Deliverable

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D2.2 User Requirements

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Abstract:

This document presents all generated home and professional user requirements for the selected scenarios including the focus group results.

REVISION HISTORY

Revision	Date	Author	Organisation	Description
0.1	15-12-2017	Sven Glaser	RBB	Template and ToC
0.2	22-01-2018	Sven Glaser	RBB	Managing partner input, chapters, conclusion
0.3	31-01-2018	Sven Glaser	RBB	Fine-tuning, re-ordering of requirements, last changes after internal review
0.4	31-01-2018	Sven Glaser	RBB	Last changes in requirements

EXECUTIVE SUMMARY

As the ImAc project is following a user centred design approach and is aiming at continuous and deep involvement of users, their needs must be carefully transformed into technical solutions and developments. To achieve that goal, deliverable D2.2 presents all ImAc user requirements, split into home and professional users, and including an initial scan of potential pilot appliances to be run in WP5.

Chapter 2 provides the methodology used to formalise the process of deducting requirements from user scenarios and focus groups results, and the approach for applying a specifically defined syntax to document the requirements and support potential changes due to the iterative development process defined in ImAc.

Chapter 3 presents the ImAc user requirements, structured along the two classes of users and system references in dedicated tables. Additionally, the listed requirements are mapped to the pilot activities, which might cover these demands and can offer the technical solutions meeting those demands.

All the results documented in D2.2 will be fed into task T2.3 and its deliverable D2.3, as well as task T3.1. All these following activities will be forming the technical foundation of any ImAc framework, aiming at the system and the user side.

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LIST OF ACRONYMS

Acronym	Description
GR	Generic Requirements
SR	Service Requirements
UR	User Requirements
YR	System Requirements
AD	Audio Description
AST	Audio Subtitles
ST	Subtitles
SL	Sign Language
HUR	Home User Requirement
PUR	Professional User Requirement
HMD	Head Mounted Display

1. INTRODUCTION

This deliverable presents the first results of task T2.2 “User Requirements” of the ImAc project. The goal of this task is to extract user requirements from the T2.1 focus groups and the user scenarios defined by them. As the goal of ImAc is to make omnidirectional media services accessible, the people who will consume the services consist of a broad range of media users with a statistically proven range of impairments, henceforth called “home users”. In addition, there are users who ensure the production and enhancement of audio-visual 360° services, henceforth called “professional users”. This deliverable is focussing on these end user requirements, to be fed into task T2.3 “Platform Specification” and task T3.1 “Design and Architecture”.

As the ImAc project also aims for several regional pilots, the creation of D2.1 user scenarios and the conducting of focus groups was initially done separately for each of the pilots. However, the general requirements-gathering methodology was to unify and to streamline all the results. In addition, it is crucial for any system development to clearly address and reference each requirement. To achieve this, ImAc has introduced a specific syntactical format for clustering and identifying the obtained requirements, including the ability to later adapt priorities or definitions. This approach was applied to the two main strands: gathering requirements from home users and from professional users, so that in this deliverable one can find two different tables containing the deduced user requirements.

As ImAc is aiming at a round of user requirements-gathering ending in month 14, this deliverable D2.2 will be updated subsequently.

2. REQUIREMENTS GATHERING METHODOLOGY

In this chapter we describe how the requirements were deduced. First, essential terms and definitions are provided; these were necessary to differentiate and specify the manifold kinds of requirements trying to follow a clear and structured path. Then the approach for deriving the ImAc requirements is explained.

2.1. Terms and definitions

This section contains a number of clarifying terms and definitions.

2.1.1. Types of requirements

As ImAc is aiming at gathering end and professional user requirements in D2.2, we are introducing two different types here: home user (HUR) and professional user requirements (PUR). D2.2 will focus on these two categories only.

2.1.2. Prioritisation

The description of a requirement must contain one of the following terms to define the prioritisation of the requirement: “must”, “should”, “could” or “won’t”. The definition of these terms has been adopted from the MoSCoW prioritisation. Negative requirements such as “should not” and “shall not” are omitted, as they are not common in software development. It may be necessary to add them based on the project’s experiences when the ImAc platform is taken towards standardization. MoSCoW [1] defines the terms as follows:

MUST	Requirements labelled as **MUST** have to be included in the solution to be a success. Think of MUST as the Minimum Usable SubseT
SHOULD	**SHOULD** requirements are as important as MUST, although SHOULD requirements are often not as critical or have workarounds, allowing another way of satisfying the requirement. They are important and of high value to the user.
COULD	Requirements labelled as **COULD** are less critical and often seen as ‘nice to have’.
WON’T	**WON’T** requirements are either least-critical or not appropriate at that time.

