user experience when consuming those services in an immersive environment.

7 - Pilot Evaluation - This activity is detailed in deliverable 'D5.2-Pilot evaluation methodology and plan' [3].

2.3.3.2 Calendar of execution

The following steps were taken, in order to successfully deploy and evaluate the pilot in its first phase.

- 1 - Meetings** - from March 2018 to May 2018
- 2 - Immersive content recording** - May 2018
- 3 - Post-production of immersive content** - from May to June 2018
- 4 - Production of accessibility content** - June 2018
- 5 - Publication of final immersive content** - June and July 2018
- 6 - Pilot execution** - 3rd week September 2018
- 7 - Pilot evaluation** - October 2018

2.3.3.3 Panel of Users

For qualitative validation, the user tests were carried out with the help of a significant number of members inside the target group of deaf and hard-of-hearing people.

In Germany, RBB worked closely with organisations for the deaf and hard-of-hearing in Berlin and Brandenburg regarding the user recruitment, achieving 12 participants.

In Spain, a panel of testers were recruited through several Spanish hearing impaired associations. CCMA achieved the participation of 13 volunteers.

2.3.4 Pilot phase 1: Professional Users

The professional tools developed in the ImAc project have been tested during the pilot phase 1. A preliminary version of the **Accessibility Content Manager (ACM)** was tested by RBB and CCMA as part of the German and Spanish pilot phase 1 with the aim of getting feedback and improve the tool.

UAB performed a test on a preliminary version of the **Subtitling professional tool** and the **Audio description professional tool** with the goal of gathering inputs for improving these tools.

2.3.4.1 Description of activities

For the professional user tests in pilot phase 1 the following preparation and execution activities were required:

- 1 - Meetings** - To discuss and prepare the issues related with the preparation of the pilot.
- 2 - Preparation of the production workflow** - Setting up the publication of the professional tools in order to make them available on the Internet.
- 3 - Pilot execution** - An in-house test was conducted at the facilities of RBB in Germany and CCMA in Spain, involving professional users of subtitling services. The pilot allowed to gather qualitative measurements of the tools.
- 4 - Pilot Evaluation** - This activity is detailed in deliverable 'D5.2-Pilot evaluation methodology and plan' [3].

2.3.4.2 Calendar of Execution

The following steps were taken, in order to successfully deploy and evaluate the pilot in its first phase.

- 1 - Meetings** - from March 2018 to May 2018
- 2 - Preparation of the production workflow** - from May to June 2018
- 3 - Pilot execution** - September 2018
- 4 - Pilot evaluation** - September 2018

2.3.4.3 Panel of Users

A total of 7 professional users for the ACM were recruited among the content manager experts at RBB and CCMA.

The test performed over the preliminary versions of the **Subtitling professional tool** and the **Audio description professional tool** involved 27 and 24 users, respectively. They were recruited online and were professionals working in either subtitling or audio description.

2.4 Pilot Phase 2: German and Spanish

2.4.1. Pilot Definition and Preparation

During the German and Spanish pilots phase 2 different access services will be tested with end users:

- **Home User Subtitling:** both the German and the Spanish pilots include actions for testing subtitles in immersive content during the pre-pilot phase 2 and the pilot phase 2.
- **Home User Sign Language:** sign language interpretation service has been tested with end users by RBB as part of the German pilot in the pre-pilot phase 2 and will be tested again in pilot phase 2.
- **Easy-to-Read Subtitles:** easy-to-read subtitles feature has been tested by home users at UAB during the pre-pilot phase 2 and will be tested again in pilot phase 2.

In addition, the professional tools developed in the ImAc project will be tested during the pilot phase 2:

- **Accessibility Content Manager:** RBB and CCMA will test a final version of the ACM during the German and Spanish pilot phase 2.
- **Subtitling professional tool:** RBB and CCMA will test a final version of the Subtitling professional tool during the German and Spanish pilot phase 2.
- **Audio description professional tool:** UAB will test a final version of the Audio description professional tool during the pilot phase 2.
- **Sign language professional tool:** RBB will test in one single iteration a final version of the sign language professional tool during the German pilot phase 2.

2.4.2. Pre-Pilot phase 2: Home Users

The pre-pilot phase 2 included actions focused on the home users subtitling and sign language access services that have been executed as part of the German and Spanish pilots. Additionally, ImAc has also tested in this phase an innovative access service that was not originally planned: Easy-to-Read Subtitles. This kind of subtitles have a simplified language structure and lexicon which aims to enhance comprehension.