2.1.3. System reference

The user requirements are based on the user scenario compilation in deliverable D2.1, separated into home users and professional users, and the corresponding results of the focus groups. In order not to anticipate the technical solution for a user requirement they are not based on the modules listed under in the first column in the tables on user scenarios in D2.1 (annex I and annex II).

The system reference for the user requirements are categorised following the stakeholders:

01: Editor Tools

02: Player / User Device

03: Other

ImAc has 17 references defined in deliverable D2.1. The table below lists and maps them to the three categories for the system reference used for the user requirements:

System reference from D2.1 tables on user scenarios	**Mapping to user requirements**
Audio production tools	01: Editor Tools
Audio reception tools	01: Editor Tools
Subtitling Tools	01: Editor Tools
Sign Language Editor	01: Editor Tools
Player for preview in editor tools	01: Editor Tools
Content Management	01: Editor Tools
Multiplatform Player for desktop, mobile phone, TV, head mounted display	02: Player / User Device
Accessibility interface Subtitles	02: Player / User Device
Accessibility interface Audio Description / Audio Subtitles	02: Player / User Device
Accessibility interface Sign Language	02: Player / User Device
Content packaging and distribution	03: Other
Interface – the signalisation of accessibility services in the content stream	03: Other
Interface - handling presentation settings from different layers	03: Other
Interface - providing access to accessibility services	03: Other
Integration and testing	03: Other

Table 1-System reference from user scenarios

2.1.4. Requirement Version

As WP2 is applying a staged approach of gathering input, there is a clear need for keeping track and documenting possible changes in definition or prioritisation of requirements.

2.1.5. Formatting

Each requirement has a certain type and is attributed to a specific system side thus follows a numbering system with type definition. **We use the following system for numbering the requirements:**

[TYPE OF REQUIREMENT].[SYSTEM SIDE].[REQ NUMBER].[VERSION NUMBER]

2.2. Approach

The user requirements are formulated on two different levels. The “home user requirements” describe the functions the ImAc services potentially expose towards the user. The professional user requirements” describe the functions from a producer’s perspective, i.e. which functions are needed on system level for enabling the production of services described by the home user requirements. The syntax and categorization for both requirement tables are defined in section 2.1.

3. USER REQUIREMENTS

3.1. Introduction

Requirements are defined as individually documented needs that a particular design, product or process must be able to perform. In this sense, in deliverable D2.2 the user requirements describe the high-level insights of how people would use mobile or head-mounted devices, whether on SmartTV or plain PC, either individually or with friends, to produce accessible omnidirectional media. In D2.2 the user requirements are mainly based on the user scenarios documented in deliverable D2.1 and on the results derived from the focus groups.

3.2. End user requirements

As stated in the introduction, the objective of D2.2 is to gather requirements from end users of ImAc services to further their design and development. More specifically, we aim to understand the characteristics of ImAc’s potential users, the environment in which the services will be used, and the actions performed by the users to reach their goals. This will give us information about the needs and wishes of the targeted users, as well as specific insights into how to design, author and deliver accessible omnidirectional media experiences. For listing the requirements, we have applied the formatting that we defined in section 2.1.5.

Req. Nr.	Title	Description	Priorisation	Related Pilot(s)
HUR.02.01.0	Access to subtitles	The user shall be able to activate or deactivate subtitles and to open the personalisation options with a graphical user interface.	MUST	GER, ES (CCMA): ST
HUR.02.02.0	Access to signer	The user shall be able to activate or deactivate signer and to open the personalisation options with a graphical user interface.	MUST	GER: SL
HUR.02.03.0	Access to Audio Description	The user can activate or deactivate Audio Description and can use the personalisation options with voice commands.	MUST	ES, PL (UAB), UK: AD
HUR.02.04.0	Access to Audio Description	The player should enable zoom or enlargement of any and all visual menus. *	SHOULD	UK: AD
HUR.02.05.0	Access to Audio Subtitling	The user can activate or deactivate Audio Subtitling and to open the personalisation options with voice commands.	MUST	ES (UAB): AST

* *This may be done through inbuilt zoom functions if using iOS or Android or using a screen magnifier such as Zoomtext if using a PC, Mac or web-based platform*

Req. Nr.	Title	Description	Priorisation	Related Pilot(s)
HUR.02.06.0	Multiplatform player for desktop, mobile phone (cardboard supported, gyroscope sensor based), TV, head mounted display	The user shall be able to start, pause, resume, forward or rewind the omnidirectional media.	MUST	GER: ST, SL ES (CCMA): ST, UK: AD ES (CCMA): AD, AST
HUR.02.07.0	Consumption of signer video in HoloLense[2]	The user may be able to use the signer in the HoloLens synchronised to the video content on the TV.	SHOULD	GER: SL
HUR.02.08.0	Subtitles always on Main Screen	Subtitles should always be presented on the main screen, i.e. users do NOT want the subtitles to be delivered on an additional (companion) screen when accessing content	MUST	GER, ES (CCMA): ST
HUR.02.09.0	Playback of audio description	The player must enable the audio description to be synchronised with the main audio track	MUST	UK: AD
HUR.02.10.0	Player support for “screen reader functionality”	The player should provide spoken feedback of playback controls[†] (play, pause, skip forward, skip backward and stop) and of main volume and audio description volume controls.	SHOULD	UK: AD

[†] *This may be done through VoiceOver or Talkback if using iOS or Android or using a screenreader if using a PC, Mac or web-based platform*

Req. Nr.	Title	Description	Priorisation	Related Pilot(s)
HUR.02.11.0	Voice commands	The player may allow the user to control playback using voice commands. This should enable play, pause, skip forward, skip backward, stop, main volume and the audio description volume.	SHOULD	UK: AD ES (CCMA): ST
HUR.02.12.0	Remote control	The player may enable playback and/or volume controls via a remote control or gamepad.	COULD	UK: AD ES (CCMA): ST
HUR.02.13.0	User settings persistence and transfer between devices	The player should retain user preferences between uses and application interface customization should be transferred within different user devices (personal and non-personal devices for example TV in hotel).	SHOULD	UK: AD ES (CCMA): ST, ES, PL (UAB): AD
HUR.02.14.0	Companion Screen as interface	The usage of a companion screen to interact with the SmartTV and customize the user preferences may be an interesting option	COULD	ES (CCMA): ST
HUR.02.15.0	Multiplatform player for HoloLens	The user may be able to start, pause, resume, forward or rewind the signer video while using a HoloLens device.	COULD	GER: SL
HUR.02.16.0	Switch on/off signer	The user must have the possibility to switch on/off the signer via a menu.	MUST	GER: SL

Req. Nr.	Title	Description	Priorisation	Related Pilot(s)
HUR.02.17.0	Selection of personalisation options for signer	The user must have the possibility to activate and deactivate different personalisation options through a menu.	MUST	GER: SL ES (CCMA): SL
HUR.02.18.0	Accessibility interface signer - basic presentation mode	There is one basic presentation mode for the signer, which is always available for the user on any device. This mode presents it as follows: The signer video has a fixed position on the bottom right area of the field of view and the user decides what direction he/she wants to look.	MUST	GER: SL
HUR.02.19.0	Accessibility interface signer - position in viewing field	The user can select between a predefined set of different horizontal and vertical positions for the signer in the “basic presentation mode”.	MUST	GER: SL
HUR.02.20.0	Accessibility interface signer - size	The user can select between a predefined set of sizes for the signer.	COULD	GER: SL
HUR.02.21.0	Accessibility interface signer - notices	The signer is always positioned in the user’s field of view according to personalisation settings and an arrow under the signer window and/or the name or description of the speaker indicates the position of the actual speaker, so that the user can turn around towards the speaker.	SHOULD	GER: SL

Req. Nr.	Title	Description	Priorisation	Related Pilot(s)
HUR.02.22.0	Accessibility interface signer - forced perspective on the speaker	Forced perspective on the speaker: Initially, the field of view will be changed by the video player (“forced perspective”) so that the user will see the speaker when a conversation between two persons starts. Afterwards the user can change the direction he/she wants to look.	COULD	GER: SL
HUR.02.23.0	Accessibility interface signer - angular-based positioning mechanisms for signer placement	Angular-based positioning mechanisms for signer placement: There is a presentation mode available for the user to select, that presents the signer video as follows: The signer video is presented at the position on the field of view that is closest to the object that is associated with the signer. For example: If the signer represents a person that is to the left of the users viewing direction and outside of the field of view, the signer video would be presented at the left edge of the field of view.	COULD	GER: SL
HUR.02.24.0	Switch on/off subtitles	The user must have the possibility to switch on/off subtitles via a menu.	MUST	GER: ST
HUR.02.25.0	Select subtitle tracks	The user must have the possibility to select different subtitle tracks.	MUST	GER: ST
HUR.02.26.0	Selection of Personalisation options for subtitles	The user must have the possibility to activate and deactivate different personalisation options via a menu.	MUST	GER: ST
HUR.02.27.0	Accessibility interface for subtitles - basic presentation mode	The subtitles are always visible in the user’s field of view in the middle slightly below eye line, two-lined and each speaker has its own colour.	MUST	GER: ST ES (CCMA): ST