The pre-pilot action concerning subtitles was performed simultaneously in Germany and Spain, and it was scheduled before pilot phase 2 in order to gather additional feedback on usability and narrow down the number of features to be adopted in the final ImAc player. The subtitles service has been tested with deaf and hard-of-hearing users.

For the sign language interpretation service, a pre-pilot action with a reduced number of users was carried out by RBB in Germany aiming at gathering feedback on different presentation modes for Sign Language.

Finally, the Easy-to-Read Subtitles service has been tested during the pre-pilot phase 2 with a panel of users made up of elderly people in which two types of subtitles have been offered: subtitles without any additional adaptation, and the Easy-to-Read subtitle version.

2.4.2.1. Description of activities

1 - Meetings - To discuss and prepare the acquisition of 360° content, as well as the future production of access content for this material.

2 - Immersive content recording - No recording was necessary, as the material used for pre-pilot 2 was taken from the available contents in the ImAc project ('I, Philip' and 'Desconcert' for subtitling, 'I, Philip' and 'Opera' for sign language, and 'Opera' for easy-to-read subtitles).

3 - Post-production of immersive content - As the material was already available, no editing or post-production was necessary.

4 - Production of accessibility content - The subtitle files for the immersive content used in pre-pilot 2 were already available from previous pilots. In order to realise the test conditions foreseen for pre-pilot phase 2 (emoji for sound representation, subtitles fixed to speaker), the existing files had to be modified and additional ones had to be produced.

A sign language video for 'Opera' was already available from previous pilot actions, whereas the production of an additional sign language was needed for "I, Philip" clip. Furthermore, some metadata files had to be created to prepare the test conditions in both contents (speaker representation, non-continuous signer). For easy-to-read-subtitles test, an easy-to-read version validated with end-users was created in Spanish.

5 - Publication of final immersive content - Immersive subtitles and sign language videos were linked with the immersive content, published and distributed through a dedicated instance of the ImAc web player on a dedicated URL ready for the pilot.

6 - Pre-pilot execution - An in-house test was conducted in the facilities of RBB in Germany and CCMA in Spain, involving some users of subtitling services from the target group. The pilot allowed to gather qualitative measurements and feedback about the user experience when consuming those services in an immersive environment. The easy-to-read subtitle test was carried out by UAB.

7 - Pre-pilot Evaluation - This activity is detailed in deliverable 'D5.2-Pilot evaluation methodology and plan' [3].

2.4.2.2. Calendar of Execution

The following steps were taken, in order to successfully deploy and evaluate the pre-pilot 2:

1 - Meetings - from February 2019 to March 2019

2 - Production of accessibility content - April 2019

3 - Publication of final immersive content - April 2019

4 - Pre-pilot execution - May 2019

5 - Pre-pilot evaluation - June 2019

2.4.2.3. Panel of Users

In Germany, as for all other pilot actions, RBB worked closely with organisations for the deaf and hard-of-hearing in Berlin and Brandenburg. Furthermore, flyers were distributed in hearing-aid acoustician shops in order to reach a larger number of hard-of-hearing participants. In this way, 10 users were acquired for the sign language test and 12 users for the subtitle test.

In Spain, a panel of testers were recruited through several Spanish hearing impaired associations. CCMA achieved the participation of 12 volunteers.

Finally, a panel of users made up of elderly people were recruited by the UAB for the testing of the Easy-to-Read Subtitle service. The UAB achieved the participation of 8 volunteers.

2.4.3. Pilot phase 2: Home Users

The pilot phase 2 includes actions focused on the home users subtitling and sign language access services that will be executed as part of the German and Spanish pilots.

In pilot phase 2, the panel of users that will test the enhanced solutions for consuming fully accessible 360° contents will be wider and will include two open pilots, in Germany and Spain. The tests will allow to gather qualitative feedback about the users' behaviour while consuming these services, focusing on the improved presentation modes, the player's user interface and personalisation features.