Req. Nr.	Title	Description	Priorisation	Related Pilot(s)
HUR.02.28.0	Accessibility interface for subtitles - position in viewing field	The user can select between a predefined set of positions in the viewing field (top, bottom).	MUST	GER: ST
HUR.02.29.0	Accessibility interface for subtitles - size	The user can select between a predefined set of sizes (small, medium, and large).	SHOULD	GER: ST
HUR.02.30.0	Accessibility interface for subtitles - background	The user can select between a predefined set of backgrounds (semi-transparent box, outline, scaled down video area with ST below).	SHOULD	GER: ST
HUR.02.31.0	Accessibility interface for subtitles - position notices icons	The subtitles are always visible in the field of view (basic presentation mode and/or selected position) and an arrow or a compass indicates the position of the speaker. It will disappear as soon as the user has changed her/his orientation to the speaker.	SHOULD	GER: ST
HUR.02.32.0	Accessibility interface for subtitles – icons represent audio events	There are icons shown, when an audio event is happening, e.g. music, explosion…	MUST	ES (CCMA): ST
HUR.02.33.0	Customization of immersive subtitle Icons	There is not a concrete position preferred for icons or similar indication elements, so customization must allow the user to customize this position	MUST	ES (CCMA): ST

Req. Nr.	Title	Description	Priorisation	Related Pilot(s)
HUR.02.34.0	Accessibility interface for subtitles - angle-based positioning mechanisms for subtitles placement	The subtitles are always visible in the field of view and the player placed the subtitles at the right or left edge of the current field of view to indicate the position of the speaker, taking into account the shortest way. The subtitles will move to the centre of the field of view as soon as the user sees the speaker in her/his field of view.	MUST	GER: ST
HUR.02.35.0	Accessibility interface for subtitles - adaptable subtitles speed	Immersive Subtitles speed must be adaptable while keeping in synchronisation with video (to different user profiles).	MUST	ES (CCMA): ST
HUR.02.36.0	Switch on/off audio description and audio subtitles	The user must have the possibility to switch on/off audio description and audio subtitles (see also requirements to HUR.02.10.0, HUR.02.11.0 and HUR.02.12.0).	MUST	UK, ES (UAB), PL: AD ES (UAB): AST
HUR.02.37.0	Selection of Personalisation options for audio description and audio subtitles	The user must have the possibility to activate and deactivate different personalisation options (see also requirements HUR.02.10.0, HUR.02.11.0 and HUR.02.12.0).	MUST	UK, ES (UAB), PL: AD ES (UAB): AST

Req. Nr.	Title	Description	Priorisation	Related Pilot(s)
HUR.02.38.0	Accessibility interface for Audio Description - Persistent soundscape	The player should allow the user to “look around” the audioscape (where the 3D sounds stay still in relation to the room and move in relation to the user’s head as they would in real life)	MUST	UK: AD
HUR.02.39.0	Headset-free	The player may avoid the need for bulky glasses (such as standard VR headsets) and an alternative solution to track head movements will be used.	COULD	UK: AD
HUR.02.40.0	Accessibility interface for Audio Description	Sound should be immersive so that users can position themselves and identify where action is happening.	SHOULD	ES, PL (UAB): AD
HUR.02.41.0	Accessibility interface for Audio Description - headlines approach	Volume should allow to differentiate relevant information: information could be given as “headlines” and then, if users are interested, they turn their head to that area and the volume then increases.	SHOULD	ES, PL (UAB): AD
HUR.02.42.0	Accessibility interface for Audio Description – mapped to event	AD position must be linked to event being described.	MUST	ES, PL (UAB): AD
HUR.02.43.0	Accessibility interface for Audio Description - choose different audio description tracks	Users should have access to a main audio description of the main action (so that they can follow the plot), and also be able to choose different secondary audio descriptions for additional action.	SHOULD	ES, PL (UAB): AD

Req. Nr.	Title	Description	Priorisation	Related Pilot(s)
HUR.02.44.0	Accessibility interface for Audio Description - audio description only for viewing field	The action happening outside the view of the user should not be described unless specific action is taken by the user (moving the head).	SHOULD	ES (UAB): AD
HUR.02.45.0	Accessibility interface for Audio Description - identify position	A specific sound effect (“beep”) should be used so that users are able to position themselves and know they are back to the main action.	SHOULD	ES (UAB): AD
HUR.02.46.0	Accessibility interface for Audio Description - change volume according to action	Main action could be suggested by higher volume.	SHOULD	PL (UAB): AD
HUR.02.47.0	Accessibility interface for Audio Description - stop content automatically	There could be a sensor that detects when user closes his or her eyes (or moves his or her head because the content provokes disgust or anxiety) and audio description should be then stopped automatically.	COULD	PL (UAB): AD
HUR.02.48.0	Accessibility interface for Audio Description - “guide me” option	Users should be guided through the main action if they choose ´guide me´ option.	SHOULD	PL (UAB): AD
HUR.03.01.0	Sign Language Service	Sign Language Service must also be considered, appearing simultaneously to the person speaking.	MUST	ES (CCMA): SL

Req. Nr.	Title	Description	Priorisation	Related Pilot(s)
HUR.03.02.0	Accessibility interface for subtitles - notices for dramaturgically-significant sounds	The user must get written translations of dramaturgically-significant sounds which are important for the plot.	MUST	GER, ES (CCMA): ST
HUR.03.03.0	immersive subtitle Icons list	A list of icons proposal to illustrate non-speech information would help production to standardise and use the same icons for different productions.	SHOULD	ES (CCMA): ST
HUR.03.04.0	Simplified Subtitles	Simplified subtitles may be useful for users with the need of easy-to-read texts.	COULD	ES (CCMA): ST
HUR.03.05.0	Immersive Subtitles information	Subtitles are always visible somewhere on the screen, whether the object they represent is visible on the screen or not.	MUST	ES (CCMA): ST
HUR.03.06.0	Playback of 3D audio	Audio is presented as “3D audio”. This may be e.g: • via a suitable surround sound speaker system (preferably including height speakers) or • via a binaural signal played back via headphones	MUST	UK: AD
HUR.03.07.0	Different voices for main and secondary actions	Two voices should be used: one for the main action and one for the secondary actions.	SHOULD	ES, PL (UAB): AD

Table 2-Home user requirements

3.3. Professional user requirements

As a result of our user research actions, a first set of functional and non-functional professional user requirements was created. These were developed on the basis of the participants' inputs and their feedback on the professional user scenarios we created in task T2.1, and taking into consideration the experience, insights and lessons learned of the professional users, we conducted the focus groups with. All ImAc pilot partners have been involved in these activities. The resulting requirements were codified in natural language form output documents, subsequently organised as an elaborate list of professional user requirements and streamlined with the help of ImAc's technology partners. As for the home user requirements, we have applied the formatting that we defined in section 2.1.5 for listing the professional user requirements here.

Req. Nr.	Title	Description	Priorisation	Related Pilot(s)
PUR.01.01.0	Watch low-res preview content	The user must be able to watch the preview content in low quality as flat folded or flat unfolded view	MUST	GER, ES: ST, AD GER: SL
PUR.01.02.0	Watch hi-res preview content	The user must be able to watch the preview content in high quality as HMD view	MUST	GER, ES: ST, AD GER: SL
PUR.01.03.0	Navigate preview content by angle	The user must be able to watch content and to navigate it with the help of keyboard shortcuts, scroll wheel and input fields by angle.	MUST	GER, ES: ST, AD GER: SL

Req. Nr.	Title	Description	Priorisation	Related Pilot(s)
PUR.01.04.0	Navigate preview content by frame	The user must be able to watch content and to navigate it with the help of keyboard shortcuts, scroll wheel and input fields by frame number.	MUST	GER, ES: ST, AD GER: SL
PUR.01.05.0	Navigate preview content by time	The user must be able to watch content and to navigate it with the help of keyboard shortcuts, scroll wheel and input fields by time code.	MUST	GER, ES: ST, AD GER: SL
PUR.01.06.0	Navigate preview content by audio	The user must be able to hear 360° audio together with graphical elements that inform about the orientation of the current view	MUST	ES: ST
PUR.01.07.0	File operations	The user must be able to perform file operations such as import or export files (video and ImAc files)	MUST	GER, ES: ST, AD GER: SL
PUR.01.08.0	Add subtitle text	The user must be able to produce subtitle texts by (1) inserting text with keyboard, (2) symbols from a library and adding it all to the video with the following ordered steps: 1) defining vertical and horizontal position and font size 2) defining timecode and duration 3) defining font colour 4) defining viewing angle	MUST	GER, ES: ST