The **subtitling access service** will be tested in both the German and the Spanish pilots, and the planned pilot actions are different according to the approach of each broadcaster performing the test. In the Spanish Pilot, CCMA has planned four scenarios:

- Open pilot for testing the consumption of immersive content with subtitles where the device is selected by the user.
- Open pilot for testing the consumption of immersive content with subtitles on companion screens synchronously with standard content on a HbbTV 2.0.1 compatible SmartTV.
- Open pilot for testing the consumption of immersive content with subtitles in companion screens synchronously with standard content on a web-browser on a PC.
- Closed pilot with a group of selected users that will test the same content available in the open pilot in a controlled environment. The aim is to assure a minimum feedback on HMD use and on subtitling accessibility features.

In the German Pilot, RBB has planned two scenarios:

- Open pilot for testing the consumption of immersive content with subtitles where the device is selected by the user.
- Closed pilot with a group of selected users to assure a minimum feedback on HMD use and on accessibility functions related with the use of subtitles.

The **sign language access service** testing is planned just for the German pilot. The foreseen pilot actions will be:

- Open pilot for testing the consumption of immersive content with sign language where the device is selected by the user.
- Closed pilot with a group of selected users to assure a minimum feedback on HMD use and on accessibility functions related with sign language.

2.4.3.1. Description of activities

1 - Meetings - To discuss and prepare the new 360° content, as well as the production of ST and SL for this material.

2 - Immersive content recording - CCMA will provide the new recordings of 'Making of FAQs', 'Making of TN, 'Sant Jordi's day' and 'Cuines'. These new productions will include the immersive 360 production and the traditional TV production.

Activities related with the production of immersive contents will be explained in detail in deliverable 'D5.3 Pilot Content' [4].

3 - Post-production of immersive content - The preparation of the new content for the pilot requires long time to process and adjust the immersive audio and video.

4 - Production of accessibility content - The production of subtitles and sign language will be carried out with the ImAc professional tools developed during this project.

5 - Publication of final immersive content - Accessibility content will be linked with the immersive content and published. Each broadcaster will integrate the ImAc player into its own website allowing access to the selected content.

6 - Pilot execution - the planned tests will be conducted involving the panel of users defined for each one. The results will be gathered directly from users who will give feedback through online questionnaires, and also by means of automatic usage tracking performed by the web apps.

7 - Pilot Evaluation - this activity is detailed in deliverable 'D5.2-Pilot evaluation methodology and plan' [3].

2.4.3.2. Calendar of execution

The following steps are being taken, in order to successfully deploy and evaluate the pilot 2.

1 - Meetings - from March to May 2019

2 - Preparation of the production workflow - from May to July 2019

3- Pilot execution - July and August 2019

4 - Pilot evaluation - September 2019

2.4.3.3 Panel of Users

For a qualitative validation the user tests will be carried out with the target group of deaf and hard-of-hearing people, although it will be accessible for anyone in the open pilots.

RBB will again work closely with organisations for the deaf and hard-of-hearing in Berlin and Brandenburg, regarding the user acquisition and the overall setup.

In Spain, the panel of users for the open pilots will consist of the CCMA TV audience with HbbTV capabilities and the CCMA website users. For the closed pilot, CCMA will recruit a panel of testers through the Spanish hearing impaired associations contacted in previous tests.

2.4.4. Pilot phase 2: Professional Users

The professional tools developed in the ImAc project are going to be tested during the pilot phase 2 in order to validate the improvements achieved since the phase 1 tests.

The **Accessibility Content Manager (ACM)** will be tested by RBB and CCMA as part of the German and Spanish pilot phase 2 with the aim to evaluate and validate this tool with a panel of professional users.

RBB and CCMA will also test the enhanced version of the **Subtitling professional tool** during the German and Spanish pilot phase 2. A panel of professional subtitlers will evaluate and validate this tool.

About the **Sign language professional tool**, RBB will test the current version in one single iteration during the German pilot phase 2.

A pilot action concerning the **Audio description professional tool** was also planned and performed by UAB: a second stage is planned for July-August 2019 to assess the final version of the Audio description professional tool.

2.4.4.1. Description of activities

For the professional user tests in pilot phase 2 the following preparation and execution activities are required:

- 1 - Meetings** - to discuss and prepare the issues related with the preparation of the pilot.
- 2 - Preparation of the production workflow** - setting up the internet resources needed to enable the use of the professional tools.
- 3 - Pilot execution** - a previous internal test has been conducted by the broadcasters partners (CCMA and RBB) as a first measure of the functionality and strength of the tools (ACM, ST, SL and AD).

The planned tests will be conducted involving a panel of external professional users. The results will be gathered directly from these users who will give feedback through online questionnaires.

- 4 - Pilot Evaluation** - this activity is detailed in deliverable 'D5.2-Pilot evaluation methodology and plan' [3].

2.4.4.2 Calendar of Execution

The following steps are taken, in order to successfully deploy and evaluate the pilot in its second phase.

- 1 - Meetings** - from March to May 2019
- 2 - Preparation of the production workflow** - from May to July 2019
- 3 - Pilot execution** - July to August 2019
- 4 - Pilot evaluation** - September 2019

2.4.4.3 .Panel of Users

For qualitative validation, the professional tools tests will be carried out with the involvement of around 30 professionals from the audiovisual sector recruited by UAB, RBB and CCMA.

2.5. Cross-national Pilot Phases

The Semi-Open Cross-National Pilot to be conducted in the UK (RNIB) and Spain (UAB) will establish the preferences of blind and partially sighted people in relation to consuming audio description and audio subtitles while watching 360° content in the ImAc Player environment. In the semi-open tests, the infrastructure and server used for the ImAc Player will be open however the testing with participants will be conducted in a controlled environment.

The test material will be three episodes of a travel documentary produced in 360° 360 format for audio description and for audio subtitles, and clips from an opera performance produced in 360 for audio subtitles. In addition, also feedback will be gathered from assistive technology participants who rely on assistive technology such as screen readers and screen magnification users on the accessibility and usability of the ImAc Player.

The audio description and audio subtitles will be produced in three and two presentation modes respectively as it is likely that the perceived QoE, and therefore the obtained feedback, will have a correlation to the presentation mode.

In order to gather feedback on the accessibility of the ImAc Player, participants with significant sight loss will be asked to test the player with voice commands while participants with partial sight loss will test the enhanced menu.

The expected outcome of this semi-open test is an evaluation of the accessibility features of the ImAc Player and establish preferences of people with visual impairments in relation to content in 360° when it is delivered with different presentation modes of audio description and also audio subtitles if necessary.

Previous to this, as with the other services, a pre-pilot was conducted to gather feedback on the aforementioned presentation modes for access services and the accessibility of the ImAc Player with a small group of home users at RNIB and UAB to establish the suitability of the methodology.

2.5.1. Pilot Definition and Preparation

The purpose of the Semi-Open Pilot will be to introduce the target group, in this case people with visual impairments, to the proposed solutions for consuming 360° content with audio description and audio subtitles if necessary within an accessible player environment, and gather feedback with demographic analysis by age, experience of using access features and familiarity with technology.

It will draw on the experience of the focus groups and pre-pilot 1 reported in

D2.1 [2] and aim to further understand user preferences in relation to:

- using the ImAc player to access, play and control content
- watching 360° content with audio description and audio subtitles presented in different modes

Test material

Three episodes of a travel documentary produced in 360° will be used as test content for audio description and clips from an opera produced in 360° will be used to test modes for audio subtitles.

The presentation modes that will differ by scripting style and placement of audio description will include:

- AD1 (Classic mode): This is where the AD is written in third person as it is normally for TV and films and anchored to the head position.
- AD2 (Static mode): This is where the AD is written in first person and anchored in the scene.
- AD3 (Dynamic mode): This is where the AD is written in first person with additional commentary on specific aspects of the content and placed on or in the direction of the action.

Target of the Pilot

The Semi-Open Pilot will aim to answer the following research questions:

- Does the ImAc player meet the functional user requirements of visually impaired audience?
- How accessible is the player for people with varying degrees of sight loss with specific emphasis on independently accessing, consuming and controlling content through the ImAc player? This test will be used to gather feedback on the significance of audible menus, voice control, magnification, default settings, within the ImAc environment.
- How do visually impaired testers evaluate the immersion of the test material in 360° content?
- Which type of audio description in the scenarios presented in the semi-open pilot is preferred to fully experience the 360° environment presented in the test material? This test will be used to explore the level of enjoyment, understanding and usefulness of audio description and audio subtitles in the content.

As the semi-open Pilot will be conducted both in Spain and in the UK, the following testing procedure will be standardised across sites in order to achieve consistency in the final results.

- Potential users are given an overview of the project and the semi-open pilot.
- Those interested, agree to participate in semi-open pilot.
- They are requested to give their consent and agree to the terms of the research (digital consent).
- Participants complete a pre-test questionnaire.
- Participants watch content on a RNIB/ UAB device with HMD.
- Participants are requested to complete a questionnaire after watching the test material and share their experience of watching the content in 360° with audio description and audio subtitles.