Req. Nr.	Title	Description	Priorisation	Related Pilot(s)
PUR.01.09.0	Add sign language video	The user must be able to add sign language video with the following ordered steps: 1) separating specific SL segments if necessary 2) defining dimensions of SL video 3) defining vertical and horizontal position 4) defining timecode 5) defining viewing angle	MUST	GER: SL
PUR.01.10.0	Create AD preview content	The user must be able to feed a written AD script and start a text-to-speech process.	MUST	PL: AD
PUR.01.11.0	Add AD preview audio to video	The user must be able to add a text-to-speech AD result to a video as additional audio asset.	MUST	PL: AD
PUR.01.12.0	Preview video and AD audio	The user must be able to preview the video together with the added speech-to-text AD asset.	MUST	PL: AD
PUR.01.13.0	Add audio description	The user should be able to add a number of simultaneous audio descriptions to different sections of the visual scene.	MUST	ES: AD
PUR.03.01.0	Accessing content for ImAc enrichment	The user should use a GUI for accessing omnidirectional (video) and ImAc content files (ST, SL video, AD) for selecting and uploading/downloading files.	MUST	GER, ES: ST, AD GER: SL

Req. Nr.	Title	Description	Priorisation	Related Pilot(s)
PUR.03.02.0	Checking content for ImAc enrichment	The user should be able to check ImAc media regarding: • file name • file size • content type • integrity • assignment	SHOULD	GER: ST
PUR.03.03.0	Assigning content for ImAc enrichment	The user should be able to assign ImAc files to omnidirectional media files	SHOULD	GER: ST
PUR.03.04.0	Triggering content packaging and distribution	The user must be able to trigger and monitor the packaging of open and closed ST, SL and AD enhanced media items	MUST	GER: ST, SL
PUR.03.05.0	Checking state of content packaging and distribution	The user must be able to check the state of packaging of enhanced media items.	SHOULD	GER: ST, SL
PUR.03.06.0	Locally retrieving the packaging result	The user must be able to direct the packaged ImAc result as local retrieval.	MUST	GER: ST, SL
PUR.03.07.0	Directing the packaging result to a different resource	The user must be able to direct the packaged ImAc result forwarded to a different resource.	MUST	GER: ST, SL
PUR.03.08.0	Configure the signalisation of ImAc services	The user should be able to configure signalisation of ImAc content for distribution and playback.	SHOULD	GER: ST, SL

Req. Nr.	Title	Description	Priorisation	Related Pilot(s)
PUR.03.09.0	Monitor the signalisation of ImAc services	The user should be able to monitor signalisation of ImAc content for distribution and playback.	SHOULD	GER: ST, SL
PUR.03.10.0	Defining presentation settings	The user should be able to define the presentation settings which should be offered to the end user	SHOULD	GER: ST, SL

Table 3-Professional user requirements

4. CONCLUSION

For omnidirectional media services to be accessible, they must fit into the established media consumption behaviour and the environment of the home users. Also, professional users have experiences and best practice gained while producing accessible services. They expect their established workflows to be continued and complemented by any necessary steps for working on 360° video.

By looking closely at how people use omnidirectional media, we identified that they are not yet too familiar with it, and tend to ask for multiple options for adapting the accessible content. One thing is clear: **home users** want to find the accessibility functionality, including adaptation options, that they already know from TV and VoD, and they don't want to be overwhelmed during the already very rich omnidirectional media experience. But they must be aware of where things are happening, of where speakers are positioned in the video, so that they can easily turn around and keep track. They **want to be immersed, but not feel lost or overwhelmed by added information.**

The requirements of home users have naturally the most important influence on how services must be created. Looking at the workflows of access services producers, we can clearly see a well-established order of activities to produce and enhance audio-visual media towards more accessibility. Adding subtitles, audio description or sign language interpretation to audio-visual media is in principle not uncharted territory, but in the case of omnidirectional variants it adds **a new level of high complexity to the work of professional users**. The addition of speech, audio or sign language is no longer purely time-based but now includes a spatial dimension that adds a lot more work while navigating, authoring and reviewing accessible 360° media.

5. REFERENCES

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