The survey questions will include a short socio-demographic profile and feedback on the usability of the player, the content, preferences for receiving audio description and audio subtitles.

The questionnaire will use a series of closed questions with a number of predefined choices.

2.5.2. Cross-national Pre-Pilot 1

The purpose of the pre-pilot was to test the methodology for the cross-national pilot. As planned for the cross-national pilot, three different presentation modes for audio description and two

modes for audio subtitles were tested with a group of potential end users and in addition, they were asked to test the ImAc Player for accessibility.

Audio Description

The different presentation modes tested for audio description were:

- AD1 (Classic mode): This is where AD was anchored to the head position.
- AD2 (Static mode): This is where AD is anchored in the scene.
- AD3 (Dynamic mode): This is where AD is placed on or in the direction of the action.

Audio Subtitles

The different presentation modes tested for audio subtitles were:

- AST1 (Classic mode): This is where AD was anchored to the head position.
- AST2 (Dynamic mode): This is where AD is placed on or in the direction of the action.

The results of the pre-pilot test have been reported in D2.1 [2].

2.5.2.1. Description of activities

The following activities were part of the pre-pilot 1 of the Cross-National Pilot:

- 1. Identify** – Identify immersive content that is suitable given the aims of ImAc and secure necessary approvals and licenses to use the content in Pilot.
- 2. Audio description and audio subtitles** – Production of the audio description tracks and audio subtitles.
- 3. Post-production of immersive content with access tracks** – Production of the immersive content with audio description and audio subtitles in different presentation modes (by IRT).
- 4. Publication of final immersive content** - Immersive content prepared, published and ready for testing on the ImAc player.
- 5. Usability of the Player** – work with USAL and i2CAT on voice interaction and enhanced menu to get it ready for the pre-pilot testing.
- 6. Pre-Pilot execution** – Panel of audio description users participate in the pilot and share feedback on the fully accessible 360° contents. This phase aimed to gather qualitative feedback on the user experience of consuming audio description in an immersive environment.
- 7. Pilot Evaluation** - This activity is detailed in deliverable 'D5.2-Pilot evaluation methodology and plan' [3].

Activities related to the production of immersive contents are explained in detail in deliverable 'D5.3 Pilot Content' [4].

2.5.2.2. Calendar of execution

The pre-pilot tests were conducted at RNIB and UAB over the months of May and June 2019.

2.5.2.3. Panel of Users

Overall, 11 people participated in the pre-pilot tests: 5 in the UK and 6 at UAB out of which five participants had significant sight loss, five were partially sighted and one person was dyslexic.

The sample included people with varying degrees of sight loss, experience of technology and using access features.

Deliverable 2.1 includes a summary of the user sample, test material and an analysis of the feedback gathered during the pre-pilot.

2.5.3. Semi-Open Cross-National Pilot: RNIB, UK and UAB, Spain

The purpose of the pilot will be to introduce the target group, in this case people with sight loss, to the proposed solutions for consuming fully accessible 360° content and gather feedback. It will aim to further understand user experience in relation to watching 360° content with AD and AST.

Tests will aim to elicit whether the ImAc player meets the core functional user requirements of blind and partially sighted people, and how accessible the interface is for people with varying degrees of sight loss, with specific emphasis on independently accessing, playing and controlling content. In this context, specific feedback on the significance of audible menus, voice control, and default settings within the ImAc environment is expected to be gathered. The cross-national pilot also aims to research how blind and partially sighted people evaluate the immersion of the test material in 360° content, and which type of audio description of the ones presented in the pilot is preferred to fully experience the 360° environment. The expected outcome of this test is an evaluation of the accessibility of the ImAc player and insights into how people with sight loss respond to content in 360° when it is delivered with different types of audio description and also audio subtitling if necessary.

2.5.3.1. Description of activities

The activities required for the preparation and execution of the Cross-National Pilot are similar to the activities planned for pre-pilot testing:

- 1 - Identify** – Identify immersive content that is available in the public domain and secure necessary approvals and licenses to use the content in Pilot.
- 2 – Audio description and audio subtitles** – Production of the audio description and audio subtitles tracks.
- 3 - Post-production of immersive content with access tracks** – Production of the immersive content with audio description in different presentation modes (by IRT).
- 4 - Publication of final immersive content** - Immersive content prepared, published and ready for testing on the ImAc player
- 6 - Pilot execution** – Panel of audio description users participate in the pilot and share feedback on the fully accessible 360° contents. This Pilot will aim to gather qualitative feedback on the user experience of consuming audio description in an immersive environment.
- 7 - Pilot Evaluation** - This activity is detailed in deliverable 'D5.2-Pilot evaluation methodology and plan' [3].

Activities related to the production of immersive contents will be explained in detail in deliverable 'D5.3 Pilot Content' [4].

2.5.3.2. Calendar of execution

The Semi-open Cross National Pilot will be scheduled over the months of September to November 2019 after a successful completion of the national pilots in Spain and Germany.

2.5.3.3. Proposed schedule

- 1 – Meetings** - with content producers, audio description providers, ImAc partners and end users
- June 2019
- 2 – Identify content for the Cross-National pilot** – July 2019
- 3 - Production of audio description and audio subtitles** - August 2019
- 5 - Publication of immersive content with audio description and audio subtitles** – August 2019
- 6 - Recruit participants for the pilot** – July – August 2019
- 7 - Pilot execution** – September to November 2019
- 8 - Pilot evaluation** – November 2019

3. PILOT EVALUATION METHODOLOGY AND PLAN

The evaluation methodology and plan for the demonstration pilots in WP5 is described in D5.2 [3]. It departs from user requirements identified in WP2 and establishes a series of criteria to determine when testing is needed in WP5.

The evaluation methodology and plan are sustained on the following test categorisation:

- tests on services, addressed to home users, in which two aspects can be tested: presentation modes, and interface personalisation and interaction, and
- tests on professional tools, addressed to professionals, in which the usability and performance of the tools will be tested.

Two additional aspects are considered to identify the most adequate methodology:

- pilot actions aiming to gather feed-back during development, generally through a reduced number of users via qualitative means, and
- pilot actions in the final implementation phase, generally aiming at a higher number of users.

The pilot evaluation methodology is based on an ethical approach to testing, where data protection is ensured. ImAc follows the guidelines (DMP) defined in '*D1.2. Ethical considerations and Data Management Plan*' [1]. Ethical clearance for ImAc tests has been obtained from UAB's Ethical Committee, and specific forms have been designed and approved to gather informed consent from users. Communicating clearly to participants (taking into account the needs of the so-called vulnerable populations), guaranteeing their health and safety, and ensuring data are kept anonymous are priorities in ImAc tests.

The pilot evaluation methodology in D5.2 [3] presents a series of broad methodological criteria that will need to be implemented in each specific pilot action. In this regard, it defines the three main measures that will be used in ImAc testing, depending on each specific test:

- Usability, in which the SUS (System Usability Scale [6]) is suggested as a sound metric. This will be applied to tests related to professional tools and also to tests in which end users personalise or interact with an interface.
- Presence, in which the Igroup Presence Questionnaire (IPQ [7]) is proposed. This is related to the concept of immersion in VR content and will be applied to tests dealing with services and their presentation modes.
- Preference/opinions, applicable in all types of testing in ImAc. This will be gathered through post-questionnaires created for each test, with a series of closed and open questions on user satisfaction, preferences and related attitudinal aspects.

The pilot evaluation methodology and plan also designs the demographic data that need to be gathered in the form of a pre-questionnaire, which includes personal items, behavioural categories, and attitudinal categories.

4. REFERENCES

- [1] Pilar Orero, José Miguel Sanjuan. D1.2 “Ethical Considerations and Data Management Plan” (ImAc) – V1.0, 2017
- [2] Anna Matamala, Pilar Orero. D2.1 “ User Centered Design” (ImAc) – V1.1, 2018
- [3] Anna Matamala, Pilar Orero. D5.2 “Pilot evaluation and methodology plan” (ImAc) – V1.0, 2019
- [4] Zora Schärer Kalkandjiev. D5.3 “ Content Production” (ImAc) – V1.0, 2018
- [5] Anna Matamala. D5.4 “ Pilot evaluation report” (ImAc) – V0.4, 2018
- [6] System Usability Scale (SUS)
<https://www.usability.gov/how-to-and-tools/methods/system-usability-scale.html>
- [7] Igroup presence questionnaire (IPQ)
<https://www.igroup.org/pq/ipq/download.php>